INTERVIEW
WITH
STUART MADNICK
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SLOAN ORAL HISTORY SERIES

S: Stu Madnick
B: Bob McKersie
G: George Roth

G: We were just talking about the background for the interviews, and Stu noted that we were missing potential for materials because he had been in the same office in E53 for a long time. You were saying that on one weekend you threw out a lot of things in order to move to new office in E62?

S: It was 24 boxes of materials, many of them with a little tear in my eye. For example, that included the 1980 East Campus computer forecast or planning report. I suspect that was the only copy still in existence. So there's a number of historical documents that are now lost to the sands of time. Fortunately, I brought a few documents with me, which I will get to as we go. But there would have been a lot more stuff. And every now and then, I'd get a call from someone, either dealing with a patent matter, or a lawsuit, or something, and they'd say, "Do you happen to have....?" Because I'm a packrat. It's amazing how often I AM able to find documents from centuries ago, as it were.

                I gave this a little thought, and this is where I hope you will ask me questions, guide me.

B: Oh yes, we're going to ask you lots of questions.

S: I had a thought about how to organize my thinking with a little bit of structure to it, into four bins. The first one is almost Pre-Sloan School bin – a little bit about how I got to MIT. That's probably not your central focus but I'll spend as much time on it as you want to. As I mentioned, a fair amount of that is addressed in this thing that the OCW (OpenCourseWare)

people did. They interviewed, much like you are but a shorter interview, as well as a number of the faculty who are on the OCW course, to help people get a little idea the professors, to make it a little more personal. "What made you decide to become a professor?" Things like that. It's much more "folksy." I talk a little bit about my early MIT experience.

Then regarding Sloan, I mentally divided that into 3 bins. I'm not sure what order to do them in, particularly regarding the IT Group, which I've been part of.

I think Sloan School does a poor job of record keeping. I don't know if any place actually records who was a group head over the last 50 years. At MIT, the department heads I suspect get institutionalized in some way. Because groups are strictly an internal notion within the Sloan School, they probably do not.   The reason I say that is I've been group head for more than 20 years, on and off, but I don't know if anybody would know that or not. One bin is about the IT Group within Sloan.

Second, about computing in general within Sloan. Probably not a lot about that, but some comments about that has changed/evolved over time.

Then my overall sense of how Sloan itself has changed over that period. I would probably break my time at Sloan and MIT into three subcategories: From 1962-1966 I was an undergraduate and had relatively little to do with Sloan other than some classmates who were Sloan undergrads. In 1966, I went into the Sloan Masters program. It took me three years because I actually did a dual masters – one in Sloan and one in (at that time) Electrical Engineering. In 1972, I became a member of the faculty. So I saw Sloan both as a student for a three-year period, and then for the last 42 years as a faculty member. That's my experience of Sloan more broadly.

Are there any preliminary kinds of questions you'd like me to focus on before I begin?

G: I think you have well covered it. One of the things that is always interesting is what brought you to MIT. You've been here for three degrees, and for your career thereafter....

S: Actually, it's five degrees.

G: That's right. You have two Masters.

S: I also have an Engineers degree, which you probably never heard of. It's a little bit like.... what do you call it? Everything except a thesis. Basically you complete all the course requirements for a Ph.D. but haven't finished your thesis yet.

G: ABD? All But Dissertation?

S: Yes, but that's not a real degree. I actually HAVE an MIT Engineers degree, which I guess is probably more commonly done in the Engineering School.

B: The place to start would be what prompted you to come to MIT as a freshman, as an undergraduate? Right back to when you're in high school, and you're thinking about where to go to college.

S;   I don't want to go through a lot of the early life, some of which is in that OCW piece. But just to put things into perspective a little bit – as far as I know, no one in my immediate family had been to college, which is not unusual in that era. I did have cousins who had been, so it wasn't an unknown phenomenon. The reason I bring that up is, I didn't really have a lot of people to talk to about the whole idea of college in general, or MIT in particular. I can't quite remember the person's name, although I could probably find it somewhere, but I had a math teacher.... I was born in Worcester, Massachusetts. When I talk to people, I say I came from "out west". If you know Boston geography, Framingham is west, Worcester is the Far West.

G: My daughter graduated from Clark University in Worcester this summer.

S: So did my older brother. I was in school in Worcester. Among the schools I applied and was accepted to was Worcester Polytech. For lots of reasons, mostly having to do with convenience and economics, I was really leaning strongly toward to going there. They offered a modest scholarship but because the tuition was much less, the overall effect was even stronger. I can't remember exactly what advice my math teacher gave me, but basically it was:

"You can be a big fish in a small pond, or a smaller fish in a really big pond. The latter case will really enhance your life much more." I don't remember exactly what his words were, but that's my interpretation. That stuck in my head, and in the end, it made me decide to go to MIT.

I don't know if this is a true story. You know how things kind of emerge in your mind....

Typically, at the freshman meeting at other universities, the president gets up and says "look to your left and your right, one of you won't be here in a year," things like that. I don't remember if this was the president or someone else, but at the MIT freshman convocation, I remember something like this. He said, "90% of you were in the top 10% of your class. That cannot be mathematically true any longer." That was very much a challenge, and to some extent I was a little bit leery of the challenge, of leaving my home for the first time, to go WAY far east to experience MIT.

G: You came here to study engineering?

S: I came here to study nuclear engineering. I was somewhat of an odd high school student. I spent a good hunk of my summer, besides summer jobs, reading physics books about neutrinos. They didn't have black holes back then, but I found it all very fascinating. This is back in the era where the atom is going to make us energy independent – even before we had the 1973 energy crisis. But energy and electricity was going to be cheap. It just seemed like a neat thing to do, to combine my interest in nuclear physics with the idea of nuclear energy. I lasted in that thought for about a year.

B: You arrived at MIT in 1966?

S: No, it was 1962; the fall of 1962. I had some experience, as a student in Worcester, I was interested in science, science fairs and science clubs, etc. I remember in one of them we went and visited a company called Norton Manufacturing, or something? Probably the largest manufacturing company in Worcester.

B: Sure. In Worcester. They make abrasives. I know the company.

S: I can't remember the club I was a member of, but they basically took you around once a week, or once a month, to visit different companies, to see what they were doing. I think it was Norton, they had what was then a 1962 computer.

B: Maybe Wyman Gordon.

S: Exactly. I was kind of fascinated by that. But I didn't know much about it. Computers looked kind of interesting. At MIT—I don't know if this was my freshman or sophomore year, possibly my freshman year—I took my first real computer course. Computers were something I'd never had any real exposure to then. I was quite fascinated by it, but I resisted it for a long time, saying "This is obviously an infatuation, it's not serious. I want to do some serious work."

First I was pursuing nuclear engineering, and then I thought I would try electrical engineering. Eventually I succumbed, and I said, "This computer stuff is really neat." But it was a slow, transitional process. I'm not sure when this happened. It may have happened when I was still an undergraduate. There used to be a very popular computer course at MIT. Once again, they changed. It used to be called the EE Department, and then later on the CS was added to become EECS. There was a very popular course that typically had a couple hundred students taking it, called 6.251. I took the course, did quite well in it. It was still when I was a senior, and I became a teaching assistant in that course. They had a sizeable staff, maybe 4-5 TAs. It was around then because they didn't usually have undergraduates as TAs.

Later on, when I graduated, I applied to the Sloan School, and I got in. But I also stayed connected with the Computer Science department and the Project MAC research group at MIT. Basically I did a dual masters. This was the days of Miriam Sherbourne, do you remember Miriam?

B: Miriam, and one other person, ran the School!

S: Yes. Now they probably have 400 staff!

B: It used to be run by 2.

S: Of course the School was a smaller, but not that much smaller. The way I financed my way through the three years I spent completing the two Masters degrees was by being a TA in EECS and a Research Assistant at Project MAC. I rose to the ranks of Head TA, which was a nice thing to have. Some of the TAs under me went on to be quite successful in their own rights, and I keep in contact with some of them.

G: And this was for 6.251.

S: Yes. I don't recall what the title of the course was then

B: I need you say a little bit about what were the computers like back then. In 20-30 years, people will see this as ancient history. I studied at the University of Pennsylvania in the late 1940s, and they had this big UNIVAC locked behind security, "DO NOT ENTER," because they were doing work for the US Army. You had a course in computers – what were they doing in the course? What were the computers like in the early 1960s?

S: Sometimes I refer to those days in my class because as I often say, if you want to know what the hottest thing will be in 20 years, look at what the hottest thing was 20 years ago. I'm going to digress a bit and then get back to the question you asked.

          In my class, right before spring break, we were talking about cloud computing, which is a hot thing today. You have all these applications, like Salesforce.com, which is running on some computer somewhere else in the world. You're sitting at your PC and you access the service. Well, in the late 1960s, early 1970s, that was called "time sharing." Although there are differences in the technology behind the scenes, the main issue was management issues. What do you control? What do you outsource? I want to say 90% of the issues people confronted back in the early 1970s were very similar to the issues people are confronting today with cloud computing. These things do have a habit of coming around again.

          Let me step back a bit. Timesharing occurred a little bit later in the game than the time you're talking about. The era of the early to mid-1960s was that the mainframe computer at

MIT, we had a IBM 7094 computer. To put things in perspective – I forgot what year this would have been, probably around 1966 – it was very easy to calculate the costs of computer memories. Basically, it was $1 per byte, so a megabyte of memory, if you could afford it, would have cost $1 million. The computers we had at MIT in those days, they were measured in words (approximately 4 bytes) rather than bytes, and they were typically 32,000 words. Multiply that times four and it equals 100,000 or 200,000 bytes. You think about what's on your wristwatch today, or your iPad, tens of thousands times more than that, and you pay $16 for a gigabyte memory stick or whatever the going price is.

In my class, I recently played a one-minute video from a show on PBS Channel 2, called the MIT Science Reporter, from back in maybe 1968 or 1969? This was when timesharing was first coming on at MIT. You see this big room full of computers, and you see people at these early typewriter terminals. Timesharing itself was still very experimental. The way people programmed those days was by punch cards. I brought a punch card to class one day. I think I passed it around, and I don't know if I got it back! Eventually they will be antique pieces or collectors' items. Students would prepare their programs on punch cards, they would submit them, and one of the jobs of the TAs was to gather all the decks of punch cards and put them in trays. We had facilities in the basement below the computer center, after everything was organized, a dumbwaiter would take it up to the computer room to be processed. Typically it was processed overnight, and students would get back printed output of what their program did or didn't do, the following day. That was roughly what it was like.

It was like what you said – the computer was kind of behind the glass walls. You actually could look at it, but that was about as close as you could get to it.

There was something interesting that did happen. It's amazing how time flies. I don't know if you deal with this, but I'm have been an undergraduate advisor. MIT, last year, first introduced its online registration system. Remember registration forms that students had to fill out? I remember registration day when students had their advisor sign them. They would be deposited at Sloan and carried over to Main Campus, and eventually retyped into computers. That's the way it's been at MIT, until last year. There was an exception, probably around 1969 or 1970, when we were still working on timesharing. There were two timesharing groups at MIT. One was a research group called Project MAC, in those days, at Technology Square. That's where the experiments were done. And once that experiment had been going on for a couple

years, MIT bought a second computer to actually use for real purposes – administration, research, etc. As a "great leap forward," MIT actually tried to do online registration of classes. A dismal disaster, because basically you're talking about computers with the power of your wristwatch trying to handle what was smaller but still several thousand students. It's interesting because MIT didn't touch that "third rail" of online registration for the next 40-some years. I don't know if anybody remembers that far back to the reason why they didn't touch that third rail.

B: It sounds like affordable healthcare.

S: We went from being probably one of the first to try to do online registration to probably being the LAST to actually do online registration.

G: Some of my favorite stories to read is the people they called in to fix the Affordable Care Act website. I don't know if you've read any of those in *Business Week*, or *Time* magazine. They've had some nice stories about how they pulled together a team, and what it's really done for the administration and the industry.

S;   Interesting you mentioned that. Paul Denning, Sloan's media person, asked me to write up a little piece. He put me in contact with a reporter, who I think decided not to use what I gave him because it wasn't provocative enough. What I said is, the Obama website is probably one of the most successful ones I have seen in the government. I referred to the FBI's attempt to build a case-management system. There have been two attempts over the past 14 years, total cost numbers float anywhere from $1 billion to $8 billion, and they still haven't succeeded! I said, (a) these things aren't easy, and (b) the government tends to screw them up. But I think he was looking for something more like "boy, Obama really screwed up." I probably wasn't feeding into what he was trying to get to.

G: So that was what computers were like when you were in the two Master's degree programs. As you came here as an undergraduate, what were your views of Sloan? Because

sometimes we hear that at that time, Sloan was seen as a place where people went who couldn't hack engineering.

S: Yup... You are correct in that the general perception at the undergraduate level of Sloan was that's where you go when you can't make it anyplace else. It also turned out to also have a reputation, somewhat valid, of being the incubator of most of the MIT student politicians. In fact, I may even have it with me...

G: You're looking in your wallet for a card.

S: Ahhh, here it is.

G: Look at this.

S: That's the Bexley Hall across the street from 77 Mass Ave. I think they are talking about tearing it down. That's one of the dormitories…

G: You have a picture of a dorm with a big flag on it that's one or two stories high, and three stories wide. It says, "STU MADNICK FOR UAP."

S: Yup. I got a bit involved with student politics as well. UAP is Undergraduate Association President. I didn't win. A Sloan guy won! I did end up serving on whatever they called the committee. So Sloan had the reputation of being the politicians at MIT at that time.
            Stop me if I wander too far afield, but there have been a number of changes taken place over the last 50 years, both MIT-wide and then ultimately I'll talk about the changes at Sloan. You probably heard this, but MIT, like many other schools got impacted with grade inflation over time. Probably during the Vietnam era of the 1970s. The reason I mention it is, when I was an undergraduate, there was a thing called the Dean's List, which was for those students who got a GPA over 4.0, remember at MIT an A is scored as a 5.0. I'm guessing that would have been maybe 10% or 15% who got on the Dean's List. It was a challenge to get there. I was on it, though not every semester. Eventually it went away, I'm not sure when. If you look

at today's GPA, probably 95% of the students would be on a Dean's List if we still had one. I was told grade inflation at Harvard was even worse. There is a slight attempt to push back now, even within the Sloan School. The reason I mentioned it is, there are these kinds of "pendulums" that do swing over time, and that's just one example of one.

Getting back to your question. This is a fascinating question. I don't know what it was that prompted me to go to Sloan. Possibly that several Sloan faculty were also involved with Project MAC and exploring ways to use time-sharing to do modeling and data analysis. That exposed me to connections between my computer interests and Sloan.

G: To apply for the Masters program?

S: Yes. But having said that, as an undergraduate you are required to take some humanities courses, and even today, 15.301 counted as a humanities class. Somehow I got into Tom Allen's class. It was a very popular class. That may have been one of the first exposures I had to what is now called Sloan School. I don't recall if it was actually called Sloan School then. It probably was already called Sloan School, but maybe it wasn't as well-named brand at that time. I guess at some point, I knew I was graduating, and I had a decision to make. And it was a tough decision – whether to go out and earn an honest living, or go to graduate school. I don't think, when I first came to MIT, and probably for much of the first 2-3 years, that I even considered graduate school. I'm not sure I even knew what graduate school was, as you work your way through classes. At that time, remember, MIT was 75-80% undergraduate. There were roughly 4,000 undergraduates, and about 1,000 graduate students. Graduate students weren't exactly rare, but they were not all over the place like today. You were basically in the midst of an undergraduate world, undergraduate culture.

I don't know who first suggested it. Remind me to tell you an amusing story about Jeff Meldman later on, having to do with serendipitousness. I don't know what serendipity happened to me, I think one of my professors said, "Have you ever thought about going to graduate school?" or something like that. That started my exploration and ultimately I decided I liked MIT and I eventually decided.... and also it probably made some sense, combining engineering and management seemed like a good idea.

B: Well, a lot of people, on their way to industry. It was a great combination.

G: What made you apply for the engineering Masters degree?

S: Two reasons. One, I was still interested in it, and they were paying my salary.

G: Okay, you had the TA there.

S;   I don't recall whether Sloan didn't have TAs, or very few – as they do today. TAs are kind of a secondary process. I don't know if they would have fired me if had strictly done Sloan. But my sense was, it also kept me more knowledgeable on that side as well.

G: You were doing two Masters degrees, and somehow you also end up with a Ph.D.

S: Well, once again, the same problem occurred again. I was coming down to graduate with my two Masters degrees. I don't recall how much I'd looked into industry, but I could tell that there were probably some good opportunities out there. I suspect in this case, it was some of the professors I'd been working with in the science world, who really encouraged me to continue for a Ph.D. I'd been doing research....

B: You must have done a thesis for the Masters degrees? Was it a thesis that counted for both degrees? Or two theses?

S: That's a good question. I'm pretty sure it was one thesis that counted for both degrees.

B: What was the thesis? What did you work on?

S: It roughly was called "Modular Design of File Systems." Somewhere along the line I should mention – there are so many digressions – some of these things are so long ago I'm not sure if they are completely true or not. But I think I actually broke MIT's computer system

once, in the following sense. As an undergraduate, because I didn't have much family money – I did have some scholarship, but not a ton – I had a number of part-time jobs. And apparently I had more part-time jobs than the computer could keep track of [laughing] In other words, you could have one or two jobs. They had time cards, and whatever number of fields they had, I was actually told I couldn't get a certain job because I had more jobs than the computer could handle, or words to that effect.

The reason I mention that is, even though I had the TA, starting around 1968 or so, I started working part-time in what was then call the IBM Scientific Center, located in Technology Square. I was working 30 hours a week as a TA and another 10-20 hours a week there, and then doing classes.

The second story: apparently I was offered a fellowship or a scholarship at Sloan, somewhere along that line, and I had to turn it down because the way the scholarship was worded, as I recall, it required me NOT to be working anyplace else. It turned out, I was making more money at IBM than the scholarship would have provided me.

I had been working on research projects with the IBM Scientific Center. And then I was also, somewhere along the line either before or after I entered the Ph.D. program, I had been working with faculty at MIT, at what is now called CSAIL. At that time it was called Project MAC, and later called Laboratory for Computer Science (LCS). And to some extent, I am the kind of person who is – cautious may not be the right word – I tend to follow a path. I was basically just continuing what I was doing. I went from being a Masters student doing research to being a Ph.D. student doing research the next day and didn't really feel that much difference. It was a simple transition.

B: The Ph.D. was in?

S: Computer Science at MIT. Let me elaborate, getting back to that issue of breaking the computer by having too many jobs. Over time, I worked for almost every part of MIT, mostly having to do with computers. The Civil Engineering Department was one of the leading civil engineering departments in the world in the use of computers in the early days. I worked under Charlie Miller, head of the CE Department, on their computers. For a while I worked in the Aeronautics Department. I worked for the Materials Department with Frank McClintock, who

died a couple years ago, developing models of fractured materials. I worked for the Student Aid office, basically writing the software that assigned people to scholarships. It didn't give people scholarships; but the program assigned them to specific scholarships. A student aid administrator might say, "We're going to give you $1000 now." There were a whole bunch of different scholarships, each with a preference. A donor might say he prefers to give it to somebody from California, or prefers to give it to someone who interested in engineering. My job was to make the donors happy by trying to match them to students. At one point or another, I worked almost everywhere MIT. In the later stages, I ended up working more with people at Project MAC. That was a logical place to continue and also was research-oriented.

B: And the topic of your Ph.D. dissertation?

S: [sigh] The topic was called "Storage Hierarchy Systems". By the way, it was the job talk I gave at Sloan School. The way I explained it, you may appreciate this, I just did it this morning with rolls of paper towels. I buy them at Costco, the big huge 24-rolls package, and I keep them downstairs in the basement next to the washing machine. Whenever we run out of them in the kitchen, I go down and grab 3-4 rolls and bring them up and put most of them in the broom closet off the kitchen. And I take one and put it into the towel dispenser.

         Well, the same thing happens to computers. You've got some activities that are relatively slow, like going down to the basement, some things that are faster, like the closet, and some things that are very fast, the roll of towels on the kitchen counter. Deciding how and when and how much to move from downstairs to the closet, and from the closet to the counter. This was called – and still is today – virtual memory. I looked at some of the various algorithms that were used and found ways to improve upon those. I explained it more as a delivery service issue that maybe appealed more to my Sloan School reviewers.

G: You're finishing your Ph.D. and you applied to Sloan. Did you apply elsewhere?

S: Yes. I applied to Berkeley, Cornell, and several other places. To be honest with you, I was mostly applying to computer science departments. Once again, this is interesting how I vacillated back and forth across all of MIT, between Engineering and Sloan. Maybe I was a

precursor for the Leaders for Manufacturing program, which combined Engineering and
Management.

I don't know when I first ran across John Little, or if he even remembers this
because it goes back a lot of years. He was very influential in seeing the opportunity. A computer
scientist in the Sloan School was kind of an odd thing. I think he saw a connection. Sloan made
me a very good offer and I took it, and the rest is history.

B: We are now at 1972. The time we were talking about occupied about 10 years –
undergraduate, Masters, Ph.D.

S: Somewhere along the line in that period of time, I co-founded two companies and
sold them.

B: During this period? We should touch on that. That's important

G: Especially given that you're working at IBM; you're working as a TA; you are
co-founding companies; you're working on two Masters degrees and one Masters thesis; and
then more coursework for your Ph.D., and doing your research.

S: There are a lot more things to cover, but let me take a second, because that's kind
of fascinating. Let me step back, in 1974, I co-authored a book called *Operating Systems.*, For a
decade that was probably the most successful book on that subject – mainly because it was the
first. The joke was, when we approached McGraw-Hill, they said, "I don't know, this is a
textbook about operating systems, but does anybody teach operating systems?" I think our
contract with them was about 1972, and we finished the book in 1974. By1974 it was becoming
a hot subject. I meet people nowadays from the universities in India, who say, "Oh, yes! When I
was a student, I used your book!" I was getting immersed in these kinds of things.

Getting back to what you were talking about, as part of developing that book, my
co-author and I, who was a professor at the time in computer science, we would teach a summer
course. Sometimes they are very popular, and sometimes not so popular. But they were very
popular in those days. There were professors and universities that were interested in learning

about operating systems, which also became a great marketing opportunity before the book came out. One of the fellows who attended the course was an older gentleman. He wasn't a computer professor. I was chatting with him and said, "What are you doing here." He was an MIT grad from many years ago, and he had been very successful in engineering and manufacturing. I'd say he was maybe in his sixties. He had sold his last company to one of the conglomerates in those days. He said he always felt that there must be a better way to run these companies, and he thought maybe computers might have a role to play. We talked quite a bit about what he had in mind, and I did some experiments to demonstrate some things to him. He said, "Would you be interested in forming a company?" What we ended up coming up with was a timeshare inventory control and manufacturing planning system. Today they would call that an ERP system, and what we provided as a service they would call Software as a Service today. As I said earlier, all the things are now back again with new names. What was fascinating about that company, which I haven't told my class yet, but they don't really appreciate history. Computers in those days were big huge monsters that were expensive and very clumsy to program and software was mostly custom-crafted. The idea was that small companies that couldn't afford to buy computers or hire teams of programmers could basically pay for the service. That was our model. What was fascinating was, one of our first companies was Perkin Elmer, which is a decent-size company.

G: They were an instrument manufacturer?

S: Well, they made stamping machines. No, it wasn't Perkin Elmer, who is the one who makes the stamping machines? They are still around nowadays....

G: Oh, Pitney Bowes.

S: That's right. I said, "You're a pretty large company." They said, "Well, the trouble is, with a large company is that we can't get computer people to do anything we want. They are too clumsy, too awkward. This is a much better system, and I only need a small amount."

It made us realize that although our vision of a business was for small companies, we realized that large companies are often really large numbers of small companies with a shared

logo. That changed our marketing strategy, and we ended up selling quite a bit to what were divisions of larger companies. That was one of the first companies I was involved in, co-founded. The company was called MITROL. It was sold to GE Information Systems, and still exists after 40 years and a number of reorganizations.

G: Let's go back to 1972, when you come as a junior faculty to Sloan. Where did you come to? What did you teach? How did your research career take shape?

B: And who else is here? Who were your colleagues?

S: I couldn't go back far enough, but I found three pieces of documentation. This one is 1989. This is roughly when people started rating things. The IT group was always rated #1 every year for the last 20+ years.
            The second is from 1978.

G: This is a report from 1978. And you are showing us a picture of the IT group, rated #1 by *Computer World*, with Jack Rockart, Tom Malone, Chris Kemerer, John Henderson, Stu Madnick, Rich Wang, Randy Davis, and Wanda Orlikowski. Wanda must have just gotten here?

S: Yes. This is the MIS brochure we put together. I don't have a date for it. I could probably figure it out backwards by who the people are, because it shows all the various faculty. People like Michael Scott Morton, Michael Zisman, Bob Alloway, and Peter Chen. I'm guessing that this probably is mid-1970s.
            What's fascinating and somewhat peculiar is the number of faculty that were in IT when I joined it in 1972 is more than we have now.

B: Hmmm, even though the School has grown.

S: Yes, triple! One of the things we predicted in those days was that computers would become so important they would permeate all the other groups. So one could argue is that the number of IT-related faculty has grown, except they are spread throughout the School.

When I came here, there was a fair number of IT faculty. But there was an interesting experience which I just happen to relate to. I'm also serving on the MIT Council on Educational Technology (MITx), and they were talking about helping people to learn courses, educating the educators. Back in those days, things were very different. The expected teaching load as a junior faculty member was 4 courses a year. Although often it was three courses if you were behaving yourself or whatever. The expected teaching load is much lower now.

The other thing though – I don't know if this was official policy, or just in the Management Science area. I'm not sure when MS became an area.

B: Well, it was certainly the first area at the School, though, and John Little was its head.

S: I think it was called the "Third Floor" for a long time. We were all on the 3rd floor of E53.... Right. There was kind of a tradition, I have no idea how widespread it was that people teach courses outside of their narrow area. For example, one of the first courses I taught during my first year or second year, was Accounting. The idea was to teach at least one class that was in the broader Management Science area. At that time Accounting was in MS; it later on moved to Finance and Accounting.

Also I was assigned to teach a class, I think it was then called 15.568, which was the core principles of MIS class, that had previously and very successfully taught by people like Jack Rockart. I had taken that class a couple years earlier when I was in the MBA program. I went to see Jack and said, "I've been assigned to teach this class next year, or next semester. Do you have any materials I could use?"

I can't remember his exact words, but it was something like, "I knew I wasn't going to be teaching it next year, so I threw all that stuff out." [laughing] You see the connection, talking about the idea of preserving the history. That wasn't a tradition in those days.

I mentioned that I had been the head TA of the computer course 6.251 during my graduate days. Eventually we actually transposed it and taught it in Sloan School, basically the same class. We already had a computer technology class at Sloan, I think it was numbered 15.564. Merging 6.251 elements into 15.564 had several benefits. It had the effect of bringing over a fair number of engineering students. The course had a strong, positive reputation on

campus, so the class ended up being half Sloan and half engineering students. I taught one class I had a lot of experience with, having been involved in it in SOE. I taught MIS principles class, and I taught an accounting class. I'm not sure if that was all the same year or some were one year and some the following year, but in the first year or two.

B: Earlier you said that you were really the nominal head, almost from the beginning?

S: I was the head for quite a long time, but not from the beginning. I think the most senior member of our group was Michael Scott Morton, so he probably was. Once again, like areas, groups were kind of a fuzzy notion in those days, and still today. I think Michael Scott Morton was probably the group head. I showed you the brochure from the Center for Information Systems Research. I argue that my most important contribution to that center was its name. They were going to call it the Information Systems Research Center, ISRC [he pronounces ISS-RICK] Doesn't quite roll off the tongue.

G: you were here for the formation of it?

S: Yes, I don't recall what year it was formed. I'd say maybe 1976, 1975.

G: CISR was the first research center here.

S: And the first, as far as we know, in the information systems field as well. Really the granddaddy of them all. I'll take some responsibility for coming up with the name. When it was formed, Michael Scott Morton was the head initially. Later I think he went into the Dean's Office.

B: He also gravitated to Strategy at some point.

G: Yes. We interviewed Jack Rockart, and he talked about its formation and how he took it over from Michael. I think Jack really ran it, although Michael might have been the head.

S: Exactly. With Michael and Jack being somewhat senior to me, when they became directly involved with CISR, I inherited the head of group. I don't know if it was a conscious transition, but there were things to be done, and they were busy with other things.

G: What about when you came up for tenure? How did that go?

S: Well, I got it! I don't know the turmoil that went on in that era, probably because I was not privy to the senior faculty meetings then. MIS was kind of a new thing. It wasn't clear. People didn't really understand, was it a passing fad? A lot of people actually said that. I will digress again. Did you interview Bill Pounds?

B: Yes, twice.

S;   I don't know if he remembers this or not, and I may have the story wrong. At one point, I was the head of what was called the East Campus Computer Facility. I was the faculty head. Bill Pounds was Dean at the time. I remember discussion at the time, probably over budget issues, and he turned to me and said, "Is there any evidence that having computers in a business school has any value?" That's roughly a paraphrase.

B: I can picture Bill, with a twinkle in his eyes....

S: [laughing] Back to the tenure. My sense was, in the end it worked out OK. I'm not sure how much secret this is. Apparently there was one dissenting letter. I don't know who it was from, or what it was about, but I remember there were some discussions with me to clarify some issues that ultimately were resolved. I don't know what was going on behind the scenes, so I don't know how much turmoil there was or wasn't.

                I comment to my Ph.D. students, they often ask me questions about writing books. I give them a somewhat double-sided response. As far as I can tell, at most serious research-oriented schools, writing books doesn't count a heck of a lot. You have to realize you have to do quality journals, peer review, that kind of stuff. Books can help, in combination. As I

said, the book I co-authored became very well established and was taught in both computer science and in business schools because of its interest in MIS and similar technologies. I think that helped me at tenure because I was probably much better known broadly than I would have been if I had merely written a small number of very narrow, technical papers. People who read the papers, they were "Oh! I know that guy!" So the connection was established. I think that helped me a bit. Once again, this is a very open space, there were very few IT faculty then.

Going way back, Sloan and Jack Rockart had a key role in creating an annual international conference on information systems (ICIS.). There is now an Association Information Systems (AIS). But originally there was no society, and AIS emerged out of that conference only in the last decade or so. In any case, recently there at the ICIS conference I served on a panel called Founders or such.... these were the half dozen people who were actually doing MIS research in business schools back in the early 1970s. Not a large number of them. Fortunately, most of them still alive.

G: One of your four bins was how the IT Group has evolved. Can we finish your thoughts on that? It was larger when you started, and now computers have been subsumed by all disciplines....

S: Yes. I'm not sure quite how to describe it. First, I don't recall when the MIS (Management Information Systems) term was first used here. I think the group of faculty were initially called Planning and Control, or such, and had a heavy Accounting flavor – remember computers were largely used in accounting related activities in companies initially.

I guess two or three things have happened over a period of time. Michael Scott Morton and Jack Rockart, to some extent, moved into Strategy or IS strategy. And although you can argue there were embryonic signs of that, I think much of the early days, say from 1972 to mid-1970s, IT, at that time called MIS, was much more focused on applications. I often use the analogy, possibly erroneously, of John Reed. The story was, he went to Citibank and said there should be a better way of doing this using computers.

B: Right, in the back office.

S: Of course there also needs in the front office in terms of decision making, and management decision systems. I think John Little had a company with that name. That was the initial focus. First, how to understand the technology in order to be able to use it, and then understanding the kinds of applications you can use it for. That was the early stage.

Then Strategy started to bubble up. In fact, it bubbled up to such an extent that a large portion of it moved on, or to other parts of the School. Although I would argue Jack still played a key part of Strategy.

Additional focuses emerged – and largely due to faculty added over time. Wanda Orlikowski, and Tom Malone focused on the organization, both impact of IT on the organization, and the organization's impact or constraints on IT. And then Erik, when he joined us, added the economic aspects. Some of Erick's first work, maybe in his dissertation, or in some work he did when he first joined our group, was addressing the famous IT productivity paradox.

G: Isn't that Bill Pounds question you posed earlier?

S: Exactly. Wasn't it Bob Solow who once said, "I see computers everywhere except in productivity."

As far as how the group has changed, you see how it has changed from being much more based on understanding the technology and application of technology. That is still there, but it's a significantly reduced emphasis and much more emphasis on the strategy piece, which is largely tied in with the work that CISR does, along with the organizational and economics piece. That's how it's evolved.

The thing that's fascinating about our group is we are very small. We've always been small. Some of the other major schools, like NYU, Wharton, or others not as well-known worldwide but are in the US, such as Arizona, have a dozen or more faculty, sometimes 20 faculty. At our peak, I think we had 8.

B: Then you lost some, like Venkat and Henderson.

S;   Yes, and others moved on to other things. The other thing that is fascinating about our group, you mentioned how CISR the first research center at Sloan. We now have at least two

other research centers. We have almost more research centers than we have faculty. Erik heads up what is now called the Center for Digital Business, which was first created as the Center of E-Business. And Tom Malone heads up the Center for Collective Intelligence, which was first created as the Center for Coordination Science. I was told, that 2-3 years back, Tom looked in sponsored research funding at Sloan and found that the IT Group with its 4 faculty represented 70% of the entire School's sponsored funding.

G: Does that lead us to computing at Sloan? I'm looking at the clock.

S: I also want to talk about Sloan itself.

B: And talk about your own contributions over a 40-year period of time.

S: Let me take the second on that first.

The other thing that is kind of fascinating, and this is probably because of MIT, my interests have broadened over the years. Just looking at work I've been involved in the last 2-3 years, there's always a connection, but sometimes it's hard for others to see the connections. Recently I have been doing quite a bit of work related to cyber security. We're doing this jointly with a project headed up by Prof. Nazli Choucri in Political Science. It is a joint project called "Explorations in Cyber International Relations," between Sloan, Political Science, Computer Science, Harvard Law School, and Kennedy School of Government. I'm working with these people. We're doing work now on a project jointly with Singapore SUTD on cyber-physical systems, i.e., nuclear plants, water facilities, smart grids. If you think breaking into Target and stealing credit cards is a problem, imagine taking over a nuclear plant.

We did another project about the European Union's database directive, that is not the privacy directive which that's a different issue, having to do with who owns data and how is data owned. Once again, my recent work is all about data: how to protect it, what are the laws constraining it? These are obvious things that you get dragged into. So one of the questions we posed to ourselves was: in the technology side, are the technologies we're developing likely to be illegal, which spurred us to think about things like that.

Another example, we just did a project with a major national insurance company in the US. In the UK, it turns out that most people buy their insurance using online insurance aggregators. It hasn't really happened in the US, but in the UK something like 70% are bought that way. The average duration of an auto insurance policy in the US is 5 years; in the UK it's 8 months.

B: They are shopping around....

S: We did lots of different, but loosely related projects.

We were approached by an insurance company here to say, what might happen in the US? We used system dynamics modeling as a spinoff from the cyber-security project we did.

We also did a project on analyzing state stability of countries using system dynamics.

I co-authored a book with one of my Ph.D. students, who as usual did 90% of the work, I forget what year it was, but it was very successful niche book applying system dynamics to software development. Software development is a lot like R&D management: it's intangible to a certain extent, there are all kinds of subtle incentive systems, issues of undiscovered errors, all that stuff.

G: All of Nelson Repenning's project management work....

S;   Exactly. Preceded him, actually. There was more work after that.

I'm going to stop there. You can see it's no longer just a matter of programming computers. Things come up and there is a connection. I actually brought a diagram, to show you how all these things are connected. But they're not immediately obvious that they're connected.

Regarding computers at Sloan, it's evolved. I forgot the sequence of events, which came first. Early days, there was a period of time when we had a computer here. It was called an IBM 1620. It was a mini computer. You may have seen or heard of them. I think that may have been Sloan's first.

Then we used the mainframe computer on the main campus, that had much more horsepower. We didn't have our own computer here. And in many ways, we had outsourced our

computing to the main center. We were probably the only department to do that. We had a lot of discussion with them about what it means to be outsourcing your computer power to a central campus.

So those are the first two stages, and both relatively limited.

Then, for better or worse, under my initiative, you may have heard of a company called Prime Computer? They were rather big for a while, and then faded away. One of the co-founders was a guy named Bill Poduska, who I still see at the opera on occasion. He had formerly been an MIT professor and was one of the founders of Prime Computer. I got him to donate, or 90% off, one of their Prime computers. What was nice about it was, it was a small timesharing computer. We now could actually have people using terminals talking with it. With the 1620, that was a one-person-at-a-time computer, and with the remote-job-entry to the main computer you basically put your programs on cards and waiting for hours or longer to get back results. Neither one were particularly good for interaction. For a lot of things you wanted to do, interaction would be helpful. We got that here for a while.

Then in the early 1980s, PCs started coming in. For a while we had a PC lab downstairs, maybe 20-30 PCs all over the place. This was in the basement of E52. Then as PCs got cheaper and cheaper, and students started coming here with their own PCs rather than Sloan providing the facilities that all the students used, the assumption was that most students used their own. We had a few here in case they left it at home, but these were desktops and they couldn't move them around. The size of the PC Lab started to shrink. Around that same time we put in the trading room, which I don't know what it's going to look like in the future. I think it's going to disappear, but I'm not sure.

Now we're at the point where the assumption is all the students have their own laptops, and there is relatively little computer facility provided as such, other than a lot of computer support. Once upon a time there were one or two people, like Ray Faith, who would help you out with a problem.

B: But for another operation, for our assistants and secretaries, we had that Wang system.

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S: For a while, yes. So we had a bunch of things, but they pretty much all faded away. Two things have happened in that regard: we now have a much more significant team of people to help both the faculty and the students. But there's also a lot more infrastructure being provided, through Sloan and through MIT. Things like backup services, the whole campus-wide network, the access to the Internet.

G;   I have to say, your rendition just helped me understand something. I've always been thankful for, and that is, Sloan has its own support group. When I worked in the Engineering School, I had to go to MIT central. Their facility was there, but it was very different.

S: The same thing was true for the CDO (Career Development Office.) MIT has a CDO for all of MIT, but then Sloan has its own CDO.
            I will tell you one miscalculation that Sloan made. When E51 was being renovated to become classrooms, maybe 15 years ago?

G: The Tang Center?

S: Yes. They spent a fair amount of money putting an internet drop at every seat in those tier classrooms. That was useful for about 3 years. Then Wi-Fi took over and almost nobody uses those wired internet connections. Sometimes you guess right, and sometimes you guess wrong.
            Lastly, Sloan changes. I'll hit a few key ones. A very much the classic pendulum swing. At the time I arrived, Sloan was very centralized. It has become increasingly decentralized over time. There is a slight turnaround taking place recently. I'll give you two examples of it.
            One is the Ph.D. program. I don't know if you remember back – at one time the Ph.D. admissions process was a School-wide process. It was always a battle. Each group would have its select few it liked. As I recall, Paul MacAvoy was then head of the Ph.D. Committee. I would put forward "Here is a person we would like to bring in as a Ph.D. student in IT." And Economics would get upset: "Are you kidding?? We have FOUR people, ALL of them much better than that person!!" Eventually there would be a vote, etc. Nowadays, in most cases it's

decentralized to the groups, as far as I understand it. I'm not saying it's good or bad; it's just illustrative of the changes.

The other one is – and I can't speak for the other areas, because each one is very different. When I joined, John Little was head of the area. Within a few years of coming here, I became the group head for IT (MIS at that time). There were weekly meetings Friday morning in John Little's office. Every Friday we would get together over what's going on in the various groups, issues they were facing, etc. I won't mention who it was, but one year I got a memo saying who our new area head was, and who he was replacing. I didn't know that the person who was being replaced had been our area head that previous year!

B: It was all happening with the interest groups, not at the area.

S: That's part of it. And the last thing.... It's historical in the sense of contrast. I was just meeting with someone, and they asked me about E62. How did I like the new building? I said, "I think what they did on the first two floors is great. There's now an opportunity for the students to meet and gather, you see them milling around, not just eating," which we didn't really have. You saw that a little bit in the lobby of E52, but not very much. That was a very successful change. And I pretty much like the classrooms on the second floor. I tend to teach in them.

When you get to the faculty office space, I've heard different names for it. "Monastery, with monks each in their own cell praying," or something. I don't know what your views have been.... I was talking to a faculty member from another area, who also said that there seemed to be much more interaction in the old E52, and my experience is much the same for the old E53. I'm not sure how much of that is due to other changes going on, or the way the culture of the School has changed, or how much is caused by the physical manifestation of E62. And, of course, I don't think we are particularly a "party" school.

One more change that is kind of relevant. The Faculty Club.

B: Or the lack of....

S: Lack thereof in several ways. Obviously, it's gone altogether right now. But also it made a transition, maybe several transitions. Even though it was the Faculty Club for all of MIT, because it was just an elevator ride away for us, Sloan people would go there for lunch. Then they stopped doing lunches. Some people would go to dinner and they might actually stay around. They also stopped during dinners – they only do functions. I think that was part of the overall process of missing out on things that made connections.

I'll do one last story, and then I'll stop. You may remember this because it goes back to the early 1970s. The bomb on the 4th floor of E53?

B: Before my time?

S;   OK. Remember the 4th floor of E53 had part of the Political Science Department, and they had a research center, I don't recall what it was called, but it was CIA-funded. Whether it was popularly known or just informally known, it was known well enough. And this was back in the Vietnam protest days. There had been a number of bomb scares or threats, and then one time there actually was a bomb that went off in the Ladies Room and the toilets were badly damaged. What was fascinating, though, once every 3-4 months a bomb scare would come and everybody would empty out into the area between E52 and E53. That was often the only time all year that I would meet many of the faculty who were only three or four offices away. When the bomb scares ended, that was the end of these informal gatherings.

G: I have two things before we wrap up. Did you say what you were most proud of?

S: Oh god! That's a toughie. I don't think I have an answer to that question. One thing I didn't bring.... I created a little diagram, because ILP (Industrial Liaison Program) asked me what I was doing and could I find a way to organize it. Sometimes it's useful to have a provocative question like that.

G: Maybe you can share that. You did say the Jeff Meldman story. I wanted to remind you of that.

S: Oh yes, serendipity. I knew Jeff because he got his Ph.D. in computer science. He was one or two years behind me, I don't remember exactly. As you may remember, he had also gotten a Harvard Law degree. You may not know this, but Jeff was very active in MIT undergraduate theater, Drama Shop, etc. When he became a Ph.D. he acted as an advisor to Drama Shop. There's a bulletin board on the third floor of E53. One day I saw him putting up a notice for the current Drama Shop performance. I said, "Hi Jeff, I haven't seen you for a while. What's going on? How are things going?"

He said, "Oh, I'm going to be graduating in five or six months," whatever.

I said, "What do you plan to do?"

He said, "I haven't really figured it out yet."

I said, "Have you ever thought of Sloan School," because I thought law and computers – that sounds like an interesting thing. If you go into computer science and just do that stuff, but at Sloan he could do business law with a computer science spin on it. In any case, he ended up coming here. If he had not been an advisor to the Drama Shop, putting up a notice on that bulletin board in E53, I doubt he would have come here.

B: There's one topic, which is a big topic. One of the issues that we often like to understand is how Sloan relates to the rest of MIT, and particularly to Engineering. And you've had your legs astride these. Do you have any reflections on that?

S;   I'll give you a story. Remember I said that even as an undergraduate, and as a graduate student, I had part-time jobs doing things for the administration, like allocating the scholarships. Over the years, I got to know a few of the people in the administration. I can't remember who, but one of the vice presidents happened to be walking through the main campus and I came across him. He said, "Stu, I hear you graduated, and I heard you joined the Sloan School."

I responded.... "Yes."

He said, "What do they do over there???" [laughter] And that was 40 years ago. I don't know if they've figured that out yet.

B: You interact a lot with people in Engineering.

S: Things like the LFM (Leaders for Manufacturing) and SDM (Systems Design and Management) are examples of joint programs between Sloan and Engineering are good examples and match my interests well. I'm also a member of ESD (Engineering Systems Division.)

B: Well, this has been good. We've covered so much ground.

S;   Well, it's kind of fun. You reach a certain point in your life; it's nice to reflect back on it.

B;   Oh, you've had an amazing career here. You're like Paul Gray, who came here and never left, right? Have you taken sabbaticals anywhere else? Have you visited?

S: Lots of places. I do a kind of crazy sabbatical. I have one coming up soon. I do multiple mini-sabbaticals, in most cases. The last one I did, which was seven years ago, I spent six weeks in Paris at CNAM (Conservatoire National des Arts et Métiers). They have a group there that is very interested in data quality, which is one of the projects I've been involved in here at MIT. Then I spent six weeks in Nice with ERCIM (European Research Consortium for Informatics and Mathematics). It was really a research consortium, a kind of aggregating group of all the major IS/IT-related research centers all over Europe. I spent three weeks at the Computer Science Research Group in University of Newcastle.

B: [starts laughing].... Now you're getting close to....

S: I took two weeks visiting the University of Edinburgh. I forget what it was called. I'll call it the Data Quality Center, but I'm not sure that's the official title of it. It's the national center for Scotland on data quality.

              I wasn't in any one place very long, but long enough to give three or four seminars, meet with people, talk with students, and get a sense of how they operate, what's similar, what's different about them.

I want to say one more thing about MIT. One of the things that is still relatively unique about MIT, or at least is very special at MIT, is the permeability of the walls. I did a stint working for IBM, and the joke was that if you were working for Manager X you couldn't go into the corridors of the people working for Manager Y. Even at most universities, maybe not quite as disciplinary, there was just a general sense that you hung out with your own guys. The idea at MIT, if you have an idea for a project and it involves political science people, or computer science people, go for it. We do it all the time. Maybe it's getting better at other school. My sense was MIT was one of the first, and probably still has the lead in that kind of activity. It's very much part of the culture.

B: Right. George do you have anything else?

G: No.

B: In terms of what you had been thinking about, Stu, have we missed any categories?

S: No. No.

END OF INTERVIEW