

**HOCKFIELD:** Today Neil is going to take on the mantle of a teacher. He does this, but usually informally. But what he's going to do for us is extract lessons from life from his own experiences at MIT and his career. Now I think, if I know a little bit about the text, he intends it mostly for young people, so the graduate students, postdocs, and younger people, not yet graduate students or postdocs in the audience. But I can tell you from my own experience that Neil has a huge amount to teach all of us.

Neil was one of the very first MIT people I met when I joined the Institute just over three years ago. And it was just an incredibly important part of my MIT education. Now for most people, you come to MIT, and a standard education takes about four years or more. You all, I'm sure, are as acutely aware as I am that I have not yet completed four years. So I remain avidly Neil's pupil, and actually all of your pupil. But it's wonderful to have Neil among my many, many teachers here at MIT.

Neil knows a great deal about MIT's history. And together with Jane, his wife-- there you are, Jane, great-- through their incredible and wide-ranging generosity they have very much helped to shape MIT's present. And today I think Neil will help us get a glimpse of MIT's future.

Now MIT has exciting new leadership in many quarters. And over the semester and the next we've been embarking on a vital, I would say unprecedented, period of inter-school in cross-departmental collaborations. And it's not often that the deans of two schools would come together to celebrate the contributions of a single graduate. And I want to thank [INAUDIBLE] and Mark for the kinds of collaborations they had together as department heads and now continue as dean, but also the collaborations that we're seeing today in this joint hosting of Neil's talk.

Now for those who don't know Neil, let me just give you a few biographical facts. I believe his talk today will give you some greater detail about his life. Neil graduated from MIT in 1964 in Core 6. It's not exactly that he started out in Core 6, and that's an interesting story, and I'm not sure we'll get that whole story. But at the end of the day it was Core 6 in which he got his degree. But then he went on very shortly after work to found MEDITECH, which was a pioneer in medical systems software.

From my vantage, I see this rush toward these integrated electronic medical records, we hear a lot about it, they are absolutely critical. But one of the things I find actually astonishing about Neil is he understood the potential of electronic medical record when most people hadn't even got their hands onto computers. So he pioneered the field, and MEDITECH remains the leader in the field.

Now while he is, I would say by anyone's measure, a legend in his field, you will also discover, if you don't know him already, that he is the warmest and most genial genius that I think I've ever met. He and Jane have used their resources to benefit MIT in an extraordinary range of ways, from helping to fund the Magellan telescope, which then helped us to assemble an extraordinary group of astrophysicists.

He funded what I like to call making a renovation of a place that is one of the few places in MIT that doesn't feel like a basement, but it actually is a basement. So he helped renovate the labs that we now call Pappalardo 1 and Pappalardo 2-- spell 2 any number of ways and they all work. And I think many of the students here today have spent happy hours wrestling with various equipment, drill presses and other things.

He also, he and Jane, also created the Pappalardo fellowships, which have become perhaps the most prestigious physics fellowships anywhere. These several acts of generosity I would say only are the beginning of a very, very long list of extraordinary ways in which Jane and Neil have impacted MIT's present. So rather than go on about Neil's life, and career, and insights, which he will provide yourself, I would like you to join me in thanking Neil and in welcoming him to the podium as our instructor today. Neil Pappalardo.

[APPLAUSE]

**PAPPALARDO:** Does this work all right? I feel sort of odd correcting one of the things she said. She referred to the labs that we did as the basement. For the amount of money it cost us, I refer to it as the ground level.

[LAUGHTER]

**AUDIENCE:** We're never allowed to use that term, Neil.

[LAUGHTER]

**PAPPALARDO:** It's actually a privilege for me to be here today, especially in this lab, this lecture hall. The beauty of this lecture hall, unlike 10-250, which is about ready to change, but I've always struggled in 10-250. The width of the seats in 10-250 are simply too narrow for me. So as you may or may not know, we're actually enlarging the seats in 10-250. I'll take that as it was done and paid for by MIT especially for me.

Again, I'm deeply honored to be here today. It's a tremendous privilege to be speaking to all of you. Obviously I'll be sharing some of my thoughts and experiences with the MIT community. I am a graduate of MIT, as Susan has pointed out. MIT, of course, is a world class institution which specializes in science, engineering, and technology, among other things. Accordingly, I believe my experiences after graduating from MIT may parallel those of you poised to graduate someday from here as well as those of you starting your formal careers. I will share some of my life with you now, if only to give you an idea of the possibilities that lie ahead.

An MIT education will awaken creativity and discovery within you. It's now January, 1964. I'm 21 years old, a senior at MIT majoring in physics. I'm actually shocked to discover that a thesis is required in order to graduate. Although I've received a rigorous education in science and engineering, this education has consisted entirely of analysis. I've yet to attend a single course on design-- I'm pointing to the Pappalardo Professor of Design over here. I've yet to attend a single course on design or synthesis. Yet, I'm expected to deliver an original thesis, something very creative.

Because of my interest in medicine, I decide to base my thesis on a medical topic. My thesis advisor, a professor in electrical engineering, introduces me to a couple of cardiologists at the Peter Bent Brigham Hospital. They explained that certain patients suffer from episodes of an erotic-- erotic, woo.

[LAUGHTER]

**AUDIENCE:** Dr. Freud.

[LAUGHTER]

**PAPPALARDO:** Of an erratic heart rate.

[LAUGHTER]

This condition suggests an abnormal heart, and is a clear indicator of a future heart attack. The cardiologists, it turns out, are happy to share their problem with me. They use a small battery-operated tape recorder that's attached to the patient and records the electrical signal from the heart. An EKG records it on a tape for a 24-hour period. The tape recorder works fine. The problem stems from attempting to analyze that signal. This process is simply too tedious and time consuming to allow them to visually examine for a 24-hour period each individual heartbeat, looking for arrhythmias. They wonder if I could build a device that would electronically examine this signal for arrhythmia, and perhaps even characterize the type of arrhythmia. There's various types of erratic heartbeats that could be characterized indicating different kinds of problems.

Excited by this great challenge-- hey, I could do this-- I decided it would make a wonderful thesis. My thesis advisor agrees with me, and of course wishes me the best of luck. In the era that I went to MIT, that's about as good as it gets, having a professor say, good luck. My solution is straightforward-- I'll play back the signal from the tape recorder at a very high speed, perhaps reducing 24 hours worth of heart rate into perhaps one hour, and have special purpose analog and digital circuits of my own design, which will not only detect and characterize episodes of arrhythmia, but it should be able to count them as well.

Within four months I have the device working. I should point out I had spent the prior four summers working for Bausch and Lomb in a laboratory teaching the older engineers all about transistor and digital design. So even though I was a physics major, I was pretty confident I could pull this one off. Anyways, within four months the device was working. Not only that, it worked just as I intended. I composed my thesis document, and my future wife Jane-- raise your hand, Jane-- my future wife actually typed it for me. It was an awful lot of work for her. Of course this is well before word processors were invented.

I submitted the document, prayed, prayed an awful lot that it would be accepted and that I would indeed graduate. It did. And a week later I indeed graduated from MIT with a Bachelor's degree, not in physics though, but in electrical engineering. I apologize to all the physicists here. Are there any electrical engineers here? Hey, I got one back there, the provost. All right, thank you.

[LAUGHTER]

Whew. That's why you like me so much. I see, I understand.

Soon thereafter, I was contacted actually by a medical device company that wanted to commercialize this device. I readily agreed. Thus ended my first exposure to the creative process.

It says there MIT graduates will be unhindered by the skepticism of the established order. Boy, I love that sentence. Unhindered by the skepticism of the established order. It's now June, 1964. I'm 22 years old and a brand new graduate of MIT.

Stimulated by my thesis work, I join a research group at a local teaching hospital. This time it isn't the Brigham, but it's Mass General Hospital. I'm actually once again surprised to discover something. In this particular case it's not that I had to do a thesis. I'm surprised to discover how complicated a hospital is. Even more surprising is how error prone the various clinical processes are going on within it. Not only are various doctors in charge of multiple patients, each doctor utilizes a staff of perhaps 50 clinicians, made up of nurses, laboratory technicians, pharmacists, radiologists, and others to treat each patient. As if this isn't enough, most of these same clinicians are also simultaneously dealing with numerous other doctors and their patients.

I'm amazed, absolutely amazed, that anyone manages to do the correct thing for the correct patient at the correct time. It seems to me that a computer system could be developed which could effectively orchestrate the various clinical processes. I immediately focus on learning all there is to know about computer hardware and software, with every intention of creating such a system.

I am armed with a minimal mound of book knowledge on computer systems, but I decide to offer my solution to the hospital's administration. I decide to offer it to the medical staff. I decide to offer it to the research community. Actually I decide to offer it to just about anybody that would pay attention to me. The feedback-- overwhelmingly negative and consistently critical. Everyone knows that computers could be used for financial accounting, but they'll never be able to quote "orchestrate" the clinical processes of treatment and care. Besides, even if it were possible to do such a thing, to develop such a system, it could never be done by a young man as me.

Someone slipped in another slide. Perhaps this is time for a personal anecdote. A picture of blood, a picture of a piano. I pointed out my wife typed my thesis. Actually she wasn't my wife, she was my fiancée, typed my thesis. We got married right after I graduated. I graduated in June, we were married in August. Obviously, by the way, we're still married. She had just completed her junior year at BU, majoring in piano at the School of Fine and Applied Arts. I figured out very early after we got married that I had one year, our first anniversary. If I didn't buy her a piano as a present for our first anniversary, I was dead meat.

Now in that time frame, things were a little tough for our family. She got pregnant right away, things were tough. I made a salary about half the amount that my fraternity brothers were making working for industry. But I wanted very much to work in a hospital, and I was perfectly satisfied making far less than them. But we were essentially poor. One day Jane and I went strolling down Boylston Street and stopped at the Baldwin store-- not the Steinway store, that would be the Baldwin store. Noticed the nice piano that Jane liked, \$600. I was making \$400 a month at Mass General. The likelihood of me being able to afford a \$600 piano for our first wedding anniversary was essentially impossible.

But it occurred to me, I worked at a hospital. At hospitals there's always a market for bodily fluids. That's why I put blood here, in case somebody was thinking of another type of bodily fluid.

[LAUGHTER]

I asked around and found this research program that would be more than happy to take actually Italian or Sicilian blood for an experiment. They needed a pint of blood every three weeks for 12 weeks. Tough negotiation, they were willing to pay me \$50 a pint. So I immediately enrolled in this program. For those of you that don't do the math, that's 12 times \$50, \$600, that's what the cost of the piano was. I was in fat city. Actually I soon became in thin city. By the 10th pint, I had pretty much lost about 25 pounds. And even though I wanted very much to complete this program, the likelihood of me doing it was going to be pretty slim.

So with \$500 only, I went to the Baldwin store. You ever seen a grown man cry on his knees in front of a piano? Anyways, they had sympathy on me. They sold me the piano, including the sales tax, for \$500. Had it delivered to our apartment house for our first anniversary. Obviously it worked out very well, she's still married to me. So, woo. So that's a little bit of personal information about me. It was unclear I was going to tell this story, because I have some grandchildren here and I was afraid they might get a little nauseated that I had to give blood simply to stay married to their grandmother.

[LAUGHTER]

Life continues. A rigorous MIT education will ignite passion within you. It's now September, 1965 and I'm 23 years old, still working at the hospital. During the past year I've added to my knowledge of computer systems by taking every computer science course MIT has to offer, all two of them. I've managed to confiscate a modest sized computer, which apparently no one needed in one of their research labs. Most importantly, I've created the first of a series of high-level computer programming languages. Eventually these languages will serve as the technological foundation for a computer system orchestrating every clinical process within a hospital.

Unaware of, therefore undaunted by, the scope of the undertaking, I set out to create software to automate the hospital's clinical laboratory. Not only is the clinical laboratory one of the most important departments, it's also one of the busiest-- it processes a plethora of diagnostic tests that are continually requested by the doctors. It's the responsibility of the laboratory to collect blood or urine specimens from various patients, to perform the required test procedures on them, and to report the test results back to the doctors. It's a complicated process, and quite often specimens are collected from the wrong patient, or the wrong test is performed on a specimen, or the result ends up in the wrong patient's chart, or any combination thereof.

After six months of long hours, I, along with two other programmers, produced the so-called automated laboratory system. We set up our system within the laboratory at Mass General using a small computer, six terminals, and a printer, and trained the laboratory personnel on how to operate the software. The system works, not without a few unintended consequences. Later generation will call these bugs. Were happy to make the necessary adjustments, thereby improving the system. And from then on, the laboratory realizes a significant reduction in errors.

Emboldened by our success, I search for other areas of the hospital ripe for automation. Over the next two years I gain a vast amount of knowledge about the inner workings of a hospital. During this time I begin to imagine the next step for me, creating a software company to provide these solutions to other hospitals everywhere, and in the process to contribute to the improvement of the national health care system within America.

A MIT degree will open doors and bestow confidence. It's now 1968. I'm 26 years old and the father of three. I've just learned my wife Jane is once again pregnant, with our fourth child. The time has come to leave my work at MGH to others. I develop a business plan and I devote myself full time to raising the money necessary to form my company.

The venture capital community in Boston is more than happy to open their doors and meet with me. I explain my intention to sell my automated laboratory system software for \$25,000 a copy. The doors remain open. Of course when I mention that in order for the software to actually work the hospital would also require to purchase a \$200,000 computer system from a computer manufacturer, it's amazing how quickly the doors close.

Disillusioned, but not discouraged, I modify my business plan with a simple idea. I'll run the software on my company's computer and connect to a display terminal and a printer at a prospective hospital customer. I'll use a phone line to make the connection from their site to the company's site. I would charge \$1,000 per month without any contract, and the hospital could try this system out before making a serious commitment to buy. Even though this idea, quote "try before your buy" quote, requires significantly more money to start my company, the venture capital community was impressed, and I raise over \$500,000.

MEDITECH is formally born on August 4, 1969, the very same day as my fourth child. I realize my dream to start my own company. Missy, you here? Where are you? Oh, there she is. She's the fourth child. Woo. We gave you a pitch, Missy, it's okay.

The next seven years are spent overcoming not only the traditional challenges faced by any brand new company, but also those unique to the emerging software industry. Perhaps the greatest challenge was simply explaining what software was. Potential hospital customers had little or no idea what we were selling, and more importantly, how it could possibly benefit them. Potential MEDITECH employees needed to be convinced that providing software to hospitals would ultimately lead to a viable business. How the world has changed about software today than it was then.

Despite the climate of skepticism regarding software, I had actually become convinced that hospitals would be best served by automating not just the laboratory but all of its clinical, administrative, and financial departments. Furthermore, although individual products could be operated in a standalone fashion, maximum effectiveness would be achieved when they were used in an integrated mode, sharing access to the common clinical, administrative, and financial records of the hospital.

In addition, we needed to replace the traditional paper medical record with the electronic medical record. Multiple clinicians must be able to access a patient's data from anywhere within the hospital or from anywhere outside of the hospital. Multiple clinicians must be able to read the data or update the data concurrently. This is actually fairly easy to do from a technical point of view. It's far harder though to convince clinicians that computers are actually easy to operate. Although setting MEDITECH on a course involving the simultaneously development of numerous systems is seen by many as risky, perhaps even foolish, I'm confident that's the only way to achieve long-term success for MEDITECH.

MIT graduates are destined to achieve professional success. It's now August, 1981. I'm 39 years old and MEDITECH is 12 years old. By now the development staff has created a comprehensive and cohesive set of clinical, administrative, and financial software products designed from the outset to work in conjunction with the overall operation of the hospital. This cohesive set of software products allows MEDITECH to offer a true hospital information system.

Not surprisingly, MEDITECH's sales staff is now finding it easier to convince hospitals to buy our products. Our implementation staff is not only installing the software, but also training the hospital staff in how to use it effectively. Our ever-growing service staff provides the continuous support 24 hours a day, seven days a week. And I should add, as a company we now live by the rules of the technological e-- we must continue redeveloping our products, we must anticipate the needs of our customers by adding appropriate functionality, and we must strive to make the human interface easier to comprehend and easier to use.

It's at this a point that I've become convinced of MEDITECH's continuing success and prosperity. I'm equally certain MEDITECH will make a fundamentally important impact on the delivery of health care within hospitals. Only one true challenge remains-- carefully managing the growth of MEDITECH to ensure that it always delivers a quality product which serves our customers, which our employees believe in, and which creates sustainable opportunity for growth.

Oop, once again a personal remembrance here. I think many of you know, Pappalardo is not your traditional Irish name. My heritage is Sicilian. Many of you should know that while most Sicilians work the right-hand side of the road, there's a few Sicilians that work the left-hand side of the road. My mother, a product of third grade, wanted very much for her two sons to work the right side of the road. In her mind it was very simple-- my brother, my older brother, was to be a lawyer, and me, I was to be a doctor, those being really the only two professions my mother knew about.

And of course she spent a lot of time wondering. When I first came to MIT, she didn't know MIT from xyz. But when I started working at Mass General Hospital, she was very happy, thinking I was well on my way to becoming a doctor. Of course after three years I left Mass General and started MEDITECH. She clearly knew something was up.

And from time to time, she would ask me, Nino-- for those of you that don't know, my name isn't Neil, my first name is actually Antonino, and the normal diminutive for Antonino in Sicily is Nino-- what is it that you do. She asked this repeatedly with me, many, many, many times. Of course I would attempt to explain to her the technological concept of software, which typically went totally over her head. But her real reason for asking was a simple one-- she wanted to know if I was working the right side of the road.

She knew in our early marriage, as I pointed out before, things were tough. In fact, for about almost 10 years things were really tough for us. Four kids, Jane of course had a far harder job than I did. I was only trying to found a software company. She was raising four kids, all of a year apart, did a wonderful job I might add. Things were tough. We never went out to eat. My mother knew things were tough for us. We only had used cars.

Then after about 10 years of MEDITECH, her son looked like he started to do all right. Things were looking up for her son. He bought a building out on Route 128, the old Underwood Deviled Ham corporate headquarters, a very nice building out in 128, from the dingy quarters in East Cambridge that we started with. My mother decided it was time to come and visit her son now that he's starting to be successful. But really she wanted to know what exactly it is that I do.

So I took her to our new building. She was very impressed with the physical plant, wanted to go inside and look around. Everywhere she looked, she saw, presumably, staff members working at their desk, the computer screens in front of them, and usually a phone in their hand. She went upstairs, saw the same thing, she went downstairs, saw the same thing. And all of a sudden she started to cry, bit her like this-- that's what my mother always did when she was upset, she bit her forefinger and ran outside. And I went chasing after her. Mama, mama, why are you crying? She looked at me. Nino, are you making book?

[LAUGHTER]

Mom, it's legit. Believe me, your son is legit. She's dead now. The sad part is, I'm glad to some extent she did pass away before we bought our fourth building, which happens to be in Canton. It's the building I working on. We happen to own a racetrack at that building.

[LAUGHTER]

A stable full of horses.

MIT graduates will give back to society and to their school. It's now April, 2008. I'm 66 years old and MEDITECH at 39 years old is one of the world's oldest software companies. Its information system is installed in over 2,200 hospitals throughout the United States, Canada, and the UK, and various other places around. Each year MEDITECH helps to improve the health care of over 25 million hospitalized patients.

Although I continue to play a very active role in my company, I now devote much of my time to MIT, making whatever contribution I can to help it maintain its world class status. Believing it important to give back, not only to my alma mater but to society in general, I also contribute financially to a wide range of cultural, educational, and social service organizations within the greater Boston area. I feel incredibly fortunate to be able to make a difference in my community.

I have no doubt that all of you, as members of the MIT community, will make an impact in whatever field you choose. Your contribution to society should not be limited, though, to technical endeavors. There are many meaningful ways to give back, whether it be teaching, lending your time or experience to worthy causes, or even sharing your financial success. Remember-- the cost of an MIT education has been subsidized by our society.

MIT graduates will embark on a journey of their own. My purpose here is not simply to talk about myself, but to relate the story of my journey, one which I believe should resonate with all of you. But like most stories, it makes sense in hindsight, when one can finally reflect on everything that has come before. Although my story nearly complete, I have no doubt it will be similar to the one many of you will author. My hope, therefore, is to leave you with some simple but very important lessons learned.

Engage your creative talents and capacity for discovery. Follow your passion and make it your life's work. Remain confident in your abilities and do not waver in the face of skepticism or adversity. And above all, should you come to be rewarded for your hard work and dedication, never forget your obligation to your family, to your university, and to your society. I end this talk with a final wish from members of the MIT community-- may your own children be proud of you, not only of your accomplishments in your respective fields of endeavor, but also in your contribution to society.

[LAUGHTER]

Thank you.

[APPLAUSE]

**MODERATOR:** For the wonderful lecture. We're going to have an opportunity for some question and answers for Neil. I wanted to start with one, and Mark has a question, and then we'll open it up but everyone. First of all, on behalf of the School of Engineering I want to thank you for all the wonderful things you have done. And in fact, the basement, or ground floor--

**PAPPALARDO:** Ground floor.

**MODERATOR:** --is a wonderful opportunity. In fact I took a walk today and it was wonderful to see so many people working there. My question to you is this-- you're a graduate of electrical engineering, and MEDITECH is a company that created computer software in the health care area. We can understand that. You also studied in physics. And your passion for physics and your generosity to the physics department is understandable. But also you have been very kind to our mechanical engineering department. And I wanted to ask you about your passion for mechanical engineering.

**PAPPALARDO:** Actually Paul Gray might know the answer to that. In the early years I think I pointed out with my thesis I had never taken any courses on synthesis, on design, anything creative. And I used to complain in the early years after I graduated in a very bitter way that I thought MIT was doing a big disservice to its graduate not being able to teach design. Anybody I talked to within MIT always hid behind the standard answer-- we don't really know how to teach design, we know how to teach analysis.

And then one day I was introduced to the mechanical engineering department, which I think you know, [INAUDIBLE], you're a mechanical engineer. Design is one of the strengths of mechanical engineering. They had design courses, and I was introduced to a number of the fair-haired professors in mechanical engineering who actually taught design. The first of which they rolled out for me was Woodie Flowers. And that taught me, first and foremost, how fundamentally important the mechanical engineering department was, because they really had a strong reputation and a knack for teaching design. They didn't hide behind we can only teach analysis. And that was the moment that I became not only involved with mechanical engineering, but actually more involved with MIT as well. That's my answer.

**KASTNER:** So thank you, Neil, on behalf of the School of Science and the department of physics. Soon we'll adjourn to the atrium of the new Green Center, which would not have been built without Neil's generosity. And we have lots of interesting stories about that too. The question I wanted to ask is, if you were starting out now-- you know more about MIT than almost anyone, having been on at least three visiting committees and the executive committee of the Corporation for a long time, you know the ins and outs of MIT-- if you were going to start over again now as an undergraduate, what would you study?

[LAUGHTER]

**PAPPALARDO:** It's an interesting question. I'll make no bones about it that I still like to believe that physics is certainly one of the great forces.

**KASTNER:** Right answer.

[LAUGHTER]

[APPLAUSE]

**PAPPALARDO:** He doesn't know why I said it's one of the great courses, but I'm going to explain to you, because I also wear another hat here. Those of you who don't know that, I have been chairman of the MIT Audit Committee for the last 12 years. And it appears that no one is stupid enough to take that role, so I'll most likely be chairman for the next 12 years. And what I have learned is that the physics department spends more money on dinners for its faculty, senior and junior, and its students than any other department. And you know, be honest, I like eating food. It's part of--

[LAUGHTER]

[INAUDIBLE]. So that's the primary reason I'd opt for physics, Mark. Oh, I'm sorry was another reason?

[APPLAUSE]

I've said that joke 100 times, he knows that. It is actually is a true statement. On a per capita basis, they do spend. But there is a reason, by the way-- it brings the physicists together. It's one of the departments that is perhaps the most spread out throughout the Institute. And providing food causes people to come together. And that was the primary-- in fact, Mark is the one, because the budget went up by about a factor of three the moment you became department head.

[LAUGHTER]

It's amazing. Now that he's dean the science, he's putting the kibosh on that whole food budget. Sorry, I don't know what to tell you.

But actually, physics is certainly a great thing. It teaches you about a lot of things. What it doesn't teach you, though, is design. And that's probably okay. But on the other hand, introducing a finite number of design, how to make something that's never been made before, how to discover something that's never been discovered before, those kind of things I believe are exciting for the MIT community. So sorry, [INAUDIBLE].

**KASTNER:** Let's open it to questions from the audience for Neil.

**PAPPALARDO:** Anybody? What an easy act to follow.

**GRAY:** Neil?

**PAPPALARDO:** Yes, Priscilla.

**GRAY:** I'm inclined to say that [INAUDIBLE] would be extraordinarily proud of you. He had a saying that you always left the campground better than you found it. You have done that.

**PAPPALARDO:** Well, thank you, Priscilla.

**GRAY:** Thank you very much.

[APPLAUSE]

**PAPPALARDO:** For those of the young people that don't know who spoke that was Priscilla Gray, sitting next to, of course, her husband Paul Gray, one of the great fixtures here at MIT. He taught me my first course on transistor theory, way back when. I remember it well. And of course he's been everything. He's been the provost, he's been the president, he's been the chairman of the Corporation, and he's been one of the great professors-- before that one of the great professors of electrical engineering, after that. Thank you, Paul, for all you've done for MIT.

[APPLAUSE]

**KASTNER:** So if there are no other questions. Oh, is there a question up there? Go ahead.

**AUDIENCE:** I had a question on the implementation of MEDITECH products from a technical versus a social perspective. You talked about the technical side. Can you talk a little bit about the social side of how you were able to integrate the software package using your environment that probably wasn't forthcoming and welcoming.

**PAPPALARDO:** Resistant. Certainly that has been the traditional problem for many, many years, and it still goes on. We clearly have a very comprehensive set of software, which today hospitals have to have in order to simply open their doors and operate. But on the other hand, there's still a large resistance of using the class of software that I particularly, personally, work on, which is trying to orchestrate the clinical process.

The dilemma is physicians. With the software that I particularly develop, I try to orchestrate what they do. I try not to give them the opportunity to order any possible drug, at any possible amount, at any possible frequency. Instead, I try to generate a short list of the orders that may be appropriate in this particular time frame for this particular patient based on what the diagnosis is, based on where they are in their pre-op or at post-op process.

The dilemma with removing freedom of choice from professionals like physicians, it's an uphill battle. Lately we certainly have been able to restrict freedom of choice in many of the clinicians in the hospital. In particular, medication errors, one of the big fundamental problems in hospitals, medication errors. Starts, of course, with the physician-- rather than ordering the medication directly from a computer, prefers to have one of his or her minions order it, and tells the minion order this particular medication for this particular patient. Hence, one level of transcription.

But on the other hand we have cubby-holed many of our customers, the nurses that administer the medication. We make sure before a medication can be administered to a patient that there's a positive check between the machine-readable code on the patient's wrist, with the machine-readable code that's on the medication order, with the obviously machine-readable order that's in the computer, to make sure the right drug is given to the right patient at the right time.

We have 2,200 active hospital customers. This product has been available for about six years. Here we are. So what fraction of 2,200 hospitals are actually using this system as opposed to the old-fashioned way? Got about 120 today.

There was a big thing done on *60 Minutes*. The movie star whose two children were given an adult version of a blood thinner, over-medicated. Didn't die, it came out all right, like thank god, most human beings actually resist medication errors.

But it's a fundamental problem. When you remove freedom of choice from professionals, it's a long road to get them to eventually-- my hope of course is not the current generation of doctors, but the next generation who are used to using computer technology will be the ones that will be easier to implement such systems. And of course I could use it as example, infection issues in hospitals. But I won't. Everyone knows that's the biggest fundamental problem in hospitals. That's where the bugs are. You want to get an infection, go to a hospital.

Any other questions of any sort? Yes, [? Dietrich? ?]

**AUDIENCE:** What's been the biggest--

**PAPPALARDO:** The assistant dean of engineering. Works with [INAUDIBLE]. I've known, [INAUDIBLE] a long, long time. Yes, [? Dietrich? ?]

**AUDIENCE:** So what what's been the biggest surprise in your career? A lot of the things you talked to us about seem like you knew where you wanted to go and you just were realizing that. What's been the biggest surprise?

**PAPPALARDO:** The biggest surprise? Well. I would say it's a joke, of course, that my mother still was, when she died, she was still suspicious whether I was running. Actually I'll be honest with you. I really haven't had any surprises. I've been very, very fortunate. The goal I set out for myself, I think, I have pretty much achieved. Certainly it was difficult starting a software company. Software was second nature to me by the time I left Mass General.

So I guess my biggest surprise was how difficult the acceptance of software would be in the late '60s, early '70s. For those of the young people, the way computers were sold in that era is you sold them to companies, and to industry, and to research labs. And simultaneously they would hire programmers to program those computers. There wasn't software for sale like there is today. And I'm trying to sell just software.

I pointed out earlier that I was trying to raise money. I didn't realize the leverage involved with selling a \$25,000 piece of software when they had to buy a \$200,000 PC computer. I didn't want to sell hardware, I wanted to sell just software. So I guess my biggest surprise was how long it took for the particular class of customers that I dealt with for them to start accepting software. Today it's second nature, right? Everyone knows what software is. I'll show you. Paulie, my oldest grandson, stand up. What's software?

**AUDIENCE:** Software is what makes programs run [INAUDIBLE].

**PAPPALARDO:** See?

[LAUGHTER]

Wow.

**KASTNER:** I'm glad you didn't ask me.

[LAUGHTER]

**PAPPALARDO:** Anyone else?

**AUDIENCE:** Neil, to be successful also means you must have had competition.

**PAPPALARDO:** Yeah, we--

**AUDIENCE:** So how do you see the role of being engaging and innovation in the face of competition.

**PAPPALARDO:** Well, first I would like to believe that the trouble we had in the early years is there wasn't any competition. There is of intrinsic benefit of competition-- it starts to add credibility to what you are doing. In the early years, not only were there not other software companies selling to anybody, there weren't software companies selling to hospitals. Today of course, the world is different. So I'd argue that competition is probably the best thing that happened to us.

Today in time keeps us on our toes. Obviously we compete every day to make sure our products are better, cheaper, are more effective, less error prone, do everything like that. So competition, as it always has been, is about the healthiest thing that could happen to society. And so be honest with you, I don't take it-- we do have competitors.

We're fortunate that we have probably the largest share of hospitals in America. We have a 25% share of all the hospitals in America. We have a 40% share of all the hospitals in Canada. So we're pleased. The president of MEDITECH now-- I'm no longer the president-- I don't know if he's even here today. I can't see that far, anyways. But it's his job to continue to increase that. And not only in the English-speaking world, like Canada, and the UK, and Australia, but we're making a big move converting all our products into Spanish so we can move south. Any other questions?

**KASTNER:** I think one more and then we'll call a close.

**AUDIENCE:** So [INAUDIBLE]. I'm actually an MIT student. And so I'm just wondering what was the key for you, or when was it clear for you, that it was time for you to start your software company? What was the key for you to make that jump between working for [INAUDIBLE] or--

**PAPPALARDO:** Really, it's actually a very good question. Certainly it was in the back of my mind, like it is in many, many MIT students. It'd be nice to start a company, be your own boss, especially around some sort of technology. In my particular case, the system that I had developed at Mass General, visitors from other hospitals would come and visit and want to see what I've done. And I would do show and tell. And then they'd ask me the very simple question, well, how can I get a copy of that? Since this was paid for with public funds, as far as I was concerned, it was free. So I said, here, if you want, I'll give you a tape. The dilemma of course is, that wouldn't help them too much. Not knowing how it's programmed, not knowing how to support it, maintain it, evolve it, add to it, et cetera.

So that's when I became-- this really happened by the time I was 24, that I realized there's probably a market for this. Because enough people saw what I was doing. It was certainly advanced for that time frame. And that's when it became clear to me that the only way, perhaps out of pride, that I would ever get my work into the marketplace was actually to start a company specifically to carry my work forward and get it into the marketplace. Fair enough?

Listen, I want to thank you all, especially Susan, for giving me a nice, warm introduction. Thank you all for coming. I think--

**KASTNER:** There's a reception--

**PAPPALARDO:** Is a reception.

**KASTNER:** In the atrium.

**PAPPALARDO:** Go that way, take your first right.

**KASTNER:** Around the corner. Let's thank Neil again.

[APPLAUSE]