

MIT 150 | A. Neil Pappalardo '64

INTERVIEWER: Today is March 18, 2010. As part of MIT's 150th Infinite History Project, we're talking with Neil Pappalardo, MIT class of 1964, and founder and CEO of Medical Information Technology, Inc. or MEDITECH. Neil is a life member of the MIT Corporation, and serves on the Corporation's Executive and Audit Committees, as well as three Visiting Committees, for mechanical engineering, the libraries, and physics. Neil and his wife, Jane are also very generous supporters of MIT, evidenced by the number of labs, fellowships, a faculty chair, and other facilities bearing the Pappalardo name. My name is Larry Gallagher.

Neil, thank you very much for taking the time to talk with us today.

PAPPALARDO: My pleasure.

INTERVIEWER: Can you please start by telling us a bit about growing up outside of Rochester, NY.

PAPPALARDO: Well, I grew up in a very small town, perhaps population 3,000, called Fairport. About 20 or 25 miles southeast of Rochester, NY. The town was split in half by the Erie Canal. And the street I lived on abutted the Erie Canal. My early childhood was pretty much spent totally in Fairport, going to a local grammar school there. The section of the town -- the north side of the town, where I lived -- everybody's last name ended within an I, O, or an A. Obviously Italians or Sicilians, in my case. The south side of the town, the people there we tended to refer to as white bread. Obviously growing up in an Italian household, you never had white bread like Wonder Bread or things of that nature.

INTERVIEWER: Can you tell me a little bit about your family, and about the influence of your parents?

PAPPALARDO: Well, again the town was where my mother grew up. In our heritage, the youngest daughter lives with the grandparents even after she gets married. So I grew up in the house that my grandparents owned. And even though my father wanted so badly to move out of town, we couldn't do that. And hence, our life revolved around, like many of the Italians in the neighborhood, around your relatives. Your best friends were your cousins. Obviously my mom and my father had many, many siblings. And hence I ended up with well over 25 first cousins, giving me plenty of opportunity to make friends with them.

My mother had worked in the family grocery store that my grandmother, of course, had run before she retired. My father, as it turned out, was the only member of his family to go to college. He became a small town lawyer. And that was the little bit about my parents.

Of course I had an older brother. And my mom's and my dad's wish, to be perfectly honest, was that my brother would become a lawyer and I would become a doctor. For many reasons, as it turned out, the influence of my mother wanting me to become a doctor -- I had a lot to do with medicine. And to this day, and still do.

INTERVIEWER: Thank you. Were there other events or influences in your childhood that impacted your career path?

PAPPALARDO: Well I guess I should point out the first I heard of MIT. One of my older cousins was getting married. And I met her fiance. This was the first time I'd ever met anybody and heard of MIT. He was a graduate of MIT, I think in the early 1950s. He worked for GE and came from the Schenectady area. It was the first time I really talked to an engineer. I was still fairly young at the time, perhaps eight or nine. And conversations with him I think he certainly had a strong influence about learning about MIT as a school that I might consider going to. But because I was mechanically inclined growing up, I asked him many, many questions about how things worked. And he clearly knew just about all there was to know in answering the questions I would ask him.

INTERVIEWER: Which leads to my next question. Was there an a-ha moment, when you realized you had an interest or special aptitude in science?

PAPPALARDO: Well, from my earliest memories, I was particularly adept at taking things apart. The gadgets that I was exposed to were mainly mechanical, and sometimes electromechanical. And I was always curious about how things worked, and therefore learned how to take things apart. I would point out I wasn't particularly successful in the early days about putting things back together. But the primary focus was simply learning how things worked. That presumably was what spurred my interest in things having to do with mechanics or electronics. Simply learning how things worked.

INTERVIEWER: And how did your parents and grandparents feel about this inability to put things back together?

PAPPALARDO: Well my mother certainly took advantage of it. Having me attempt to repair anything that broke around the house. Certainly it was very easy to repair lamps that the wires had become frayed. I even remember attempting to rewire her electric stove when some of the wires to the burning elements frayed. I don't think I was particularly successful at doing some of these things, but I was certainly given the opportunity routinely to fix anything that appeared broken.

INTERVIEWER: And how did you grandfather feel about that skill?

PAPPALARDO: I don't have that many strong memories, because both my grandmother and my grandfather only spoke Sicilian. And since in my generation, my parents believed very, very strongly that I should not speak Sicilian, and should learn to speak English only, the communication I had with my grandparents was somewhat limited.

INTERVIEWER: I understand. When did you decide you were going to attend MIT?

PAPPALARDO: I think I had decided it certainly by the eighth grade. But starting my freshman year in high school, my mother chose to take me out of the local Fairport school. And instead enroll me in a fairly new school that had just gotten started two years ago. A Jesuit high school in Rochester, NY. I would end up commuting to it daily. And as soon as I arrived there, one of the first things I sort of announced is that I would be going to MIT sometime in the future.

This didn't necessarily please the Jesuit priests who were teaching the various subjects at the school. But as it turned out, they were convinced that if they exposed me to subjects other than science, that this might influence me. And so I ended up being started in my freshman year, in a Greek honors program. Where I learned ancient Greek. I learned obviously Latin, which is another ancient language. And I learned French. I ended up in all four years at that high school not taking even one science course. The priests would tend to point out to me that if you're going to MIT, what we could teach you in science, you'd end up learning in one week at MIT. So better you should take these classical type of studies. It'll be something you'll probably never get at MIT, so it'll end up rounding your education much better. Perhaps they were right. But I never knew for a fact, other than in later times. I'm still friendly with the priests from my high school. They would point out it was part of their master plan hopefully to have me not attend MIT. And perhaps enroll at some Jesuit university.

INTERVIEWER: So were you concerned at the time, given the fact that you were committed to going to MIT, that you wouldn't be prepared to be accepted?

PAPPALARDO: No. At the time, I didn't even learn about the admission process to MIT until I first came to MIT, early in my senior year, to visit it. And in my interview in the admissions department, when they pointed out that chemistry and physics and perhaps biology were prerequisites. As well as four years of math. I'd only had two years of math. These were prerequisites to getting into MIT. I was a little surprised, and of course tried to point out the same argument that the priests had used with me. But I can learn all those things in one week here at MIT. Better I should have taken Greek and Latin and French and history. As it turned out, the admission officer simply said, "Well, I guess you're probably right. You'll probably learn these things quickly. But to be perfectly honest, if you do well in your SATs, then I'm sure you can get accepted into MIT."

As it turned out, it was the only school I applied to. In that era, you simply made the assumption that the school you applied to would of course accept you. I lucked out, obviously. They did accept me.

INTERVIEWER: In terms of your first impressions of MIT, the students, the faculty, the culture. How did that map against the preconceived notions you had about coming to MIT?

PAPPALARDO: Well I'll be honest with you. Since I had started at a new school in my freshman year in high school, starting at a new school in my freshman year in college seemed very, very similar. I didn't know anybody at MIT. As it turned out, I was the first person from my high school to go to MIT. I had no knowledge of anybody other than these were kids from all around the United States, into. Which was much different than my high school when they were simply kids from all around the city of Rochester and some of the towns around Rochester. Similar to me.

I don't remember any particular reason other than people from different states were, of course, interesting to me. Because they had a different point of view on just about every topic of conversation. I joined a fraternity immediately upon coming to MIT, and ended up living in the fraternity house for the next four years. And therefore the close friendships I had were mainly my fraternity brothers. And the conversations that I had with these kids obviously influenced me in many, many ways. Including, ultimately, trying to be an entrepreneur. Many of us would talk about eventually starting a business. And I certainly had that feeling early on during my MIT career.

INTERVIEWER: What was some of the other common ground that you shared with fellow MIT students?

PAPPALARDO: Well most of them, again, were mechanically adapt. Perhaps the thing that had interested me most was my junior and senior year in high school were spent building a hot rod, like many people in the late 50s. And of course, among my fraternity brothers, interest in cars -- building them -- was of course very important to us. I still remember very, very clearly. The car I had been building, which was a '39 Ford with a 1954 Oldsmobile engine in it. And I had left on a lot, adjacent to our house in Fairport, when I went off to MIT. And when I came back at Thanksgiving, the first time I returned home, the car was gone. My father told me he called the junk man and had it towed away. At the time, I certainly didn't forgive him. And held a grudge for many, many years thereafter. Until you become the parent, yourself, you perhaps then become a little bit more sympathetic to what my dad's point of view was.

INTERVIEWER: Were you hoping to bring it back to MIT?

PAPPALARDO: I just was hoping this would be my car than I would drive around at home or at MIT. Apparently my dad had other wishes for me.

INTERVIEWER: And what eventually drew you to physics as a major?

PAPPALARDO: Well, to be perfectly honest with you, even though I had mentioned that my cousin had married an engineer. In fact an electrical engineer. Engineering per se wasn't the immediate attraction to MIT. I wanted to become a scientist of some sort. And in particular a physicist.

I've thought about it many times and I don't have a strong recollection on why physics, as opposed to chemistry or biology or any other field of science. But for some reason physics, perhaps based on much of the science reading I had done in high school, appealed to me.

I still remember an early meeting with one of the scientists at MIT that I knew about from high school. I had first seen a TV program on cosmic rays. And one of the characters in the TV program was Bruno Rossi. Bruno Rossi was a very famous physicist who studied cosmic rays in his early years, and later on x-ray astronomy. And I remember as a freshman walking into Building 26, one day early in my freshman year. And Bruno Rossi was walking towards me. Not that he was interested in me. But I did notice him and I immediately stopped him. And said, "I remember you're from this TV program." And I'm sure the conversation lasted all of 30 seconds. But in my mind I magnified it probably to 30 minutes. And discussed much of what I knew about cosmic rays with him.

INTERVIEWER: And then there was a shift because you -- Can you describe the shift that took place when you were looking for a topic for your undergraduate thesis.

PAPPALARDO: Well first I should point out, I did enroll in the physics department. And my intention was to get my Bachelor's in physics. But quickly, you learn in physics that if you're going to be an experimentalist, as opposed to a theorist, you have to learn how to build things. And many, many of the physics majors would also take the various subjects in electrical engineering. Because that was thought to be the best experience for you if you were going to end up being an experimentalist. And I did it as well. So I pretty much did what today would be called a double major. Taking all of the required subjects in electrical engineering as well as all of the required subjects in physics. But at that time there wasn't a formal double major program that I'm aware of. And when it came time to graduate, you could pick either. It was up to me. I could say I'll get my Bachelor's degree in physics, or my Bachelor's degree in electrical engineering. It's still a B.S. degree, so it didn't matter.

But I think the thing which finally influenced me on whether I'd go with physics or electrical engineering was the thesis I did. There I picked a thesis having to do with medicine. And having to do with building a device which could detect and tabulate arrhythmias in one's heart rhythm, if you will. Arrhythmias are fluctuations in the steady beat of the heart. And this could involve me designing and constructed various electric circuits to do that.

It wasn't the first time I ended up doing something involving medicine. In my junior and senior year in high school, I also got interested in doing a major science project. At that time there was this Westinghouse science search in that era. And to enter it, you pretty much had to do a major science project. And the project I chose at the time was to develop a method to determine the rate at which a cancer grows. I ended up doing it at Strong Memorial Hospital. I actually built the equipment in high school. It was simple. I built a radiation detector. Shall I say a Geiger Counter, but attached to a counter so I could count the number of clicks per unit time. And that would give me an idea of how much radioactivity I was measuring. I ended up -- I had a batch of about 30 some odd white mice. I injected each of them with a type of a cancer that grows in the abdominal cavity. I then injected a radioactive isotope into each of them. And over a period of time, killed each of these mice, extracted the cancer, a sample of it, and measured the effective radioactivity per cell.

INTERVIEWER: And this is as a junior and senior in high school?

PAPPALARDO: Yes. It ended up -- that was possibly another one of the reasons that MIT as it turned out accepted me. I did fairly well and ended up being one of the finalists, based on this particular project. Even though to some extent you could assume that in doing these projects, I did them totally on my own. And of course that's not totally true. I met a physician at Strong Memorial Hospital -- high school -- whose field was cancer. He was a researcher in cancer. And he's the one that suggested this kind of an approach. And even though at a conceptual level, it's straightforward. If you could measure the radioactivity per cell, and then take into account the decay period of the cell, you could tell effectively, based on how the radioactivity is changing per cell, how the cells are actually splitting. So to this day, I'm always troubled by whenever cancer is detected, the medical solution is always to surgically remove it as quickly as possible. It seemed to me then and it still seems to me today we ought to at least determine the growth rate of the cancer before you surgically remove it. Especially if it's in certain parts of your body that shouldn't be opened up.

INTERVIEWER: Prostate cancer, for example?

PAPPALARDO: Perfectly good example. It's only as of late that people are eventually agreeing that you ought to determine its growth rate before you attempt to do something about it surgically.

INTERVIEWER: And so this interest in medicine was there all along. But then particularly renewed as a junior in college.

PAPPALARDO: But I did point out my mother wanted me to be a doctor. And even though I was going to MIT, my mother, the product of a third grade education, and didn't really know anything about MIT, she assumed I would go to college and I would become a doctor. That was her assumption. And because it was MIT, that didn't in any way prove to be -- suggest to her that maybe I won't become a doctor. And in fact upon graduation, I went to work at Mass General Hospital. My mother might have assumed I was a doctor, for all I know. Her knowledge about these things was somewhat limited.

INTERVIEWER: We're going to circle back on that story a little bit later.

PAPPALARDO: Let me just add one thing. When I did my thesis at MIT, there I was influenced -- I worked at Peter Ben Brigham. I did it under a physician there. And that physician was a cardiologist. And therefore, again, helped influence why I should be measuring arrhythmias, and what in particular about arrhythmias should be tabulated to give the type of possible disease of the heart that we should be trying to deduce.

INTERVIEWER: And then you ended up with a degree, after all of that, in electrical engineering rather than physics. But as you pointed out, these days you might have gotten a dual degree.

PAPPALARDO: Right.

INTERVIEWER: Did you have any mentors in college or influential professors?

PAPPALARDO: Well there was certainly one professor that influenced me. And it happened to be in my first electrical engineering course. Amar Bose. That was a very early influence. Not only because he was an excellent professor. An excellent teacher. The course and my first course sophomore year in electrical engineering was, to be honest with you, very exciting. Because for the first time, I learned really how electricity works. I'd said before I was adept at taking apart things mechanically to understand how they work. Or even electromechanically to understand how they worked. Taking apart radios. Shall I say purely electronic circuits, doesn't actually tell you too much about how they work. So you first start to learn how electricity and how electronic devices worked in that course. And so that was an exciting course for me.

But more importantly, not only was Amar Bose a great teacher, but he would offer students the opportunity to come back to his lab. And he would show some of the devices that he was working on. The first devices of course that he exposed us to were these very, very small speakers that produced sound equivalent to what much, much larger speakers in those days produced. And simultaneously, this was the origin of the Bose Corporation. So not only was he a professor that you were exposed to him doing his research, but you were exposed to his ideas of trying to make devices that he would ultimately form a company to sell. And that was certainly one of the early periods of time in my life when I said, yeah that sounds like a very interesting thing to do. To build something. To create something that hadn't been created before. That you could ultimately form a company about. And this, of course, was part of the reason even though I was enrolled in physics, I continued to lean toward the electrical engineering side of things. Figuring that was the set of courses that would ultimately affect me for the rest of my life.

INTERVIEWER: So is that one of the special things about MIT, the fact that you are taught by these very bright people who then also apply their expertise in setting up companies.

PAPPALARDO: Sure. As it turned out I met many professors who had started a company themselves, or were involved with other professors in starting a company. As it turned out to be almost, if you will, the norm around here. It was almost expected of MIT graduates that they might end up starting their own companies. And as I said earlier, when chatting with my fraternity brothers, this was a dream for many of us.

INTERVIEWER: Well that leads to after graduation, you went on to work at Mass General?

PAPPALARDO: Correct.

INTERVIEWER: And so how did you wind up working on computer systems at Mass General?

PAPPALARDO: Well, I pointed out I did my thesis under a professor in the electrical engineering department. Professor Jackson. But he of course introduced me to this doctor over at Mass General who was a cardiologist. Which I actually did the actual thesis. But as it turned out, I met another doctor there, while doing my thesis, who was also, it turned out, he was a non-practicing physician. That was interested in computers. And it turned out he was offered an opportunity to move to Mass General literally a month after I graduated. And invited me to join him. And he was offered an opportunity at Mass General to head up the MGH side of a hospital computer project that had started two years before as a joint project between Bolt, Beranek, and Newman, BBN, and Mass General, or MGH. So this joint project between BBN and MGH had been going for two years. It was originally conceived by a visionary at Bolt, Beranek, and Newman. One of their senior vice presidents named Jordan Baruch.

In 1962, BBN had developed perhaps one of the first time-shared computer systems. About the same time, by the way, that MIT was developing its first time-shared computer systems. It wasn't a surprise because many of the professors at MIT got involved with BBN. The founders of BBN, of course, were MIT professors. And since both MIT and BBN were in Cambridge, there was a strong relationship.

In either case, they had developed one of the early time-shared computer systems. Built around a PDP-1 computer, the first computer that Digital Equipment Corporation made. Had modified it somewhat and adapted it with adding a swapping drum and a very large drum to store information. And a device which was capable of running up to 64 teletypes. And this visionary from BBN was convinced that he could get the NIH and the American Hospital Association to fund a research project on using this computer to automate a hospital. And got in touch with MGH, and this project was started.

You could easily describe the first couple years of the project as developing a lot of specialized software for demonstration only, if you will. So when I showed up at MGH in 1964, I was exposed to the project from MGH's side. But determined that this would be the greatest learning experience that I, as a 22-year-old, could possibly hope for. And I would spend much of my time over at BBN talking to the computer scientists there and the programmers there. And that's when I got strongly introduced to programming computers, etc. And within a year, I had my own computer at Mass General. Started developing a similar system that I'd learned from Bolt, Beranik, and Newman. It was built around a PDP-7, also from Digital Equipment Corporation. And I developed a time-shared system for it. A fairly high level language, in contrast to the language that the BBN people were using to develop the, "hospital applications." Which was -- they used an assembly language. I instead developed a very high level language. Felt that productivity could be increased significantly if we had access to a high level language. Because in trying to learn the systems of how hospitals are run. Whether it be a department like the laboratories which to analysis on blood and urine. Or whether it's a pharmacy which, obviously, delivers medication to the floor. You don't have something -- It is not obvious how a computer system will make that process more accurate, and therefore perhaps run better. And it was important from my point of view to be very quick on your feet as far as programming. Programming in a low level language simply took too long. And so within a year I pretty much had developed enough of this technology to convince the people at MGH that perhaps MGH should go it alone, and not include BBN in the project. And from that point on, we actually started developing a lab system, an admissions system. And actually let it run in the hospital.

INTERVIEWER: And what was the initial reaction of folks at Mass General to this system? And a follow up question is what was the eventual impact that computerizing these results had at Mass General?

PAPPALARDO: Well I could argue that the first six months to a year was to convince people that a young 23-year-old person should be given the authority to spend upwards of \$400 thousand on a pair of computers, and staff of two or three programmers. And be allowed to let loose and develop such a system.

INTERVIEWER: There must have been a lot of skeptics. PAPPALARDO: There were a lot of skeptics. But as it turned out, I was able to quickly develop some programs. We first automated the chemistry lab at Mass General. And we got it working in a fairly short period of time as a test case. And the people in the chemistry lab liked it. We put about three or four terminals, in this case teletypes, in the chemistry lab. And when specimens came in the lab, they were logged into the computer. And the computer would produce worksheets of what analysis was to be done on these set of specimens. And they would load it into various machines, if they were automated machines, or do it by hand. And eventually the results were keyed back into the computer. And the computer produced for the first time legible printouts of test results. So it was certainly one of the very earliest examples of using a computer to automate a function within a hospital.

INTERVIEWER: So you're 23 years old, 24 years old. You've already touched on the fact that you were kind of predisposed to look for entrepreneurial opportunities. So in 1968, just four years, you decide that you're going to turn this work into a company. Can you tell me about that?

PAPPALARDO: I certainly made the decision to leave MGH at the end of 1968. But in reality, I made the decision to start a company in early 1967. And I spent not only continuing my work at Mass General, but talking to anybody and everybody who could possibly help me in forming a company. In early '67, I was 24. It didn't stop me. One of the amazing things that I learned about young people today is they don't know that certain things can't be done. And obviously back then, I was a young person. And didn't know that you couldn't start a company being 24 years old. As it turned out, you make up for things with a certain amount of bravado. It's one of the things that MIT pretty much gives its students. They come out of MIT with an awful lot of confidence. That anything they want to do, they can do.

So anyway, I spent almost two years talking to people, including people from MIT. One of my partners became a professor in the Sloan School here. Ed Roberts. Still a member of the board. He helped advise me in how to go about starting my company. Among others at MIT. But I also spent a lot of time with people who supposedly had money. Venture money that could start a company. And in reality was when I finally determined that for the company to really get off the ground, I had to simply leave MGH and devote 100 percent of my effort to starting the company. As opposed to part time, if you will, while I'm working at Mass General. And I think that was the major triggering event in my life, at the end of '68 when I left MGH and, shall I say, was gainfully unemployed. i.e. no money coming in. It took pretty much to the end of July in '69 to actually raise the money I was looking for.

Once again, it came indirectly from MIT. I ended up getting venture money from a company called EG&G. And obviously EG&G is another one of the MIT companies. Edgerton, Germeshausen, and Grier. Started by an MIT professor. Edgerton, of course. And two of his students. And they're the ones that provided the venture capital for starting MEDITECH.

INTERVIEWER: But what did you think you could do with your own company that you couldn't do as an employee?

PAPPALARDO: Well, MGH, presuming that's the employer.

INTERVIEWER: Exactly, yes.

PAPPALARDO: It was interesting. They wanted me to automate more of MGH. And of course during the time frame and the -- shall I say from 1966 and '67 and '68, we had many visitors come by MGH simply to observe the system that we were running in the chemistry laboratory. This being again perhaps one of the earliest examples of automating part of a hospital other than an accounting function. This was a clinical function where a computer was integral to the running of that department. And we even put some of the teletypes out on the floors so that the reports could be printed directly at the floors and put into people's charts. Or that physicians could walk up to a teletype and inquire about a laboratory result. So we had a lot of visitors come by. And the visitors usually would ask me. This is great. How can I get such a thing? And of course at that time, I'd say well I guess if you buy your own computer, I'd be more than happy to give you a copy of the software. The project was funded, as I said earlier, by the NIH. And therefore the software was in the public domain. I'd be more than happy to share it. But of course offering that to someone from another hospital wasn't going to necessarily get the job done. They needed technologists who perhaps adapt the software, or even run the computer system. And knowing how to back up the database and how to maintain it if anything got damaged or whatever. This took a skill set that hospitals didn't have. So it became clearer to me that the only way to get shall I say my work into the marketplace was to form a company that would offer this kind of software and service it accordingly.

INTERVIEWER: And when you went off at 24, did you -- And you approached EG&G, they came through --

PAPPALARDO: That was when I was 26. [INTERPOSING VOICES]

INTERVIEWER: But did you also have on your team MIT faculty as well back then? Or this was the point when you went off on your--

PAPPALARDO: I brought along the three people that formed the first employees of the company. Were myself, one of the programmers that I had had working for me at Mass General, and a salesman from Digital Equipment Corporation. The three of us formed MEDITECH, with me being the principal one. I'm the one that obviously left in '68. They both kept their jobs until we got financing. Hence the early company, everybody agreed, it was sort of my company to run. The reason I brought someone from Digital Equipment Corporation was again at the advice of the professor at the Sloan School. That it would be nice to have somebody with some business experience. And in particular some selling experience. Because this stuff has to be sold to the marketplace.

But as a technologist myself, I was capable of doing any and all things. And ended up doing any and all things in the company.

INTERVIEWER: What were some of the most significant challenges during the early years of MEDITECH? And how did you persevere?

PAPPALARDO: Well the biggest problem was achieving a modest amount of success before running out of money. To be able to achieve success, you had to convince people in hospitals to buy the software that you were trying to sell. In 1969 and 1970, a very strong argument could be made that virtually no one knew what software was. I did of course. But the people you're trying to sell to have no idea exactly what software is. Let alone how a particular application, whether it's automating the admissions department of a hospital, or automating the laboratory or the pharmacy. They had no conception of why these departments had to be automated in the first place. Everyone sort of agreed that computers could be used for accounting functions. But how they could be applied in other processes that went on in a hospital defied the imagination of anybody. So it was a big uphill battle.

INTERVIEWER: And if I can interrupt. I did hear a story. Could you describe the significance of the "try before you buy" in establishing MEDITECH.

PAPPALARDO: Sure. Well of course that is the concept that I finally came up with prior to getting the venture capital. When I pointed out that our first piece of software, that being the software to automate the running of a chemistry lab, I intended to sell for \$25 thousand. But simultaneously, I pointed out to the venture capital community, that the customer, if they're to buy my package for \$25 thousand, they had to simultaneously spend upwards of \$200 thousand for the computer from Digital Equipment Corporation that the software would run on, for them to make it work. And if they didn't buy my software, spending \$200 thousand for the computer would be simply a device which could warm up the room when turned on. But if they paid my software--

But the point is the leverage was obviously wrong. People weren't about to buy from me because of the inherent cost of the computer and the software. Therefore I had come up with the idea of the "try before you buy." Part of the reason that I went to the well from EG&G, and actually got close to \$700 thousand from them, was I intended to buy a couple of computers for MEDITECH at day zero. One to continue our development on. And the other one to run in a time-shared mode, but allow remote access through the phone lines to terminals. In the years teletypes, and eventually display terminals. So that customers could try out the software without making any capital commitment for the computer. I would charge them \$1,000 a month per terminal. Perhaps they could try it out with one or two terminals in a laboratory. Paying MEDITECH only \$1,000 each per month, without any commitment. And if they liked running this software and became convinced that it could do the job that I proposed it would do for their hospital, then they could ultimately make the decision to buy a computer. And at the same time spend \$25 thousand for the software from us.

As it turned out, this turned out to be a good idea especially because the \$200,000 computer system, within a year or two, became a \$100,000 computer system. And as time went on, as I think everyone knows to this day, computer system prices dropped and dropped and dropped. And if anything the piece of software that I sold for \$25,000 40 years ago, I now sell for about \$100 thousand. Not because it's increased in price per se to manufacturing it. It's software, and therefore can be replicated for nothing. But because its functionality has been greatly expanded. And therefore I can easily justify \$100,000. So the great thing about my business. The old days, the hardware would sell for upwards of 10 times what's the software would sell for. Today it's just the opposite. Software goes for about 10 times what the hardware would sell for.

INTERVIEWER: That's a better business to be in.

PAPPALARDO: And also, of course, perhaps 30 years ago I stopped needing to offer the "try before you buy" solution. Because everybody was convinced. They knew what software was. They knew what it could do for a hospital. And it was easy for them to make a buy decision without having to try it before they buy it. There were plenty of other customers who they could go see, see how it worked.

INTERVIEWER: So Neil, what were some of the most significant challenges during the early years or months of MEDITECH?

PAPPALARDO: Well as I said, I left Mass General in December of 1968. Because I was convinced that start my company, I really had to begin full time in earnest. Perhaps pressured by not having a salary anymore. And I spent most of early '69 knocking on doors of venture capital companies that presumably had money that I felt was needed to fund the company. I was originally looking for \$300 thousand. Needing about \$200 thousand to buy a computer system from Digital Equipment Corporation. And another \$100 thousand to carry myself. Carry the company for a while. Until we started generating our own money.

I quickly learned in my presentations to various venture capital people that my idea of selling our first product, which was to be a laboratory information system, that customers would be very reluctant to buy. They didn't know what software was. And they certainly didn't know how a computer system could possibly make the running of their laboratory more error free and more reliable. And even more efficient. Especially when I pointed out that the laboratory information system I proposed to sell for \$25 thousand. And that the customer would have to spend an additional \$200 thousand for the appropriate computer system. They constantly pointed out that nobody's ever going to buy anything from you. And I'm sure they were right.

But then it occurred to me that perhaps if I had a second computer system that I could set up in our company, which I would connect through phone lines to customer sites. With a terminal at the customer site, the customer could try it out before they would ever make such a buy decision involving the kind of capital of \$200 thousand for a computer and \$25 thousand for a piece of software. When I explained that idea, it's amazing how the venture capital people were far more interested in what I was talking about. Even though, by the way, they really didn't have any idea what software was, themselves. No different than hospitals did. Software but was a very different concept. And MEDITECH was to be one of the very first software companies in America. Perhaps in the world then.

Anyway, as it turned out, when I changed my tune, and focused on needing far more than the original \$300 thousand, I actually went for about \$700 thousand. To spend \$200 thousand for each computer. And an extra \$300 thousand to get the company running before it became profitable. With the understanding that since it would still take some time for the "try before you buy" concept to turn into a real sale of the \$25 thousand piece of software.

In either case, that was the -- by the time I did raise the money, and I raised about \$700 thousand from, of all places, EG&G. Another company effectively spun off from MIT. Dr. Edgerton was still a professor at MIT who I'd taken one of my courses from. And his company, EG&G, when I presented the idea to them, they offered to finance the company. Not because they necessarily knew about software. But because they were also into a "try before you buy" concept. Their venture capital arm would tend to provide early financing for companies in very novel technology based environments. They, by providing the initial seed capital, got to learn and try out the company, try out the technology, in the hopes that some day they may acquire it and it become part of EG&G. As it turned out, we were never acquired by EG&G. I wanted very much for the company to remain independent and that's the way it went.

INTERVIEWER: Was

there interest expressed?

PAPPALARDO: In them acquiring us? Yes. Don't get me wrong. For their \$700 thousand, they eventually walked away with over \$20 million from their investment. So it was a very good investment from their point of view. But as it turned out, perhaps because I believed that I didn't ever want the company to be a public company, that it probably wasn't in the cards for them to acquire us. So they ended up selling their interest and we actually bought it all back from them.

INTERVIEWER: And so tell me how MEDITECH then grew over the years into a leading supplier of information systems for hospitals.

PAPPALARDO: Well first we were very early in this business. There weren't too many people focused on automating hospitals. But I kept blinders on. I was convinced that hospitals were the technological center of a community. In that if I could automate hospitals, ultimately this would be the best thing I could do for the well-being of patients in that hospital. I started out with one software product. The laboratory system. I quickly expanded to a pharmacy system, to radiology system. Eventually automating the medical records. And eventually getting into accounting functions. I do everything from payroll to general ledger. But most importantly billing accounts receivable, which is very specialized for a hospital. So today, I pretty much have a very, very large chunk of software, which pretty much automates the complete running of a hospital.

My approach has been to keep blinders on and continue doing that, hospital after hospital after hospital. At this point in time, we've automated a total of 2,300 hospitals. Mainly in the US, Canada, and the UK. Of those about 1,900 of them are in the United States. That represents about a 30 percent share of the hospitals in the US. So I continue to do that. And the reason it's grown so much is because that's all I do. Some of my competitors have chosen not only to be involved with automating hospitals, but to do a lot of other things for the medical establishment. Automating physician offices. Having consulting companies which consult the hospitals and teach them how to change their process. Stuff like that. I focus on one thing. Making software to run hospitals.

INTERVIEWER: And could you talk a little bit about MEDITECH's work in developing a management system to help clinicians determine the best patient treatment?

PAPPALARDO: Well as it turns out, you don't have to do too much to teach physicians how to manage patients. The process has been pretty well established on the best course of action for most disease processes. But what you can do is to make -- in automating the process, to do it as accurately and as quickly as possible.

In a hospital, for a particular patient who's going through some sort of therapeutic procedure, and that's the normal reason patients go to a hospital -- they need a therapeutic procedure -- what you want is to allow the 10, 20, or 30 clinicians who are simultaneously performing some aspect of that therapeutic procedure, you want them to be able to do their job as accurately and as quickly as possible. And that's where the computer system helps out. From perhaps the physician in charge of the patient ordering a procedure for that patient. It'd be ideal that if the physician could order that procedure directly from a computer terminal on the floor where the physician is, make sure that the order is communicated properly and accurately to whatever department is involved in executing that procedure. If he's ordering a medication, that order has to be conveyed to the pharmacy. If he's ordering a diagnostic test, it has to be conveyed to a laboratory. In which case the rest of the process gets automated as well. If you ordered a laboratory test, the computer has to tell a phlebotomist to draw blood from a particular patient in a particular location in the hospital, and bring that blood specimens back to the appropriate laboratory to perform that test. And in which case after the test is performed in the laboratory, to gather the results, merge it with the rest of the information about that patient, and allow the physician back on the floor to see that. In all cases, what you're trying to do, once again, communicate information as quickly and as accurately from its source to its destination. And as a byproduct of that communication, to form an electronic medical record so that all clinicians within the hospital or even outside the hospital can simultaneously access the patient information to help them in the process of delivering care.

INTERVIEWER: And that's what MEDITECH has done so well.

In terms of your own role in MEDITECH. After training and working as an engineer, how did you find the job at being a manager?

PAPPALARDO: Well I certainly took no particular management courses at MIT. My physics and my electrical engineering courses had nothing to do with management. Common sense. My style of running MEDITECH in the very early years was very, very simple. I did something. If it burned, I didn't do it again. If it didn't burn, I kept on doing it. So many of the things about MEDITECH that we do to this day are all based on that concept.

For instance, in the early years, we could only hire entry level people. Because mature, experienced people weren't going to start working for a start-up software company. Especially because they knew nothing about software. And it seemed to be a great risk of coming to work. So the only people that would tend to work for us were quite often recent graduates of MIT. And many of our early employees were recent graduates of MIT. Not all of them stayed. But the ones that did stay obviously grew with us. And I learned from that -- far better to have entry level staff that grows with the company. And they become very loyal, and it works out well. So to this day we've yet to ever hire anybody in a supervisory, management, or officer position. All of those people in the company all started as entry level people. I'd even point out, of course, I started as an entry level person.

INTERVIEWER: And what's been your experience in hiring MIT grads?

PAPPALARDO: Well in the early years, we hired a lot of them. Lately, not as important. We certainly have a core group of MIT, especially technologists that form our advanced technology group. And they're very helpful in developing the fundamental software for the company. But what we have learned, like any company learns, is to be ultimately successful, you've got to get, shall I say, better than average performance out of average level people. Because by and large, that's all that's out there. Are average level people. So what I've learned, and it's not a surprise also, we've had a number of MIT people that have worked for us, that ultimately left to start their own companies. So it's difficult, quite often, to have too many MIT people for the same reasoning.

INTERVIEWER: But you do advance from within. I mean that's one of the things that you've been most proud of in terms of the ways you've managed MEDITECH.

PAPPALARDO: Sure.

INTERVIEWER: So most chairmen and CEOs have enough to do with just running a company. Why was it so important for you to remain involved in product development?

PAPPALARDO: Well that's still the area that I'm particularly good at, as it turns out. I develop most of the prototype software technology for the company. I became convinced early on that even though it happens to be that many, many educators will tell me that you've got to talk to your customers to know what they're going to need, what they want. I've learned that if you don't know in advance what customers want, when you do find out, to some extent it will be too late. You've got to be particularly good at anticipating what customers will want.

Since I worked in a hospital for four years and I've spent essentially all my life in this business, I'm pretty well versed of how hospitals are organized, what they need today, what they will need tomorrow. And hence, that coupled with my innate technical ability allows me to anticipate the software products that we need to automate the hospitals in the future.

And nowadays, it takes upwards of five, six, seven years to develop a product. Unlike the early days where the functionality was much narrower. or And therefore you could develop a piece of software perhaps in as little as three to six months. The time scale has expanded. So it's very important to be able to figure out in advance, so that when the customers then demand something from you, you actually have that product for them.

INTERVIEWER: So you're still writing code?

PAPPALARDO: I still write software. You bet.

INTERVIEWER: What accomplishments at MEDITECH are you most proud of?

PAPPALARDO: Well, I think it's back to automating hospitals. . I said earlier we've done 2,300 hospitals. These are all today active customers of MEDITECH. If you translate that to patients, that sort of means over 20 million patients. Their health is being improved yearly because of the automation of our hospitals. It's a large number of people to help each year. Over 20 million. I guess collectively I'm most proud of that.

You know from days zero, as I said earlier, my mom wanted me to be a doctor. If I was a doctor, perhaps three or four thousand patients I could help each year. And I'd say the 3,000 people that work for MEDITECH today are most proud of the fact that we improve the health of over 20 million patients a year.

INTERVIEWER: Neil, can you please share the story about the first time your mom visited your MEDITECH facilities out near Rt. 128?

PAPPALARDO: As I said earlier, my heritage is Sicilian. And as many people know, sometimes Sicilians work the left side of the street, sometimes Sicilians work the right side street. My mom always wanted to make sure my brother and I worked the right side of the street. But when she came to visit my company for the first time in the late 70s, she, upon entering the building, wanted to see exactly what it was I did. She went throughout the first floor, and all she noticed were people sitting on desks, at terminals, complete display screens in front of them, sometimes on the phone. She went to the second floor, and she'd see the same thing. This puzzled her greatly. At some point, she began to cry, ran downstairs, and ran outside. I chased after her screaming to my mom. Mom, stop. Why are you crying? And outside she turned to me, looked at me, and finally in a glimmer in her eye, she was convinced she knew what I was doing. She said to me, "You're really making book, aren't you?"

To some extent it's humorous because she thought I was a bookie. Because what else could she understand about the software business? It looked like that's what I did. And her fear, of course, was that I maybe wasn't working the right side of the street.

INTERVIEWER: Thank you, Neil. Thank you.

Neil, you've remained very active at MIT over the years. Why has that connection been so important to you?

PAPPALARDO: Well the main reason is to I guess give back to the institution that clearly was fundamentally instrumental, fundamentally important in my success. I'll be honest, I used to complain about MIT in the very early years after I graduated. The major complaint I had about MIT was all of the courses were pretty much analytical courses. Even in engineering, where they should be focused, I think, on design. They weren't. They spent much of their course work on analysis. And to me, coming from MIT, the thing I learned was how to create something that's never been created before. If I'm going to have a business, it should be based on something that I've conceived of. Something I've design. Something I have created. You would think MIT would be particularly good at teaching design. Teaching synthesis. They weren't. And I used to complain. I complained to many professors over the years. And I know eventually Paul Gray came over to my office behind MIT, at MEDITECH, one day. And he told me to get in the car with him. And he drove back to MIT. And he introduced me to the mechanical engineering department here. And pointed out that this is this department that is really good at teaching design. I of course was exposed to the electrical engineering department. Certainly the physics department, being a science, I could understand why they didn't focus on design. But the electrical engineering department, where most of my complaints were about, because those were the courses I took, didn't focus on design. But it turned out mechanical engineering did. And I got introduced to the department, and actually fell in love with that department. That's really my first opportunity to start giving back.

I quickly figured out it would be appropriate for me to fund a chair for one of the design professors. In this case, Woodie Flowers, one of the earliest professors at MIT.

INTERVIEWER: How long ago was that?

PAPPALARDO: I'm afraid if you ask me too many the exact date, I'll forget. I would guess 20 years ago. That would be my best guess. That would be around 1990. That's when I really started getting involved at MIT. And I met Woodie. And of course I found out about not only the courses he teaches, but this design contest that he was running for the sophomores in mechanical engineering. And I became convinced, of course, that just because I hadn't been exposed to design courses, that design courses were obviously very prevalent in mechanical engineering, and were finding their way into other engineering departments as well.

INTERVIEWER: Thank you. And we're going to touch on that just a little bit later. You've also been involved, and very actively involved, in the Intsitute's governing body. How do your experiences as a corporate leader influence your role as a member of the Institute's governing board?

PAPPALARDO: I don't know if there's any strong relationship between the two. Certainly I've been a long term member of the Executive Committee at MIT. Perhaps serving as long as, I guess, 18 years. I think I started in 1992. I certainly learned a lot about how MIT works in detail from my monthly meetings with the Executive Committee. I don't know if my particular experience outside of MIT helps that. I certainly do believe as an MIT graduate, I want very much for MIT to stay on top of its game. And therefore, try to make sure, by whenever I participate in any strategy discussions or any decision making, that everything that we do in the Executive Committee enhances MIT's reputation. Not just here in the United States, but worldwide. It is still. And I want to make sure it stays for a long, long time the premiere engineering, science, and technology university in the world.

INTERVIEWER: Voted with your feet, as they say, in terms of ensuring that MIT stays on top of its game. And I'd like to explore that a little bit. If you would, talk a little bit about the support you've provided over the years. Maybe you could tell me about each of these contributions, and the motivating factors behind your support. And there's just a list, and I'll just ask you. Funding a full professorship in mechanical engineering.

PAPPALARDO: Well again, I did that to underscore the importance of design. In mechanical engineering, Woodie Flowers was clearly one of the strongest leaders in the department in focusing on design courses. And that was my way of underscoring that.

INTERVIEWER: And you've supported that chair for the last 20 years?

PAPPALARDO: Yes.

INTERVIEWER: Could you tell a little bit about financing an undergraduate teaching laboratory?

PAPPALARDO: Well that was also in mechanical engineering. That's coupled with another aspect. My favorite building at MIT is the Main Group. That is clearly the icon of MIT. And to some extent, that building had far more of deferred maintenance than it should have. It should have been the building that MIT made sure that it was always at the top of its game. Just like MIT is at the top of its game. But it didn't. And I set up a way when I determined that the laboratory that, for the mechanical engineering department, which was on the first floor, the ground level floor of MIT, basically was a dung heap. I decided it would be the best thing I could do to totally renovate that department. That laboratory. And that's what we did.

I put up the money. We hired architects to come up with a brand new design. And converted that into very, very nice looking laboratory space. I was hoping it would set an example. It was one of the early major changes in dilapidated space in the main building of MIT. And that was done as an example of what could be done with the so-called basement, that I of course referred to as the ground level now. Not the basement.

INTERVIEWER: And then how did Pappalardo Lab 1 turn into Pappalardo Lab 2?

PAPPALARDO: Well across the way, there was more of that same space. In this case, the space was owned by the ocean engineering department. And when the ocean engineering department was merged into mechanical engineering, we had that space renovated as well. And another big chunk of laboratory space was created at MIT.

INTERVIEWER: We've done a lot of shooting of video in those spaces and they continue to be such beautiful and useful spaces.

PAPPALARDO: Well especially because before that, any space at the ground level of MIT was simply treated like a basement full of storage of junk.

INTERVIEWER: You've also funded a book series. Can you tell us about that?

PAPPALARDO: Yes, that was another way to help out the mechanical engineering department. Even though it started out as a book series from my point of view, at the time, it would evolve eventually into these books being done on the internet rather than on paper. But at the same time, when you find a department that you become enamored with, you recognize that still so much of learning is accomplished through books. And I provided an endowed fund to pay the professors to write courseware for mechanical engineering. A series of books have been published, as well as some of these are now being put on the internet.

INTERVIEWER: You've also helped to construct the Magellan Telescope for physics in Chile.

PAPPALARDO: Physics was of course the department that I majored in. When I got back involved with MIT, not only with the mechanical engineering department, I also revisited the physics department. The physics department was doing fairly well when I showed up at MIT. But the one area of physics that I guess you could describe almost as second rate was optical astronomy, and astrophysics in general. Even though there was a legacy that had been established before Bruno Rossi. Therefore x-ray astronomy was being done at MIT very well, under Claude Canizares. And of course radio astronomy was also strong at MIT. But optical astronomy wasn't. And optical astronomy still is one of the most important aspects of astronomy. And because we were second rate in that department, not having any access to a world class observatory, the department suffered. And with all my conversations with the various people in the department, continued to reinforce that point of view. So I quickly helped them establish access to a world class observatory that had already been conceived, and helped MIT buy in to its share of that telescope. A pair of twin six and a half meter optical telescopes on a mountaintop in the foothills of the Andes.

INTERVIEWER: Have you visited?

PAPPALARDO: I have visited, yes. I went there for the opening ceremonies for it. It's impressive. I've never been at an observatory up, I don't know, eight nine thousand feet above sea level. Very impressive.

INTERVIEWER: And you also created the Pappalardo Fellowships in physics.

PAPPALARDO: Well there again, this is to some extent similar to the observatory. When I try to find out from the professors in the department what they think is the most important thing I can do. In the same way that we came up with the idea of if we could get access to world class optical telescope, that would increase the status of the astrophysics department at MIT. Which it did.

I then asked them, all right, I'm now prepared to do the next thing for the department. What's the most important thing I could do? And they felt, the various members of the department, especially the department head, of course, and the dean of science at the time, felt that if we could establish a post-doctoral fellowship program, maybe upwards of three post-docs a year who would stay here for three years. So when it got up and running, it would have nine post-docs who could -- I would obviously provide the funds for their compensation, for a little bit of their stipend for travel and other activities they might do. But that if we could pick from around the world the best possible physics post-docs, it would allow the department to try before they buy, give them the opportunity to see these young people in action, and hopefully use them as candidates for the junior faculty. It turned out the department's now running - I think the program's been almost 10 years in existence. It's gained a huge amount of success. There's a number of other universities that are trying to do something similar that have consulted with MIT. In either case, we've had four of them become junior faculty at MIT.

INTERVIEWER: Quite a worthwhile investment. And then more recently, you stepped up for funding the Green Center for Physics.

PAPPALARDO: Right. Once again it's in the main building of MIT which I've said before I've been very, very fond of. I've resisted putting any funds into bricks and mortar outside of the main building. But here's a case where the physics department had been spread out too much throughout the MIT campus. And there was an opportunity to provide them with some effectively totally brand new space, built in one of the infill sections of the main building. And I provided a sizeable amount of funds that got matched by an equal amount of funds from other people. It was the first attempt for the physics department to do a major fundraising on their own. And I was convinced they could do it. They could easily establish a rapport with the community by inviting people to various physics lectures, which they started doing. And they started interesting the friends of MIT to help fund them. And they raised close to \$15 million. Something that the department head didn't think it was capable of doing. And it turned out it could do it. And that was enough with MIT's help itself, to build this magnificent infill building, and renovate all of the physics space around it. So the department's quite happy now.

INTERVIEWER: So my understanding is that your gift came at just the right time, when they needed kind of an influx. And it stimulated all this other fundraising.

PAPPALARDO: Sure.

INTERVIEWER: So it seems that despite the fact that you're an electrical engineering alumnus, it seems to me you're still most connected to the physics department. Even after years of working on computer software. You still feel its tug, don't you?

PAPPALARDO: Yes. I go to a lot of lectures here. Even though I'm involved with mechanical engineering. I don't go to mechanical engineering lectures, but I do go to physics lectures. I'm here probably every other month. Some lecture in physics. Be it some of them in obviously astrophysics, and some of them in nuclear physics, all around. I just find these lectures very interesting. It's an exciting time. Especially when I actually know a little bit about the subject matter. So it's easier for me to comprehend. I sometimes bring my grandchildren to them. And they enjoy it as well.

INTERVIEWER: Yes I've heard Jane say that you always have a stack of books on astrophysics and cosmology next to your bed.

PAPPALARDO: And mathematics. Those are the three subjects I tend to do most of my outside reading about. Cosmology, physics, and mathematics. Someone's got to do it.

INTERVIEWER: So in addition to your financial generosity, you've also made an extraordinary commitment of your time and energy in other rolls at MIT.

PAPPALARDO: I have another long term position. It looks like -- I have these for-life positions. I'm a life member of the Corporation. I appear to be almost, so far, a life member of the Executive Committee, although there isn't such a one. But because I've been on it the longest, I consider it almost a life position. The other one which is clearly a life position is I'm chairman of MIT's Audit Committee. I've been chairman now for 15 years. There it'll be probably another eight years before I turn 75. That's only because no one else is stupid enough to become chairman of the Audit Committee. Audit committees these days are becoming more and more important in any kind of corporate governance. So as it turns out, I am one of the very few people from the outside who actually understand MIT's finances. So I continue to stay chairman of that.

I said I've been on three different visiting committees for a long time. Both mechanical engineering, of which I'm chairman of the Visiting Committee. I'm on the Physics Visiting Committee. I'm on the Library Board. And those three I'll probably stay as members of it until I eventually turn 75. That's when I'm told you can step off the Corporation.

INTERVIEWER: So if you can explain again why you feel it's so important to give back.

PAPPALARDO: Well the major reason again -- I give back in money. But I also give back in time. And that's the area that it's harder to do. Obviously my company is successful. It's easier for me to give money. It's harder for me to give time to anybody, anything, other than my company, But I do it for MIT because that's the area that I really want MIT to continue staying on top of its game.

It's funny, I was asked about five years ago to be an adviser to a Korean university called KAIST. The Korean Advanced Institute of Science and Technology. Their version of MIT. I was asked by the president of MIT who happened to have been a professor at MIT. A department head, in fact, of mechanical engineering. And then he was asked to be the president of KAIST, because he actually is a native Korean that came here after the Korean war to America. In either case, he did, and he asked me to join him. And to advise this KAIST University to be honest with you, to learn how to be very similar to MIT. And I agreed to do it. But I went to both the provost here, Rafael Reif. And asked Rafael, Rafael, I've been asked to be an adviser to KAIST And since my involvement at MIT, I wonder is that going to be a conflict of interest? Should I accept this position or not? And Rafael said, "Of course you should accept it. And not only would they learn from you, but we want you, Neil, when you travel to KAIST to learn how the Koreans are doing so well. And based on that, help MIT out. Because these days, we're going to be, some day in the future, we're going to be competing with KAIST. So therefore we had better learn how other universities are trying to catch up to us. We want to make sure we stay on top of our game."

But in either case, that's the fundamental reason why I help out MIT, both financially and with time. I want to ensure that MIT stays on top of its game.

INTERVIEWER: So Neil, in what ways do you stay connected to MIT students?

PAPPALARDO: Well probably not as much as I'd like. From time to time, obviously with visiting committees, you get exposure to both the undergraduates and the graduates. But the reality is these kids are far brighter, far more impressive these days than I think we were when I came here. The kids that I involve myself the most with are these nine post-docs that I've been I've been funding for the physics department. There I tend to have dinner with them every few months. And some physics occasion in the summer. I invite them to spend a weekend with us in our place in Marion, Mass. And even in the Christmas holidays, they come over to our place for a party. So most of my interactions are with them. It's all part of -- I find it fascinating what their field of endeavor is, and learn about their -- The kids are very smart. I'm always to some extent jealous. I was a physics major. In no way am I as close to being as smart in physics as they are.

INTERVIEWER: And you're also a frequent attendee at the annual MIT 2.007 Mechanical Engineering Design Contest. Can you describe that event to me?

PAPPALARDO: Well that's somewhat of an entertaining event. The mechanical engineering department has a course for sophomores. And it's a contest. They are given a box of electromechanical parts. They are asked to build a robotic like device, and compete with each other to accomplish some goal. And the contest ends up with a single -- it's done over two nights. But the final night is the one I attend. And it's a fun event. These kids are sophomores trying to build a device which can win a game from their peers. And each year the contest is different. Much of the entertainment is performed by the professor in charge. I said earlier it was started by Woodie Flowers. And most recently Alex Slocum is -- which, by the way, is the one that inherited the Pappalardo chair after Woodie Flowers retired from MIT.

INTERVIEWER: And Alex has gone on to do a number of other interesting things, as you know.

Thinking back to your undergrad years at MIT. Is there one particular memory that stands out in your mind?

PAPPALARDO: Well I guess there's one very, very specific one. It happened in October of 1963. One of my fraternity brother's girlfriends, who was a BU student, brought her sorority sister over to the fraternity house to introduce her to another one of my fraternity brothers. It happened it was a Friday afternoon around 3 o'clock after classes. To be honest with you, I was just getting up. I had had an all-nighter the night before. I can't really say it was for studying. It was for playing cards. But in either case, I was just getting up. And when I met this girl that my fraternity brother's girlfriend was bringing to the house, I obviously interceded and said, well the fraternity brother you're looking for is probably at MIT. But I'm here. So why don't you introduce this girl to me. That girl, of course, turned out to be my wife, Jane, who I immediately started dating. And either you could argue because I went to MIT, or because my fraternity house was next to the BU dormitory in which she lived, and because I happened to have been around the fraternity house which she brought her in. She ended up the girl that I ended up marrying. And we've been married now for I guess it's 46 years. That's probably the most memorable event. I remember that event every day, if you will.

INTERVIEWER: And I've heard you say that you had the easy job when you were trying to get a start-up off the ground. And Jane the more important and much more difficult job of --

PAPPALARDO: Yes. Well it's as I said. I met Jane in October of my senior year. We got married a couple months after I graduated, in August of 1964. My wife became pregnant immediately. We had a child every year. In fact when Jane thought she was pregnant with our number four, she announced that to me in Thanksgiving weekend of 1968. And that was the triggering event that caused me to leave Mass General. I was gainfully unemployed for the next eight months. When I actually got the money from EG&G, and I opened MEDITECH's doors on a Monday. August 4, 1969 is when we actually officially started the business. And that night my fourth child was born.

My job was to, as I said, to get the company -- make it successful. I worked very, very hard. Probably seven days a week for a long time. But my wife had a tougher job. She had four kids, all a year apart, and raising our family. The only regret I really had is I didn't really spend too much time with my four kids. To be honest with you, my son to this day still points out that I never took him to a baseball game.

So having said that, I do make up for it somehow. I have 12 grandchildren now. I babysit my grandchildren. I bring them to the office. I spend a lot of time with my grandchildren. Perhaps time I could have or should have spent with my own kids. But it turned out my wife raised them very well. They turned out all to be good kids. So I'm very, very pleased. But her job, raising four kids, was a 24 hour a day responsibility.

INTERVIEWER: Well I've seen the work, also, of your daughter, the architect. So you have a talented brood there.

So shifting back to MIT for a second. Are there notable people at MIT that you've met over the years that have influenced you? And you've already talked about a couple of them. Paul Gray's influence. Certainly Amar Bose's. Is there any other that you'd like to --

PAPPALARDO: Well, I mentioned Woodie Flowers, of course. And how he's done in that--

INTERVIEWER: Dr. Edgerton? Did you --

PAPPALARDO: Sure, I took a class from Dr. Edgerton. But I also took a class from Paul Gray. He taught one of my early semiconductor courses. I'll be honest with you. As an undergraduate, there was a very small amount of influence. Because these were people in such high esteem that I really didn't get to interact with them. As one on one type interaction. The only real interaction I did have is with Amar Bose, after, as I pointed out earlier, in going to his lab after classes. And I had a little bit of interaction with Dr. Edgerton. But everybody had interaction with Dr. Edgerton.

But most of my friendships have actually been established over the last 20 years with the professors here and now. And to this day I remain very close to a number of them.

INTERVIEWER: Was the experience you had with Dr. Bose, was that kind of a precursor to the establishment of the UROP program?

PAPPALARDO: Well I'm sure it was to some extent, because they're clearly, I wasn't the only one that was interested in going after class to visit him. There were a lot of us in that course that would do it. I don't know the roots. Although I keep thinking Howard Johnson. Wasn't UROP started during --

INTERVIEWER: Well Margaret MacVicar -- It was under Paul Gray. [INTERPOSING VOICES] It's interesting in that there graduate students have opportunities in the labs. But it's unusual for an undergraduate.

What about the MIT culture? How have you noticed that changing over the years?

PAPPALARDO: Well, I don't know if it's changed that much. I've said I think of the kids as being more well-rounded than they seemed to be when I was an undergraduate. I'd like to think a lot of that has to do with the proportion of females at MIT. When I went, of course, if you had 10 females in the freshman class, that was sort of the norm. Nowadays close to half of the undergraduates are females. And that alone causes the males who are here to be more well-rounded. And of course there is far more interaction with the females as well.

And there's far more competition with the females as well. I still remember the first design contest in mechanical engineering that a female won. And the cheering was fantastic. Because it just shows you that they're clearly as good as males are, by any definition.

INTERVIEWER: And you touched on this, but how do you think the educational experience at MIT is different now from when you were a student?

PAPPALARDO: Well I don't know the answer to that. Other than that I would surmise there's more opportunities to do hands-on research than perhaps when I was an undergraduate. As I said, my only exposure was in 6.01 and 6.02 afterwards. But the UROP program does allow more hands-on experimentation. Which I think in the long run has to be very, very beneficial. It's certainly -- most of the kids are involved in UROP one way or another. From our point of view, the only exposure I had during undergraduate years, was summer work. I happened to work as a technician in one of the labs at Bausch & Lomb, in Rochester, NY. That was my only hands-on exposure to industry, if you will. Let alone research, per se.

INTERVIEWER: What do you think makes MIT unique compared to other universities?

PAPPALARDO: Well the main thing that as a student you recognize is that you're amidst a group of people. And in general, half of them are smarter than you. And therefore there's a lot more opportunities to learn from them. As opposed to the high school you came from. Where quite often, you're already at the top of your game in that high school. When you come to MIT, you're at best average. And I guess you tend to always learn from people who are more experienced, who are smarter than you. That's where you learn from. And that's one of the great things about MIT. Of being put in the midst of people. Even because MIT primarily focuses on science, technology, and engineering, those are the classes -- as opposed to if it was a university that had liberal arts. You probably wouldn't learn from that group of people as much. But here, pretty much everybody has a scientific bent of some sort. And a lot of opportunities there.

INTERVIEWER: You often hear students say that most of their learning comes from outside the classroom. And oftentimes from each other. And MIT encourages that kind of collaboration. The team approach to things.

So how would you describe MIT's role in the world?

PAPPALARDO: Well the funny thing -- in Boston itself, MIT seemingly isn't known that well. It's funny. Harvard is far more famous in Boston. But the farther away you go from Harvard, from MIT, from Boston, MIT becomes more and more famous. I know when I go to Korea, which I tend to go to once a year to meet with this university. Because I'm an MIT graduate and have a ring that is a well-known symbol of MIT. And it's funny how you're a lot more popular. You're a lot more known because of your association with MIT.

But MIT, as you know these days, is involved in more and more activities outside of the Boston, Cambridge area. Our involvement with Singapore, for instance, which gets bigger and bigger each year. There's a lot of places. Again, my involvement with Korea is the same issue. There's a lot of -- I was at a conference a year ago, where I was, for some reason, one of the speakers. It was a conference of presidents of research universities in Southeast Asia. We had about 75 presidents of universities. From Korea, Japan, China, Australia, even Mongolia. Which surprised me that there was a research university there. I was the speaker at the lunch time. I was asked to give a speech on how universities could cultivate entrepreneurship. And use my examples of what happens at MIT. But because I was from MIT, the audience was very receptive to my talk. And afterwards, asked me more detailed questions about it. And you could see that these research universities throughout Asia certainly consider anything that MIT does as something to listen to, to think about, and figure out how they can do the same thing.

INTERVIEWER: Just in some of the examples that you've cited of MIT faculty, MIT students and their spin offs, companies that have been created. They seem to, in some way, fit into an answer to the fact that MIT is often called upon to solve some of the country's problems and some of the world's problems. Do you think that that's kind of the role that MIT plays?

PAPPALARDO: Well, to some extent it's characteristic of a school like MIT to solve problems in the first place. Especially in engineering. It's what engineers do. They solve problems here and now. They're not necessarily like science, trying to do basic research. They're instead trying to solve real honest to goodness day to day problems. Because engineering is still fundamentally MIT's strength and reputation. It would be natural to expect us to tackle some of the big problems of our day. Certainly the energy initiative that President Hockfield initiated in a formal way five years ago is a perfectly good example of this. And not only are we many of just consolidating, if you will, the large number of professors who are working on some aspect of energy into a more cohesive group of people. So that they can attract a larger funding for this. Is a typical example of us trying to focus on one of the largest problems of our day. How to provide enough clean energy for the future.

INTERVIEWER: Great thank you. Just shifting gears a little bit. You have recently supported a multi-year initiative to showcase the excellence of the MIT educational experience by preserving and sharing MIT's educational video content with a global audience via the web. What do you see are the potential benefits of this initiative?

INTERVIEWER: [LAUGHTER] Well it's funny you bring that subject up. To some extent, I'm perhaps paying for this interview myself. No, I think I've told you before. There's two aspects of it that are, I think, fundamentally important. One is to capture some of the great professors' lectures. There have been over the years a number of professors whose reputation for teaching was such that just to capture that on video so that all future generations would be able to see and hear and experience that. To me is fundamentally important. Just as a learning experience. More and more knowledge can be conveyed this way.

In the old days, books were a primary -- and still are, by the way -- but were a primary way to convey knowledge. Well videos have the same kind of format. You can see them on your computer, pause, repeat certain sections. You can hop ahead. You can revisit them on another day, another week, another month. And by having access to that, it's perhaps a better way to experience knowledge. Not just reading the written word. But seeing some of the experiments done in front of your eyes. And participating with the imagination and the enthusiasm of the professor. It accomplishes something similar to what we said before about visiting a professor in his lab, and getting his experience. That kind of thing. So I think this capturing of these videos will stimulate future generations far better than a book could ever do.

INTERVIEWER: And particularly when you have somebody with the genius of a Walter Lewin.

PAPPALARDO: Correct. And as you know, Walter has been in the hospital.

INTERVIEWER: I do.

PAPPALARDO: And I'm obviously concerned. Walter has always been a good friend, and I've known him a long, long time. But if 20 years from now, 50 years from now, his lectures will be as popular then as they are today because you have capture that for us. So that's clearly one of the reasons.

Then of course, the second reason is there's other things besides just professors teaching their courses. There are many events that happen at MIT that should be recorded for posterity. And these will ultimately become the history of MIT. And you know, though I can't imagine a better way of capturing these so that they're permanent than doing it with video and audio productions like you're doing. So I was pleased to be able to help support the effort that you and your staff have done over the years.

INTERVIEWER: It's greatly appreciated. So what would you like MIT to accomplish? Or how should it change in the future?

PAPPALARDO: Well, I maintain the only challenge MIT will have in the future will revolve around the high cost of a residential experience here. Because of the internet, because of available access to knowledge, be they video lectures, be they any kind of knowledge through the internet, it's unclear that we can justify spending the kind of money it takes to go to MIT. Versus having access to that knowledge base remotely, without having to pay the high cost of tuition at MIT. There will be more and more effort expended in people trying to figure out a less expensive way of educating our kids. And it will obviously compete one way or another with what's happening at MIT. The advantage MIT has, of course, is two-fold.

First you are among peers that are smart. Not just other students, but with the professors. And if you take advantage of that, that's hard to compete with. The second advantage is you can do hands-on research side by side with the same people. Fellow students as well as professors. But at the end of the day, the economic situation of spending -- it costs right now upwards of \$50 thousand a year between tuition, room and board, and other expenses to come here. \$50 thousand per year for a family is a very expensive proposition. So ultimately MIT has to make sure it can justify. Because that's effectively the amount of money it needs to pay for this institution. It's expensive to carry on the research that we do. And therefore there's no simple way other than to charge what it takes to pay for this place. And therefore we have to be very careful to make sure, though, that the quality education we provide at MIT is justified because of cheaper alternatives.

INTERVIEWER: And do you think MIT will be able to continue to provide need blind admissions?

PAPPALARDO: Well obviously I use \$50 thousand as the current cost on an annual basis. But the average cost, of course, after you factor in the money that MIT doesn't charge its students, the average cost is about half that. And that, of course, is based on need blind admission. I don't know. We can't do this forever. Because if you look at the last 15 years, the tuition has gone up approximately 4 percent a year. Financial assistance has gone up about 5 percent a year. And of course if you take that to the extreme, we can't continue to perform need blind. We've got to at some point level them both off. But right now, we've been trying our best to increase financial aid at a higher rate than we're increasing our tuition. So you can't go on forever like that. The two have to become the same, if you will, at some point.

INTERVIEWER: And this question isn't about at all the financial aid. This is just separate. But do you have any advice to offer to new students coming into MIT?

PAPPALARDO: Well, my only advice is there's a lot of opportunities here that they should take advantage of. I didn't take advantage of all the opportunities that were here. Other than first term freshman year, I found it very easy not to come to class. There were a lot of us that didn't come to class. And eventually you take your final and you get the grade in your final. Perhaps because you're living away from home for the first time and you're on your own, it's easier to fall into the trap to experience other aspects of life.

On the other hand, do I have regrets? Not particularly, because in my case, my confidence and enthusiasm and imagination compensated for perhaps the lack of my scholastic ability. But I think for the average person, they're in the best place they could possibly be. And my advice to them, of course, is to take advantage of this place. There's a lot to learn. There's a lot to experience. And I would hope they would be better students than I was.

INTERVIEWER: I think you over state that.

PAPPALARDO: Well, I lucked out. I mean I'm like many people. I would point out, I know many other MIT graduates who started businesses the same time I did. Their businesses failed. Mine didn't. Was there any fundamental difference between us? Probably not. They're just as smart as I was. They just -- you know, luck is a pre-requisite. And I happen to have lucked out. My business caught on before I ran out of money. You know?

INTERVIEWER: And what advice would you offer the administration?

PAPPALARDO: MIT still has a reputation of being very hard. It's very difficult. The students work very, very long hours. I think we could figure out ways to make the place a little bit more human. We've certainly gone a long way in that regard, increasing the female population here. And there perhaps are other ways they could try to focus on this not being such a hard place to get through. And I don't have any simple answers to it. And perhaps it's, you know, to play down its reputation. You know we still talk about the place as like a fire hose. You know what I mean?

INTERVIEWER: Yes.

PAPPALARDO: And perhaps there are better ways to portray the place that make it appear a little bit more human.

INTERVIEWER: Well during my time here, and also the time that you referenced -- 1990 through today. You know there have been great strides in terms of, you know, the Z-Center and improving the opportunity of student life and learning.

PAPPALARDO: So just to make sure we don't fall back into the old days. And to keep it going in the current direction.

INTERVIEWER: Thank you. Shifting gears again to wrap this up, or getting there. You've received a number of awards. You've received the Bronze Beaver Award. You're a Life Sustaining Fellow. You have an honorary degree from Suffolk University and the Korean Advanced Institute of Science. Plus you have your very own asteroid named after you.

PAPPALARDO: Plus I have a Presidential Medal from the government of Korea. I guess most governments have these presidential medals. And the Prime Minister of Korea visited me a year ago to present me with their Presidential Medal in science and technology for my helping out at KAIST.

INTERVIEWER: So what do these kinds of honors mean to you?

PAPPALARDO: Not much when it comes down to it. I told you the honors to some extent don't matter. The thing that continues to mean the most to me is that my work continues to help out well over 20 million people a year. That has the most meaning for me. Improving the health of our society.

Many of my fraternity brothers I know went to work for industry and military type of things. And I chose not to. I worked at a hospital initially. Making half the salary that my fraternity brothers made. Now of course I wanted to make sure I was working for a place where the funds came out of the public sector. And hence I was free to take those which I created, and made a business of it. But the reality is I was focused on doing things which I thought could help society.

INTERVIEWER: And bringing it back to MIT. MIT Nobel Prize winning physics professor, Frank Wilczek has characterized you as the "soul of the physics department." Where does that sort of recognition stand among the numerous awards?

PAPPALARDO: Well getting Frank to compliment me like that of course, I'm very appreciative. Frank is a brilliant scientist. And certainly he knows that I try my best to help out the department. And that's what he's certainly -- over the years I guess the physics department has considered me very, very helpful in many of the things that I've done for them.

But that's my generation. I'm sure in prior generations, Cecil Green probably did something very, very similar to the physics department. And I'm sure in the next generation there will be someone else. But the reality is what I'm doing for the department basically is part of my overall gift to MIT, because of what MIT gave me many, many years ago. It's just part of giving back. I'm pleased that I'm well liked at MIT. I perhaps have to learn how to say no from time to time on some of the causes, some of the committees, some of the things I'm asked to do. But as long as I'm healthy, I'm more than happy to do it.

INTERVIEWER: You have also been involved as a trustee for the New England Aquarium, the Mass Horticultural Society, the Dibner Institute, the Boston Lyric Opera. Why is this type of community important?

PAPPALARDO: Well I should point out that in all of those cases, I only give money, rather than I give time. And in fact my normal statement with them is I give this much money to you. If you want my time, I'll give you less money. If you leave me alone, I'll give you more money. They usually opt for the more money thing.

But the reality is that I don't mind lending my name on a board of trustees to any of these cultural institutions that both my wife and I enjoy the benefits of. We obviously give them money. But we also suggest to them that really what they should be doing is not trying to get my wife and I to sit on their board. I think Jane is a member of about six or seven boards now. They should be asking our kids to join their boards, leaving the older folk, my wife and I alone. We'll continue to give them money. But if they have our kids on their boards, over time, they'll ensure the next generation of help and aid to them. You know there, it's simply because we do enjoy living in Boston, enjoy the culture of Boston. Therefore, we believe we should be the ones who can afford to help them out. To indeed help them out.

INTERVIEWER: Is there anything that we haven't talked about that you'd like to talk about? I think we've covered -- Is there anything we haven't touched on?

PAPPALARDO: I don't think so, to be honest with you. I'm sure in recollect we can always conjure up one more thing. But I think you've done an excellent job covering as much of my life as is appropriate. I don't suspect I'll change very much in the future. I expect to continue being involved with my company until I die, to be perfectly honest with you. I still think I can contribute. Much of the day to day running of the company is left on the other officers now. And my wife and I continue to live in Boston and are very close to MIT.

The only thing that I really haven't said is my wife, herself, about 10 years ago, started to get involved at MIT. She was a product of BU. She got a degree in music from BU. But she joined the Arts Council and is now on a visiting committee at MIT, and comes to many more events than I thought possible. So the only thing that I lack is to start getting my kids involved a little bit. And I'm sure that'll happen in the future as well.

INTERVIEWER: I would like to end this interview, if I may, by again quoting you. This time from a very popular lecture that you gave at MIT in 2008 titled "Reflections on an MIT Education." You concluded by saying, and I quote, "May your own children be proud of you. Not only of your accomplishments in your respective fields of endeavor, but also in your contributions to society."

Your children must be very, very proud of you.

PAPPALARDO: I think they are.

INTERVIEWER: Thank you very much. It has been a real pleasure.

PAPPALARDO: Thank you.