

INTERVIEWER: This is the 150th anniversary interview with Robert Everett. And let me start by asking you where you were born.

EVERETT: I was born in Yonkers, New York.

INTERVIEWER: What was it like growing up in New York?

EVERETT: Yonkers is a suburb of New York. And we had a house. It was a kind of a normal thing, I guess.

SPEAKER: And how about your family? Tell me about your family.

EVERETT: My father was a civil engineer. He designed waterworks very successfully at his offices in New York City. And I had one brother-- a slightly older brother. And I had a kind of a checkered educational career because my brother was very ill at one time and another. And that result was that if I went to school, I would come back with a cold, and he would get very sick. And as a result my father took us both out of school. And we were tutored at home until the seventh grade. After the seventh grade we went to various little private schools. So I went to six different private schools, one each year.

INTERVIEWER: So what was that like? How do you think that impacted your education?

EVERETT: I don't think it impacted my formal education in any way, because it's all in the books. And I was a good student and I learned everything. I think it had a big effect on me socially, but nothing desperate or anything of that sort.

INTERVIEWER: Do you want to talk about the impact socially?

EVERETT: Since I went to so many schools, it was a different group every time. So I was lacking in long-term friends, things like that, which probably affected my social development. It led me to be more shy than I would have been otherwise, but it didn't really do me any harm.

INTERVIEWER: Do you think that background had any impact on your academics?

EVERETT: The part-- the fact that my father was a civil engineer, and on weekends we used to travel around and look at the various systems he was working on-- of which a number were within an easy driving distance-- and so I got used to such things. I loved to go and look at all of the steam engines, and power plants, and pumping stations, or things of that sort. So I grew up expecting to be an engineer. My rebellion was to be an electrical engineer instead of a civil engineer. And so I think that had a big effect on my career and what I studied. I think I was fortunate that I was a good student so I didn't have any trouble.

INTERVIEWER: So what drew you to Duke?

EVERETT: When it came time to go to school, up to college, I was suffering from some sinus problems. And the doctor said that I would probably be better off in the South than in the North. So my father and I looked at the southern schools and picked Duke as what seemed to be most promising, and never regretted it.

INTERVIEWER: What drew you to electrical engineering?

EVERETT: I don't know, I was just interested in it. I read lots of books and magazines and so on. And I thought electrical engineering was a coming thing. This was a drawback in the Thirties. So, I don't know, I just decided I guess. I don't remember worrying about it very much.

INTERVIEWER: So after you graduated from Duke, what brought you to MIT for a Master's degree?

EVERETT: Two things were going on: one was that the war had started, and the other was that we all were looking for jobs. And various people came around and interviewed us on campus. And a man who was famous for his recruiting skills came from General Electric. And I was a very good student. I stood at the top of my class. And he thought I should go to graduate school. It never crossed my mind before. So I went home and talked to my father about it and he thought it was a good idea. So GE had a cooperative plan-- which I guess they still do-- in which you alternated semesters at MIT and at General Electric. So I signed up for the cooperative program. And I came to MIT in June of 1942. And the first term of our semester was supposed to be at MIT, and I never got to GE.

INTERVIEWER: You just came here and stayed?

EVERETT: Yes, I went to work as a graduate student in the Servomechanisms Laboratory-- which is run by Gordon Brown-- and I worked for Jay Forrester. And so really I've only had one job my whole life. I grew out of that.

INTERVIEWER: When you first got to MIT, what was your impression of the environment, the culture?

EVERETT: I don't think I had a very good impression. And it's not that I had a bad impression of MIT, it's just that I didn't have much of an impression. Because as I said, the war was on and it made things very different. I came and moved into the graduate house and took a couple of courses. And I did not get mixed up in the social aspects of MIT. And shortly thereafter-- about six to eight weeks after I got here-- it seems like a good idea to go to work in the labs. And I was offered a position as a graduate student in Servo Lab and I took it. So then I lived in what was the sub-life of the Servo Lab. Which it was full of fine people, and good work, and interesting, and everything. So the rest of MIT, I never really experienced at that time.

INTERVIEWER: So all of the people at the lab were living together?

EVERETT: Oh no, but we worked together and we worked long hours in those days. And then we did things on the weekends. We worked all day Saturday, so we did things on Sunday.

INTERVIEWER: So this was your separate little social group?

EVERETT: Yes.

INTERVIEWER: Okay. Did the lab seek you out or did you seek out the lab?

EVERETT: I think I had discussions with the people at MIT about what I should-- whether I should continue as a full-time student, or work. They felt I should go to work someplace. And I think they told the Servo Lab that here was a fresh hand that they might find useful. Jay came around and talked to me and decided he would take me on, and I never talked to any other lab.

INTERVIEWER: Can you tell me about that first meeting with Jay Forrester?

EVERETT: I was 21 years old, he was 24-- obviously a very bright, energetic, self-confident individual. And it was not a very long conversation. I think he would have taken anybody who was reasonable. So we just had some conversation about what I had done, and what I had studied, and so on. So my impression was that this was a really great guy to work for, and I was sure right.

INTERVIEWER: So tell me a little bit about the work that you started doing when you joined the lab.

EVERETT: I went-- Jay was working on a stability control to stabilize radar amount for ships. Search radars at that time-- which were to look for things fairly close to the level of the ocean-- had the problem that the ship would roll and pitch. So either you needed a radar which had a very high vertical beam-- so as it rolls and pitches, this horizon would still be within the beam.

Or you could get a much more effective, powerful radar, if you could point the beam. So we needed a device which would tell you where the horizon was and move the radar antenna to match. And we were working on that. And I was working on the hydraulic servomechanisms that moved the antenna mount.

INTERVIEWER: Okay. You did eventually perfect this.

EVERETT: We eventually made it work. And it went into production at Westinghouse Air Break. And a few sets came off the line and were put on some big carriers. But the war ended and everything stopped. Really everything stopped-- they just-- bing. And so no more were made. And the ones that were on the carriers were used for a few years but then they were orphans. And so they were taken out and replaced with something else. So as far as my effect on the success of the United States in WWII is concerned, it is too small to measure.

INTERVIEWER: When you say everything stopped, do you mean all the funding ended? Everything?

EVERETT: Yes, they stopped the production, they stopped funding things-- just bang. I remember Raytheon was building the radar, so we were working with him on this thing. And at the end of war they just stopped and told everybody, you're free to go. And then they hired back the ones they wanted.

INTERVIEWER: So no one at this point was sort of looking ahead to the fact that these were developments that would be needed in the future?

EVERETT: I can't say that nobody did. But I think all the attention of all the people that I was officially familiar with, I think I knew what they were thinking. They thought that we were, every ounce of attention was on the war and getting things done. And the amount of thinking that was going on about what had happened after the war was very close to zero.

INTERVIEWER: So what did you do after that? You stayed at the Servomechanism Lab?

EVERETT: I stayed at the Servomechanism Lab. Actually before the war ended we started working on a new program because this one was essentially done. It was going into production. And there was a thing called a Special Devices Center in the Navy, run by an extremely well-known man named Luis de Florez, which was building simulators of one sort and another-- aircraft simulators.

And somebody had the idea that if you had largely analog computers, which were twisted and tweaked to make it look like the existing airplane that you were simulating. Somebody had the idea that if you could make a sufficiently flexible machine, it would be able to act like an airplane you hadn't built yet, based on wind tunnel data, and calculations, and things of that sort, or the minimum to simulate modifications to existing airplanes. So MIT, and Servo Lab, and Jay got interested in that. That program started and I was working for Jay on the servos for the radar and after that I worked for him on the things for the simulator.

INTERVIEWER: And how did Whirlwind get started?

EVERETT: We started out expecting to build an analog computer to go with the simulator. But it became clear that it was very difficult to get an analog computer with sufficient flexibility, accuracy, precision, and so on, range of action to solve the problem. And Jay talked to a man named Perry Crawford, whom he knew, who told him about digital computers.

So he looked into that and he went off to a meeting, or one thing or another. And one day he came back and he got us all together and he said, we're now building a digital computer. And we said good, what's that? And from then on we were building a digital computer for the simulator. And in the course of time, the digital computer and its applications outside of simulation, became so apparent that it used up all the effort. And the simulator was never built. In fact, it was never developed.

INTERVIEWER: Can you tell me more about that? Maybe you could walk me through a little bit. How did you start to realize that you were on to something really big?

EVERETT: In the first place, I assume that Jay Forrester is being interviewed, or has been interviewed?

INTERVIEWER: I actually did the interview, yes.

EVERETT: You, did?

INTERVIEWER: Yes, I did.

EVERETT: So, he's the one who really knows. But I'll tell you what I remember, I know. It was quite clear that computers had a tremendous future. And first of all we worked on a computer which was based on the thinking at that time, which was a serial type computer. It was clear that that didn't have the performance, so we switched to building a parallel computer. And in 1947 I prepared what we call the block diagram, or what would be called the architecture for the computer. And we've started thinking about other applications. This led to writing a series of reports. One of which was on a communication system which was guided by the computer. Then we added a report on how you would use it for air defense of ships-- we were working for the Navy. And we thought of lots of other things you could use it for.

We-- the difference between our group and all the other groups in the computer business was they were working on what was known as number crunchers, which are machines to solve differential equations and things of that sort. And for running business processes. And we were thinking of things that were really real-time control. And that put a different emphasis on it and resulted in a very different computer than the other groups were working on.

INTERVIEWER: And how did Whirlwind turn into the Digital Computer Lab?

EVERETT: Whirlwind was supported by the Navy. And the Special Devices Center disappeared and became part of the Office of Naval Research. And the Office of Naval Research was an outfit who primarily gave small grants to college professors to do very fundamental work. And it was a great thing. But here was this strange body that they inherited because they had created-- that they inherited which was spending \$1 million a year, or something like that-- and which was run by a bunch of engineers, not by a bunch of faculty members, or physicists, or mathematicians. And so, this led to a period in which there was continual argument about whether the program should continue. And throughout this was the support of the MIT people as well as Jay and the Servomechanism Lab people.

We continued to get enough money to really get the thing together. But then the Navy announced that it was just going to support some continuing operation. Fortunately for us, air defense became a big problem. The Russians built a nuclear weapon far sooner than expected. And they had aircrafts which were copies of some of our aircrafts which were capable of reaching the United States on one-way missions. And this suddenly became an enormous priority. And, well you probably heard all of this, but I'll go over it anyway.

A fellow named George Valley, a professor of physics at MIT was an important man in the Radiation Laboratory during the war. He became interested in air defense. He was a member of the Air Force's Scientific Advisory Board. He was made head of a committee to look at air defense. And he became-- he decided he needed lots of radars, particularly small radars to cover the problem of the spherical earth. And so we needed a processor of some sort. And here was Jay with a processor, a computer, but without any support. And here was George Valley with a need for it. And this-- the two were introduced, I believe by Jerry Wiesner, and that became the Sage system ultimately. So it was a close-run thing.

Now, we had moved out of the Servo Lab up to the street to the Barta building. Which is still here, doing others things. And we still were legally and formally a part of the Servo Lab, because a lab had to have a faculty member in charge of it. And Jay was not a faculty member, in fact he was not a faculty member let alone the head of a legal laboratory. So Gordon Brown was still nominally in charge. And he showed up about once a year. He had complete faith in Jay which shows how wise a man he was. So we were essentially a separate organization anyway. So all this process resulted in creating the Digital Computer Laboratory and then all of the Lincoln Laboratory. And most of the Digital Computer Laboratory people went to Lincoln, but some stayed on the campus.

INTERVIEWER: So what was the thinking of-- why the move to Bedford?

EVERETT: I think the move to Bedford was based on two things: one was that this laboratory was going to be a big thing and needed a lot of space and buildings, which were just not available in Cambridge. The other thing is that the Institute was interested in getting the classified work off the campus. So this meant that by this process, you built this facility out in Bedford, Lexington. And you put this new, large laboratory out there, and it worked out fine. It was went-- it was built on an Air Force base with Air Force money. And that was a good thing from MIT's point of view.

INTERVIEWER: Why was it that MIT wanted the classified work off of the campus?

EVERETT: I-- I was not privy to the discussions of that matter which carried on at a very high level, I assume. But I can understand why they didn't want it. Because during the war, I mean, the place was full of classified material. Especially the whole of MIT was working on various aspects of that. So now the war was over and we go back to teaching school, doing research, and so on. And obviously classified activities created problems of clearances for people, separation of this group from that group, guards and badges, and all that sort of stuff. And I think the Institute really thought they ought to clean it up. And I think a lot-- when I say the Institute, I'm sure it was the faculty, as well as the administration-- thought this way. And the faculty, quite reasonably, thought this way. Why do they want all this multi-million dollar, God knows what, going on in their bailiwick.

INTERVIEWER: So you moved over to head Division 6 at Lincoln Laboratory. And that was sort of the beginnings of-- is that when it became Sage?

EVERETT: No well, first of all the work continued at the Digital Computer Laboratory. And we built all kinds of additional displays, and storage devices, and connected it up was radars, and so on, to demonstrate what was going on or what was possible-- writing reports on this whole sort of thing.

And it was not called Sage at that time, but the Air Defense System, or something like that. And I guess the Air Force asked MIT to take on this larger job. And the Institute said well, we'll do it. But we first of all want a study made of whether this is all the right thing to do. And that was the Charles Study. And the question of whether-- as I understood it-- the question of whether this was the right thing to do was given to George Valley, who was one of the creators of it. And after careful thought, he came out and decided it was a good idea. So the Charles Study said it was a good idea, and MIT said it was fine, and that enabled it to go and that led to the creation of Lincoln.

Now, Lincoln included not only the work we were doing, but they swept up other classified material, work that was going on on the campus and put it in it. And we also got some stuff that was working-- being worked at the Air Force Cambridge Research Center. So this made a large laboratory with many divisions. And the Digital Computer Laboratory essentially became the Division 6. And it was headed by Jay, who was the division head and I was the associate division head. So for a long time we continued working where we worked. Lincoln didn't have any buildings. They, in a very souped-up process, built one and got the thing started out in Bedford. But the rest of the buildings took a while to build. So we didn't have to move physically out to Lincoln until a couple of years after it was formed.

INTERVIEWER: Was there-- were you doing other projects in addition to the air defense system-- you specifically?

EVERETT: We were doing-- we were working on other things. We did some work on air traffic control for instance. And the machine was being used by other people on the outside. This was, in part, because of our arrangements with the Navy. But part because we've got this thing which now is very, very flexible. You can do almost anything. So there were people from the Institute and other places that came and brought problems which our people worked on. Such things as somebody came around and he had a problem with the UHF TV sets-- TV stations-- which were new. They needed more channels, so they went to UHF. Now there were many more of them but they had interference problems. And there was a set of rules about how far you could be from one of them that was at the same frequency, or twice the frequency, this whole set of rules.

And the problem was, how did you lay these things out? And they did that by using pencil and paper, of course. So this fellow came by and he had this problem and it was interesting and some of the guys wrote a program for laying out UHF TV sets. I don't bring that up as an important thing because I don't know that it really had any effect on what happened, but it was an example of how widespread their interest was.

INTERVIEWER: At the time that you were working on the air defense systems, what impact did the political climate of the times have on the work that you were doing?

EVERETT: Because air defense was such an enormous problem-- I mean, the survival of the country was at stake to some extent-- I think that as far as political support was concerned we had all we needed. Secondly, the Air Force was new in those days. It was only formed out of an Army Air Force, in I think 1946, or something like that. And so the Air Force had an enormous flexibility. It had an enormous ability to make decisions. They decided to do something and actually do it, get money, and work directly with the Congress.

INTERVIEWER: Is that because it was smaller and less bureaucratic?

EVERETT: No, it was because during the war, the encumbrances-- the bureaucratic encumbrances of government had disappeared. And it took years to put it back in the condition it's in now. But everybody had a lot more flexibility. A lot of great things were done during the war. And you got scientists, and you got engineers, and you got military people, you got money and look what you could accomplish. So there were-- although the war with the Germans and the Japanese was over, the Cold War with the Russians was coming. And so as far as I know, anything-- once the Air Force made up its mind to build Sage-- anything we asked for we got. That was a remarkable situation. And one that one had to be very careful not to assume is normal, because it's not.

INTERVIEWER: It's not like that now.

EVERETT: It's not like that now.

INTERVIEWER: So I'd like to take a little-- a couple of minutes and just talk a little bit about the significance of the Whirlwind, the digital computer, in some of the various areas. You talked a little about air traffic control, but it became important for weapons systems too, didn't it?

EVERETT: Oh yes , the air defense system is an information system. And what became obvious is that everybody has information systems. People have their own information systems. Companies have information systems, the government does, all the agencies. So everybody has an information system. And the way it has happened is that to a first approximation-- maybe even better than a first approximation-- everybody's information system is based on a digital computer, or many different digital computers. So it became obvious that air defense was not the only job. Particularly as the things move fast in those days. The ICBM appeared on the horizon and raised questions about whether the air defense system was all that important. But the ICBM business required computers for control, for guidance, and things of that sort. And they were all digital computers. And so the whole business of information systems, Sage was the progenitor of, the beginning, the first one.

INTERVIEWER: Do you know when it was-- when it was brought into the banking system? Do you know what it was that changed when computing started to go into banking? What was different?

EVERETT: I did not have anything particularly to do with the banking system. But it was an obvious application, and Eckert and Mauchly were talking about such things. And those were just keeping books. And it enabled them to do that much faster. You know back in those days if you had a checking account, you could get a checking account and it'll cost you \$0.10 a check, which would be about \$1.50 or \$2. Can you imagine paying \$1.50, \$2 to write a check? I mean there wouldn't be any checks. But now you can get a checking account with no charge at all. And that's because all this stuff is done digitally instead of by hand. And ATMs wouldn't work without all this. And not only the computer itself, but the communications and systems involved, and all that makes such things possible. So our whole financial processes are-- you might say well, maybe if there hadn't been any computers there wouldn't have been any depression or recession last year-- but we had a pretty good one in 1929 and there weren't any computers at all. I don't think that we caused it. We might have made it a little easier to do.

INTERVIEWER: So you've got-- it must be pretty satisfying to think about something that you worked on changing the way defense is done, and air traffic control, and banking, and reservations, and record-keeping. Did you know when you were working on it, that it was going to be able to do as much as it's turned out to do?

EVERETT: We didn't spend very much time thinking about it because we had lots of things to think about. But sitting around at lunch or something we talked about things. And we thought of lots of these things that are going on now. You know, you must know from Jay about his study that we did of how much-- that laid out the growth of computers and weapons and all kinds.

INTERVIEWER: I don't think he talked about that specifically.

EVERETT: He didn't? Oh.

INTERVIEWER: We had to do system dynamics and we had a lot to cover.

EVERETT: Yes, I think as I recall-- my recollections are not very reliable these days-- is he was asked by either Killian or Stratton about the future of this thing and he came back and laid out this big chart of various applications and various parts of it and what has to be done. And we filled it all out estimating how much time and money would be, and people would be required. And we made this big chart, which is available. And it showed many things have gone on. It wasn't complete. We don't know now what's complete. It's still growing and changing in wonderful ways. But that's a digression. You asked me whether we thought that, and yes we thought of such things. And it's a great pleasure to be able to look back on it. But you know, the thing you have to be careful of is that to think that it wouldn't have happened without you, because it would have. It might have been different. The evolution of information systems would have been different, but it would've evolved, and the fundamentals were there.

INTERVIEWER: So how did the work with Sage wind up leading to the formation of MITRE?

EVERETT: Sage was the result of this agreement with MIT-- between MIT and the Air Force-- to work on this air defense system. And MIT agreed that they would follow it until the completion of the first segment of the system. Sage was supposed to be-- and it actually did-- ring the United States. And there were eventually 20 odd direction centers built. But MIT's agreement was to follow it until two direction centers and one combat center had been built. They didn't want to have us a lifelong commitment.

So when we came to the point, it was about 1956, when one could see that this was happening and what it was like. The question arose-- let me back up a bit and say-- it became evident to us, even more than we thought originally, that Sage was not something that you built, delivered to the Air Force, signed a check for it, and then you went off and you did something else. Sage was a living thing, which changed all the time-- as weapons changed, and threats changed, and tactics changed. And it's not so much that the physical hardware pieces changed, but the software changed. So suddenly, it gradually sank in on everybody that there had to be a continuing operation to look after Sage and control its evolution and the changes in the software to make sure that it all worked and so on. And so now who was going to do this?

INTERVIEWER: MIT had said they weren't interested?

EVERETT: First they asked MIT and MIT said no. And I thought that was quite entirely appropriate myself. And then they went and asked various other industrial organizations which were involved in Sage-- of which were many. And they couldn't work that out because none of them would have sit still for having one of them in charge. They asked the telephone company and the telephone company said, no, we're not even happy about Sage. [INAUDIBLE] of it. And so you go back and tell MIT to do it.

So they went back and talked to, I think it was Stratton and he said no. But what they would do is spin-off the piece of Lincoln that was working on Sage into a new nonprofit organization which would carry on the responsibility. And that was MITRE.

INTERVIEWER: And what made you decide to follow it and go for MITRE?

EVERETT: I'd been working for Jay for 14 years until 1956. And he announced he was going back to the campus and be a professor. He thought all the good and interesting things with computers had been done, and he was going to do something new. It was an amazing-- when you look back on it-- decision on his part, quite Jay-sian I think. Anyway so I was surprised because now I never had to worry about what I was going to do, because I was going to do work for Jay and he was going to do all kinds of interesting things. So I ended up as head of the division and head of the Sage activity.

So when this took place, I had to question did I want to go with a new organization? And my feeling was, if it was only air defense, it was probably not worth it. But we understood at that time the enormous possibilities for computer-based systems, for information systems for the military, and others. By that time we had gone back to working on air traffic control. So we decided-- I got together with my guys and we talked this over at great length-- and we decided that there was an enormous future for this. So we went to MITRE not to do air defense, but for the future of information systems.

INTERVIEWER: Institutions like Lincoln and MITRE, why do you think they're so important?

EVERETT: They're what once was called FCRCs and are now called FFRDCs, federally-funded, something or other, research and development centers. And their characteristics are that they are nonprofits. That's not so because you don't want to make money, but because it enables the company to be undriven by the profit, by its needs to raise money, and earn money, and pay dividends, and all that stuff. Otherwise profit-making companies can't exist. And at the same-- and that enables the company to get a long-term relationship with a government agency. Which ordinarily sometimes happens, but they don't ordinarily do. And a nonprofit is part of the agreement. It's also, we don't work for commercial organizations, except in certain specified ways. And we don't compete with people except for FCRs, they like businesses.

So this means that this is a restricted company which can work with the government agency. Now the real problem is that the government needs qualified people. And in technical matters it needs highly-qualified, technical people. But originally-- my story is almost as long-- when they formed the government, the first gang that got in, hired all their friends. And then after a while the people threw out the first gang. And a new gang came in and fired all of the gang and hired all their friends-- new friends. You can't run an organization like that if you require great skills and dedication and so forth.

So the solution was to form civil service, which enabled you to build up an organization which was not subject to a spoil system, but had the difficulty. And now you couldn't fire anybody for any reason. So these special organizations I'm talking about, they can get bigger, or they could get smaller. If you want them to do some new thing they will grow that capability. If you don't want some capability they'll get rid of it. In other words it can act like a private company with the flexibility and so on. But at the same time it can do the work that really is what the government needs. And that's been highly successful.

INTERVIEWER: Since you were more interested in other applications of computing outside of just Sage-- and that was one of the reasons you decided to go with MITRE-- I'm interested in the relationship between the government oversight and actually running MITRE. Were you able to sort of lead the government into the areas that you were interested in pursuing?

EVERETT: It was kind of a joint thing. We had a lot of influence on where they went. And of course they had their-- there was needs. Which they felt, and which we helped them to understand. So we didn't work just for the Air Force, we worked for all parts of the Department of Defense. We worked for all parts of the government, for that matter. I think that the important thing is that it's a relationship with the government. Because a private organization can build an in-house capability, or set up the relationships with a community, which are necessary to get. They don't have the restrictions on them that drive the government. The government has laboratories. The Air Force has laboratories-- PODs full of technical organizations. But they can't-- they don't have enough flexibility to make those organization grow, and change, and shrink, to fit their needs.

So that's the ideal customer for an FFRDC-- is somebody has needs but is unable to provide on them themselves.

INTERVIEWER: How did the government oversight-- how did that work in terms of day to day decision making? Do you feel like most of the decisions were made at MITRE and then approved, or were they made collaboratively with the government?

EVERETT: The decisions as to what to do, what to buy, that is, do we want to build a system of this sort to solve this problem? That's largely the customer's problem. We could help him understand it, and understand what can be done and not what can't be done, and help him to decide. So that's the place where we can assist but fundamentally that's his decision. And the government has to put up the money, and that's the government's decision.

Now once you get the thing you have to design it. We have usually a large measure of influence on that. This is ranging from actually designing things, to having a large amount of influence on how the contracts are let, what the specifications are, and things of that sort. Now I want to add that there always is tension between two groups. And there's always tension between a MITRE and its government agency.

But another thing that happens here is although when they come at deals with MITRE, it doesn't have to worry about our doing strange things because we need the money. But at the same time it can't kick us around like it kicks around the industry. You know they can tell them to go away, tell them to bid on something, and then decide not to build it. They can ask them to get twice as big and then next week get half as big. I mean they do things like that in the industry. They can't do that to us because we don't make any money anyway. So the people that run it get a salary and they like to have a salary. But the fact remains, we're pretty independent. And that's part of the deal. Because it's only by being different from the government that we can be useful to them.

INTERVIEWER: So in the years that you were at MITRE, can you talk a little bit about some of the things that were most interesting, or that you valued the most that you worked on?

EVERETT: I found-- you mean which programs? There were many interesting programs. We had a feeling that the whole military information system is one big system, which was broken up into large pieces. And then the large pieces broken up into little pieces. So in addition to finding a program like AWACS -- a fascinating program and very important -- as opposed to, say, building some control center for some particular operation, which is also important and necessary but not as fascinating as say AWACS. But all these things are necessary and we thought of them all as pieces. My feeling about MITRE has always been that MITRE is the thing that we grew. And MITRE's still doing great. That's a great source of pleasure to me although I've been retired now for 24 years-- 23 years.

INTERVIEWER: When you moved from MIT to MITRE, who came with you?

EVERETT: Essentially all of Division 6 came with me. All the people that were working on Sage did. I had-- there was, in Division 6, a group of people who'd been set aside to work on computers and data processing without being restricted to what Sage is. And that group, for their own reasons, decided to stay with Lincoln. But most of Division 2, which was running the outside parts of the Cape Cod system, and things like that, most of that came too. So we got-- we took away about a quarter of Lincoln, something like that.

INTERVIEWER: So much of the work that you've done, has to do with work that is in the public interest. And I'm wondering was that part-- was that an important personal mission for you or was that just sort of a byproduct of doing interesting work?

EVERETT: I think that I felt strongly that the military is a very important part of the United States, very necessary. And that working on it is an honorable thing to do. And that extended to where we're working on other parts of the government. You know, you don't have to like the government but we've got to have the government. And it has these problems which have to be dealt with. And I think that's a good thing to be able to work on that. But I would think that people in industry must feel the same way. The people at Westinghouse who built the radars for AWACS. The fellows working on the radar must have thought that was an important thing. And that adds to the-- good organizations need good jobs to work on. Good jobs are interesting, and important, and well-supported and clearly necessary in some way.

INTERVIEWER: You've served on a lot of boards and committees over the years. And I wonder if we could talk a little bit about what you get out of that and why you think that's important. You can talk about some-- I mean I have a long list here. But if there are some specifics that are more valuable to you.

EVERETT: You mean, why do I go off and spend my time on such things? A couple of reasons. One is they're very educational. You learn a lot about a lot of things-- technologies, needs, how the government works, operates-- and once in a while you get the feeling you did something good. The social aspects are good. These committees have many fine people in them. And when you meet at a committee, it's a different thing from meeting at work, and the interrelationships amongst the people. And you get to know them, and serve on committees. And they become friends and that's very important. So it's pleasurable, and it's educational, and that's important. So I like to go on committees. Airplanes have lost, and hotels have lost their charm for me.

INTERVIEWER: Is there-- I'm wondering if there are any particular stories that you have about any of them. I don't know, a particular connection that you made from the Defense Science Board, or National Aeronautics and Space Administration Advisory Panel, or anything? I can go through the list if you want me to.

EVERETT: No I have a few recollections. My career as geek for committees began with the Range Technical Advisory Group of the Air Force which was a subset of the Air Force Scientific Advisory Board. I was not on the board at the time because this was back in the '50s. The range-- the Air Force built a range that ran down the islands in the Caribbean for things fired out of a [INAUDIBLE] down there. And we got together-- and a gang of us, this committee-- and went down and visited all the sights, and ended up on Eleuthera and we sat on chairs on the beach at Eleuthera and decided what to say in our committee report. And in some ways that's the high spot in my career, is sitting on the beach in Eleuthera, figuring out what to say about the range.

We looked at the air traffic control with a contract with the radio technical something or other agency, which still exists, I guess, and the application of computers which is an early thought. This was before the machine was built. And when air defense came along, that disappeared. But when it-- we came close to having the Sage thing out of the way. I took a small group of people from Division 6 and put them back to work on air traffic control. And one of the things that was looked into was whether you should use Sage for air traffic control.

And that led to-- this was supported by the Air Force, which likes air traffic control because they fly around all the time. And so they were paying for this work, but then the FAA took it over. And we were working for the FAA when MITRE was formed. And that has continued to this day. We still have a sizeable group working for the FAA on system engineering the air traffic control. And that's been an interesting thing to watch that change, you know. It's been interesting to watch everything change, but to flight strips to the new system that they're building based on GPS-- it's very, very interesting.

INTERVIEWER: How has it been being an electrical engineer with so much management responsibility?

EVERETT: That's what happens to engineers. They start out actually working on something and then if they're successful, they spend more and more time dealing with people who work for them, or for whom they work. And if they get successful enough, they hardly ever design anything again in their lives. That's one of the things that being on committees would do for me. I could get on a committee which had a particular problem, and I could work on that problem. This was a privilege which was rarely come by at the MITRE corporation, because there were thousands of people working on these hundreds of projects and once in awhile you get to look at something, but you can't ever spend enough time on it to be a major contributor.

INTERVIEWER: You must not feel as much of a sense of accomplishment when you're managing an endless stream of projects as you do when you actually get an assignment and complete it.

EVERETT: That's true but I've always looked at it as MITRE was a thing that I had a big hand in creating. And that, it required deciding what it would do and what it would be like, and actually building it and picking the pieces, and picking the jobs, and so on. So it changed from a piece of an airplane, or a communication center, or digital computer or something, into more of the design and maintenance of the MITRE corporation.

INTERVIEWER: What MITRE accomplishments are you the most proud of?

EVERETT: Well I think our success is the thing I'm most proud of. We work for almost all parts of the government and they like us, they need us, they appreciate us. We help them. That's a great source of satisfaction. And it's full of good people, which is also a great source of satisfaction.

INTERVIEWER: You were also the creator of the Whirlwind Projects Collection.

EVERETT: Was I?

INTERVIEWER: I thought you were. That's what I read.

EVERETT: Whirlwind Projects.

INTERVIEWER: I guess to amass and collect the papers.

EVERETT: There were-- there's the story of the Whirlwind equipment and the story of the papers. When we left Lincoln for MITRE, we had all the Whirlwind papers and we took them with us. Lincoln didn't seem to have any interest in them. And MIT didn't seem to have any interest. In fact, there was an occasion when I asked MIT if they wanted the papers and they said no. That was a long time ago. So we kept them. And kept them in the archives and people who wanted to do something like Whirlwind could come and we'd give them access to the papers.

Up until recently, that's the way it stood but then the deal was made between MITRE and the Institute to turn the papers over to the Institute where they would be much more available. We turned some of the papers over to the Smithsonian, but they didn't seem to want all of them. So that was done. And also really at the instigation of Jay who told me that he had had all of his system dynamics papers put on CDs. And why didn't we do that with the Whirlwind papers? So we did. That is, I suggested it to MITRE because I was no longer at MITRE. Although I am still an honorary trustee for MITRE, that is. But there's still Whirlwind people at MITRE. And still people at MITRE who think fondly of Whirlwind as one of the reasons that MITRE exists. And so they decided to do that and they did it. And they arranged to transfer the papers to Lincoln-- to MIT. And I thought that was fine but I didn't have much to do with it.

About the equipment: we shut down Whirlwind, I think it was '56. And it still belonged to the Navy. And Bill Wolf, was a guy who used to work for us one time, made a deal with the Navy to get the computer. And that deal included making it available to the Smithsonian when he didn't need it anymore. And he had a building out in Concord and he broke down the computer and moved it out to Concord and made it work.

We were surprised. We thought that by the time it'd been through that, it would probably have enough bad connections in it that it would be a hard sell. Bill was smart. He hired a whole bunch of old Whirlwind computer technicians who had been maintaining the thing for years and knew it's every nut and bolt. And he made it work. I don't know how much good he got out of it. He didn't need the processing part, which was well overtaken by orders of magnitude. But it had a lot of output and displays and things that he wanted. So he announced that he didn't want it anymore. And by that time the Smithsonian people had come around to see us. They really knew almost nothing about us. But they just dropped in to see if there was anything, and they discovered that MITRE-- that Whirlwind was the best documented computer of them all.

Anyway so they'd come around and talk about Whirlwind from time to time. They tried to make a deal with Bill Wolf. One day they had a deal-- an appointment to go over and see him at the building. They went over there and he wasn't there. So they walked around the building and they saw a window that was unlatched and they opened the window and went in and looked at the computer. And he was watching from a distance and called the police. So we helped get that straightened out.

Bill said he wanted \$100,000 to package the computer and send it to Smithsonian. Smithsonian said they weren't going to spend \$100,000 on anything, let alone a computer. So it sat there in the building. And then one day Ken Olsen, who was one of our graduates, he called me up and said Wolf had called him and said he was scrapping the computer and if Ken wanted a souvenir to come by and pick one up. So we agreed that he'd get some summer students, and some trailers he had lying around, and collect as much of it as he could. And I would get a hold of the Smithsonian and tell them what's going on. So he did his part very well, but my part was a total flunk. It was the summertime. There wasn't anybody in the Smithsonian, that I could find, who had the slightest knowledge or interest in this. So anyway, Ken rescued most of it. And it sat in the trailers for a long time. And then he put it in a warehouse and it sat in the warehouse for a long time. And Smithsonian wouldn't do anything.

So I finally said, this has got to stop. So I said, we will-- MITRE will take it. We'll go over with it, to the warehouse with Ken. And we'll pick what would seem to be a nice display for Smithsonian, and we will take it to MITRE and make the display. And then we will call Smithsonian and ask them to come and look at and see whether they like it. And if they like it, we will take it down and put it in Smithsonian. They couldn't turn down that. And that's what we did. Ken and I picked a set of pieces for display. And we took it over to MITRE. And Gus O'Brien, an old Whirlwind hand who worked for us, he made a very nice display out of it and we put it in the lobby. And the Smithsonian people came up and they were astonished. They thought this would be some amateurish thing. It was done by people who loved Whirlwind, so it was nice. So we took it down and put in the Smithsonian. And they had it for many years, but then they had changed it and made a big new computer display. I don't know how much of their part of Whirlwind is in their warehouse or not. But there were a lot of other parts of Whirlwind which ended up in the computer museum. And that vanished and turned into the Computer History Museum in California.

INTERVIEWER: You have won a lot of awards over the years. I wonder, just generally, how do you feel about winning awards?

EVERETT: It's nice. I like winning awards. I mean, they're not the end-all and be-all. But it's nice to have somebody think that you did something good, and be nice to you.

SPEAKE: How about the National Medal of Technology?

EVERETT: That was a very nice one to get.

INTERVIEWER: What do you remember about the experience of getting that?

EVERETT: My recollection is that Charlie Zraket who was at MITRE and came from Lincoln, and came from the Digital Computer Lab, in fact. And he was executive vice president of MITRE and took over as president when I left. He did a lot of work on getting that done. And the ceremony itself, we went to Washington, and went to the White House. President Bush Senior gave out the award. He was busy because something awful had happened out in California. I can't remember what it was, why he was busy. But he showed up and said some nice things and gave us all the awards. Jay and I shared this one. And it was very nice. I got a tour of the White House, had a dinner-- black-tie dinner-- very nice. I was very pleased.

INTERVIEWER: And also another big one you won was the Gold Medal Award for engineering from the Armed Forces Communications and Electronics Association.

EVERETT: I don't know, they're nice. I have them in my basement. I have an office in the basement. And they were all packed up in boxes. And my son-- my sixth son, David, the one we hope to have lunch with-- we were off someplace in Florida, I think. And we came back and he had opened up all the boxes and hung all this stuff on the walls. Which I thought was a nice thing for him to do.

INTERVIEWER: That's a wonderful thing for your child to do.

EVERETT: Yes, and I got the Fubini award for being a committee member last June. And last week I was made a fellow of the Computer History Museum.

INTERVIEWER: You've gotten the highest civilian recognition award from the Department of Defense-- Public Service Medal.

EVERETT: Yes.

INTERVIEWER: Quite a lot of accomplishments.

EVERETT: There are a lot of medals around.

INTERVIEWER: I have some questions to ask specifically about MIT. But before I get into that, I wonder in what ways do you feel like you've changed the field of electrical engineering?

EVERETT: Computers of course, have had an enormous effect. Electrical engineering now has computers. And the computers have made big changes in how engineering is done. I don't feel that I did it. But I watched it go by.

INTERVIEWER: You contributed.

EVERETT: I contributed. A lot of people contributed. It was a lot of fun. INTERVIEWER: So you've had an ongoing relationship with MIT over the years. How have you seen the institution change?

EVERETT: I got here early because we avoided the traffic jam that had been set up for us. So we walked down the main corridor and looked at the things on the walls and what not. And obviously there are a lot more buildings. There are a lot of new departments and things. MIT is a much larger size. There were six women at MIT, students, when I got here. Now they're walking down the aisles in hordes. And minorities-- Chinese people, black people-- and that's all good because we need engineers. And in my experience, women and minorities make very good engineers. Over the years, it's changed at MIT, it's changed at Duke, it's changed at the MITRE corporation. I don't know very much about-- I've kept pretty good track of Lincoln. I've been on the Advisory Committee up until last year. I've been on the Advisory Committee for I don't know how many years. And that was fun to go to Lincoln, and they'd tell you what they were doing and it was always fascinating. And you can meet the people.

INTERVIEWER: It's such a huge place now.

EVERETT: Yeah, so it was a great pleasure to be attached to it. But I think highly of Lincoln. It's a great place-- different place from MITRE.

INTERVIEWER: How are they different?

EVERETT: It's much more of a research-- Lincoln develops things, builds things. Or they may design things and have it built for them and so on. Most of what we work with is designed and built by others. And it's mostly a system engineering problem, although we have a lot of technology. That was always a problem with MITRE: a fight to get enough technology in the house. People would say well, we're spending all this money at Lincoln. I'd say, they're friends. And if you ask them a question and they know the answer, they'll tell you. If they don't know the answer they won't stop what they're doing and work on it.

INTERVIEWER: Are there-- do you have a sense of how doing your graduate study at MIT may have impacted-- either helped or even hindered-- your sort of career path? Do you see a connection between the two in any way?

EVERETT: Clearly if I hadn't gone to MIT my career would have been entirely different. I don't know what it would have been like. So, in fact I went to MIT and went to work in the Servomechanisms Lab for Jay and the Digital Computer Lab in Lincoln and so this is all due to MIT. So, does that answer your question?

INTERVIEWER: Do you have any thoughts of how, with your connection with MIT, how things have changed over the years with the students, or the faculty, or the culture, besides the diversity?

EVERETT: No, I was never embedded in the MIT culture, so I really can't say.

INTERVIEWER: Okay. When you think of Jay Forrester do you see him as-- is he a colleague, is he a mentor? What role has he played, do you think, in influencing your own career?

EVERETT: Oh, gee. He had an enormous effect on me. He's a truly amazing man. And his leadership of Whirlwind Project and Sage-- as I said there's an issue of computer history magazine, that the IEEE puts out-- which is on Sage. And in that I said if there had been no George Valley, there would have but no Sage Program. And if there'd been no Forrester, there would have been no Sage System. I believe also the statements are true. And so he's just a brilliant guy, just a brilliant guy, amazing fellow. So he taught me a lot and did a lot for me. I hope I did something for him.

INTERVIEWER: Have you been in touch with him over the years?

EVERETT: Oh yeah. We usually have lunch a few times a year or something. I still see him. He lives in Newbury Court in Concord. And I have a number of friends there. When I go up there-- my wife has a dentist in Concord and so-- when she goes to the dentist, I go to Newbury Court and visit with Jay or other people. It's always fascinating. He's amazing. You know he's 91 now. And I told him the other day when I saw him that I'd always thought he'd live forever. He said he was in favor of that.

INTERVIEWER: Yes, he was working on this, on his new thoughts about applying system dynamics to education, public education.

EVERETT: That's right. He's going to raise \$100 million.

INTERVIEWER: If anybody could do it.

EVERETT: Only Jay. He always did whatever he said he was going to do.

INTERVIEWER: What do think it is about MIT that makes it unique compared to other academic institutions? Is it something about the culture?

EVERETT: I've never quite thought of that, but I don't know. I would say a couple of things. One is that it's obviously a very senior place, full of very, very good people, which attracts very, very good students. And this leads to a feeling of pride and accomplishment, and confidence, which is probably stronger than almost any other engineering school. And I think it has a greater freedom for people to do things. It was certainly true back in the days of the Digital Computer Lab, and Sage, and Lincoln, and so on.

It's truly amazing as I look back on the amount of freedom and responsibility that was allowed for Jay and his people. And I don't know whether that's still true at MIT or not. I hope it is.

INTERVIEWER: Are there any other thoughts you have about MIT specifically, it's role globally?

EVERETT: No, I'm proud of the fact that I have a degree from MIT and that I worked here for 14 years. I'm proud of that. I have a great fondness and respect for MIT and the people in it.