

**INTERVIEW WITH
ARNIE BARNETT
October 11, 2012
Sloan Oral History Series**

A: ARNIE BARNETT
G: GEORGE ROTH
B: BOB MCKERSIE

G: Today is October 11th, and this is George Roth interviewing Arnie Barnett. Our partner who is usually here, Bob McKersie, is not able to join us, so it's just the two of us. Welcome, Arnie.

A: Hi.

G: Nice to have this opportunity to sit down with you and go over your experiences at Sloan. We've heard other people talk about you and your teaching. One of the people we interviewed was Annette LaMond. Do you remember Annette? She worked with Phyllis Wallace.

A: I'm sorry, I don't.

G: She met you a couple of times, and was very impressed with some of your lectures and the things you did, which is great to know. I know you've been here a long time and are an important part of what's gone on at Sloan. I know a little bit about some of your research. I've sat in on some of your seminars as a PhD student. So I'm interested, and this is a privilege on my part to be able to hear people's history.

A: Okay. Well let me offer some thoughts. I have been at MIT since 1969, so that means 43 years, essentially. I started out as a Ph.D. student in the math department. In fact, I got my PhD in mathematics here, in applied mathematics, in 1973. I stayed on as an instructor of applied mathematics in the math department rather than go somewhere else. Then, I believe it was the spring of 1975 while I was still an instructor, someone said to me, "Would you be interested in going over to the Sloan School, which is hiring an assistant professor? They want someone who has an interest in public-sector management." I remember my initial reaction was

very negative because I didn't know much about business school, and what I knew was not particularly positive. I remember when I was in college in the late 1960s, a tumultuous time, it seemed like the only people who were going on to business school were people whose names ended in Roman numeral III, and who had gotten Ds in physics—almost as if management were a career if you couldn't hack it in the more traditional academic worlds.

G: And I think the business school had some of that reputation here at MIT as well.

A: I think it very much did. But I thought, "Look. It's right across the campus. Certainly I can go over there." And I recall my interview. It wasn't any of the anxiety I would normally feel in an important interview because I thought the whole thing was so far-fetched that it was, to some extent, just a courtesy to go over. But I had a pleasant experience when I was being interviewed. I won't mention specific names....

G: Why not?

A: Because I might get it wrong.

G: Okay.

A: For example, one person who interviewed me was a chemical engineer; another was a former physicist—that was John Little. Another was Roy Welsh, whose background was in mathematics. Then there was the late Jerry Shapiro, who was in Operations Research. I remember at the end of the day thinking, "Well, I don't know much about management but, then again, none of these people knows much about management either, so maybe this is quite an interesting place." So I was offered a position.

Bill Pounds was the Dean then, and Abe Siegel was Associate Dean. They made the offer on something like a Monday in June 1975. I said, "Well, I really appreciate it. Can I have a little time to think it over?" The offer of an assistant professorship.

Bill said, "Sure. What about Wednesday?"

While that sounded preposterous, I thought, "Look. I'm not going to get any new

information if I stall beyond that.” I thought, “Why don’t I go?”

When I initially started in the math department, I had a vague feeling I would try to continue there to get tenure. I’m not sure that ever would have materialized because to get tenure in the math department here, you have to be a mathematical genius. And while I’m good at math, and good sometimes at applying math to real-life problems, I’m not a mathematical genius. I thought, therefore, that if I was going to stay at MIT – which is something that is attractive to me....

I was an undergraduate at Columbia, but I didn’t like Columbia. I was a physics major there. But I really liked MIT, and I liked being at MIT. I thought, “Let me go to the Sloan School where people will certainly respect mathematical work, and people are very accomplished in mathematics, but it isn’t absolutely at the center of the enterprise. The center is to do something of practical value.” I thought, “This is probably closer to my orientation, anyway, as an applied mathematician, rather than as a theorist.”

I accepted the position, and was happy to do so. Among other things, I got a big increase in salary. When I was an instructor in the math department, I believe my salary was \$9,000 a year. It was not that much higher as an assistant professor here, but in percentage it was somewhat higher. So I began teaching here. I joined the faculty in the spring of 1975.

I remember thinking, “How does one teach business students?” I teach probability and statistics. I thought, “Well, in probability, if it is business students, instead of calling the unknown X, you have to use a dollar sign as the symbol for the unknown?” I was pleased to find that wasn’t the case; that students then, like students now, are bright, mathematical, pleasant, and easygoing. They wanted to apply math, but also wanted some understanding of why you’re doing this, not just a series of formulas that people find incomprehensible, which is all too often what people get from statistics courses. They know they’re supposed to do this or that. But if you ask, “What does this mean?” it’s not always so clear.

So I enjoyed teaching here. In fact, in the first semester I taught here, one of the students was Bibi Netanyahu, the current Prime Minister of Israel. At the time he was named Ben Netanyahu. He got an A in the course, I might add. But I remember thinking right away that I liked it here, and I was glad I made the transition.

G: When you moved over, what group were you in? Where did you sit? Who were your colleagues?

A: I was in the Management Science group. Tom Magnanti had an office nearby. There were some people – I don't remember their names, and they're not here now. The Management Science group had John Little as head of the group. Glen Urban in Marketing was one of the people involved in hiring me. He was, in some sense, my sponsor that day. He was in charge of the search. And of course I came over. There were no travel expenses coming over from the math department. But Glen Urban was involved. Roy Welsh was doing statistics. Jerry Shapiro was part of the Operations Research group.

There were also people I knew from outside the Sloan School. Dick Larson, for example, who's now in ESD, Engineering Systems Division, was one of my colleagues. Amedeo Odoni, in the aeronautics department.

Danny Kleitman was my thesis advisor in the math department. He was a very interesting character. He was an absolute genius in terms of theoretical mathematics. His field was combinatorics, which is counting arguments. How do you count things in rather complicated ways? I owe a great deal to Danny because when I would go in, let's say after a week, and be prepared to tell him what I had done, he would casually say something to me like, "You know? I had a thought," and he'd say something. And his casual thought was my week's cogitation. He could have been tough on someone's ego, but he wasn't. He was very nice, and he seemed excited about what I was doing. And it's conceivable some of the excitement was a little bit put on, but –

G: This is while he was advising you?

A: He was advising me. He was my Ph.D. thesis advisor in the math department. But he was someone I knew then, and continued to work a little bit with.

I had ties around MIT. One of the nice things about the Sloan School, and MIT in general, is that interdisciplinary work is routinely encouraged. Yes, there's talk of different silos and whatnot, but these silos have very permeable walls.

My field was public sector management. So I worked on analyses of, for instance, crime data, particularly homicide data. One of my early observations was if you look at a city's annual murder rate, it doesn't look so bad because maybe 60 people out of 100,000 are murdered. Then again, 99,940 were not murdered. So that doesn't look bad. But if you're subject to that level of risk year after year over a lifespan of 75 years, the cumulative risk is on the order of 3-4%, and that was the number in many American cities. People who were familiar with the initial statistic, the FBI statistic, weren't aware of its implications. What I did was a multiplication by 70, essentially. But it hadn't been done, and it attracted a certain amount of attention, and a certain amount of criticism. One has to get used to that. But that's one of the things I started with.

I worked a little on transportation systems. There was the case – you may have seen it. Sometimes you're waiting for a bus, and you wait and wait and wait. The bus finally arrives, and it's accompanied by a caravan of four others. There's an explanation for that, a simple explanation if a bus falls behind schedule. It falls further behind schedule because there are more people waiting for it, more stops for people to get off. The next bus, which has fewer than the usual number of people, starts getting ahead of schedule. Finally they converge and they're one after the other. So I worked a little on transportation systems.

I also worked on aviation safety. This is interesting because I was, at the time, more or less afraid to fly. I would fly but I had a certain anxiety about it. I remember, here I was, an assistant professor, thinking, "Well, how can I sublimate my fears in a way that might be publishable?" So I did some data analyses about aviation safety – the risk of being killed in flying, and how it varied around the world, things of that sort. Again, this is not mathematically path-breaking. But on the other hand, there are people who are genuinely interested in it.

G: People didn't know, the comparison – I'm assuming the level of risk of flying in a plane versus other things that you don't care about. But a plane somehow seems worse?

A: Yes, that's certainly some of it. So I was doing work like that, and I was very fortunate that it attracted a certain amount of attention. When I said something good about Aer Lingus, they suddenly sent me a green flight bag, and said, "Whenever you want to fly to

Ireland, let us roll out the green carpet for you.” [Spoken with a brogue.] So I was doing work like that.

G: How did that happen? How did you make the shift into the different areas you’ve studied and applied math to?

A: That’s easy. I started transportation systems in my Ph.D. thesis, the ground transportation about... In fact, a quote from my Ph.D. thesis was, “The trains will run on time. Benito Mussolini.” And I continued that work.

I had started work on analyzing homicide data, and continued work like that.

I began the air safety work simply because it interested me.

This is one of the great things about the Sloan School, then and now: I didn’t have a feeling that people were looking over my shoulder and saying, “How does this apply to – why should this be done at a management school?”

If you have a broad concept of management, you could say that if crime is a public-sector problem that you’d like to try to manage – you don’t want crime – so getting a better description of how big the problem is is part of the decision of how to manage the problem.

You could say the same thing about aviation safety, to the extent that it affects the willingness to use this mode of transportation – understanding what is the problem? What is the risk? What can we do about it?

It makes a certain amount of sense, but I never had people saying, “Look, if you want to do this in your spare time, that’s fine, but not as part of your academic career.” If I had been in an aeronautics department doing research on aviation safety, and then I wanted to analyze crime data or cancer data (which I analyzed at the Tufts New England Medical Center), people would say, “Look, if you want to do it on the weekend, no one’s stopping you. But this is not part of your career here. This is not part of the research you’d point to when it comes time for tenure.” There are not many departments where one can change topics as drastically as I was able to, and yet be comfortable that all the work I did would be viewed as somehow under the umbrella. It was quite imaginative, actually, that people took that view. They were sincere about

it when I was hired, and they were sincere about it throughout the time I was a junior person getting ready for tenure.

One topic I looked at was research on the deterrent effect of capital punishment. The use of mathematic and statistical models to assess whether executions reduced the level of murder, and for that reason, paradoxically, they save lives. You take lives in executions. But if each execution prevents five murders, you could say that maybe in some aggregate sense it saves more lives than it takes. But there was a lot of work done by economists on this, some of whom took their models a lot more seriously than I think they should have. One paper – and it wasn't meant as a satire – talked about the so-called “supply of murders” function. The person said that society indicates its demand for murders by the penalties it provides. If the penalties are light, it's almost demanding murders. So they used supply curves, demand curves, and it seemed almost like a joke to me.

G: The person was very serious about it.

A: The person was serious, yes. Economists are serious about what they do – much more serious, sometimes, than they should be. In any case, I basically romped about in areas like this, writing on subjects related to public policy in some general way, and I was very comfortable. When people in the Management Science group looked at my work, they were looking not so much as to what exactly is the topic, but what kind of thinking went on in a paper like this? Someone like John Little would basically think about how I tried to model something.

One thing I noticed then, and have certainly noticed since, is that people are really very sophisticated here in getting to the bottom of things. There are people I've seen who are very well known for their work. But here people actually read it, and say, “Does this make sense? Never mind that it's made a big splash, but we like the way the person has gone about this work.” There is enormous integrity here, which is important for both intellectual honesty and also intellectual skill, etc. So I was a very, very lucky person to be here.

When I was up for tenure – and I won't deny I was quite nervous, because it is the question of whether you get a lifetime appointment – one of the reasons for my anxiety was that I thought there was a long way to fall, meaning if I didn't get tenure, it isn't a matter I could just go to another business school and they would welcome me with open arms, because the broad

viewpoint that the Sloan School takes is not typical of business schools. In other words, it could have been a long way down. I don't know. We'll never know, fortunately. Nonetheless, I remember thinking, "I'm really lucky, and I'm going to try to stay here. I like the teaching very much, and the students over the years are very good, and also appropriately demanding."

I remember one year, the teaching didn't go all that well, and that year it really showed up in the ratings. It's not a matter that because you have a reputation of being a good teacher that people now will call you a good teacher. On the contrary, if they hear you're supposedly good, and then they're disappointed relative to that expectation, then even if you do well... Like in the presidential elections, a lot of it is an expectations game. But I very much liked the teaching I was doing here.

Some of it was interdisciplinary with my colleagues Dick Larson and Amedeo Odoni. We had a course called Urban Operations Research. This was going back to around the early 1970s when there was a lot of idealism about using technical methods to make cities better using mathematics to help the cities. In fact, the Rand Corporation had an institute in New York City that focused on urban problems and scientific approaches to them. So we taught a course, Urban Operations Research.

Then things changed. I remember the early 1970s, you've got Mayor John Lindsay in New York. Things changed a great deal. In fact, the course still exists. We still teach it. But it now has a name like Logistics and Transportation Planning, because there were not many people who really wanted to take Urban Operations Research because of an interest in urban studies and planning.

G: Urban interest went away?

A: Yes, it really did go away for a long while, although maybe now there's a slight resurgence. Still, I was able to teach the course, and people were comfortable that I was co-teaching a course like that.

I came up with some of my own courses. Math Models and Policy Analysis was a course I offered in the spring, as well as teaching the basic statistics course. It was a very pleasant experience. I got a lot of support, and I had enormous respect for the people around me.

They might not be doing the same work I was doing. Certainly Glen Urban was not doing the same work. But they were doing work that I really respected.

When I first came here, when I heard there was a marketing group, my thought was, “Marketing doesn’t belong in a university. Maybe you do it on Madison Avenue or something, but marketing....?”

G: You’re thinking advertising.

A: Yes. It just somehow struck me that a university should be more general fields, like economics, but not marketing. Well, I realized I was wrong because so many of the concepts of marketing – like product positioning, market segmentation, perceptual space – are really very valuable concepts. And while marketing has its aspects in consumer psychology and economic forces, etc., nonetheless I developed quite a bit of respect for that. System dynamics was a very interesting model for watching the full range of consequences of decision, including many that are unanticipated and unintended. So it was and is an exciting intellectual environment here. I certainly never had the feeling that I was dealing with people who were my intellectual inferiors, or anything like that. In terms of mathematics, in fact, there are people here unquestionably stronger than I am – always were stronger than I am. So I felt that while I fit in, it wasn’t a matter that I was a big fish in a small pond. I thought it was really a very big pond. And yet, I felt comfortable in it. Not necessarily the brightest here, or anything, but still it was very good to feel that this was the kind of place where I belonged. I think of someone like Steve Graves. A very thoughtful person, very sensitive, and it’s good to have such a person as a colleague.

G: Speaking of colleagues, you were all in E-53?

A: Yes, for a long time. My immediate colleagues were the statisticians, Roy Welsh and Gordon Kaufman. We had a bit of a disheveled suite there. As time went on, the Management Science group became more fragmented. The Marketing people moved to a different building. The people who were in Information Technologies – I’m not even sure exactly where they are now. System dynamics was part of the Management Science group, but I think it may have moved.

G: John Sterman and Jay Forrester moved. They were on the fifth floor in E-52 for a while. Then John moved back to E-53.

A: I'm not sure how it happened. I know, in conjunction with the move into E-62, there were some realignments.

I don't know whether I'm jumping ahead, but I'm jumping ahead to 1987, which is one of the reasons I feel so grateful to have had a career here. My son was born in 1984, and we realized about three years later that he was autistic. He is to this day, although he's a remarkably happy person. But at the time my wife and I that, there was a program at UCLA in the psychology department based on behavior modification that had had quite bit of success, supposedly, in helping autistic people recover somewhat by creating an extreme environment in which, even though they had massive attention deficit disorders, nonetheless the environment was sufficiently extreme that they started to pay attention, which started a virtuous cycle in which they learned to talk and to gain skills they didn't have, and to be a bit more orderly. We thought that given that time is of the essence – if you didn't help these kids when they are very young, when there is some plasticity in the brain, it is too late – we decided we would go to Los Angeles for a while and enroll our son in the UCLA program to see whether this technique would work with him.

I had just been on sabbatical, so I wasn't due for a sabbatical. But I thought maybe I would consider an early sabbatical or something. I remember I went to talk to Lester Thurow, who was dean at the time. He said to me, "Arnold. I understand the problems you face. I was worried at one point about some of my own children. You just go out there as long as you want. We'll do anything." And what he meant was, 'we'll continue your salary, we understand this is a personal crisis, the School is behind you, and you can do that.'

G: Wow!

A: The funny thing is, it's not that he put his arm around me and said, "I'm so sorry about it." What he did was much more important.

In fact, I did go out there, and my salary was uninterrupted for the year we were out in Los Angeles. I learned later that the School quietly attempted to see whether I could get sabbatical money that would be allowed by the Institute early, but the Institute said no. But no one ever said anything to me about that. I found it out later on, that the School was paying a faculty member who was not there.

G: So somebody else had to pick it up your courses and load?

A: Yes. When you think about it, not many people are lucky enough that when they have a need to transplant themselves, it doesn't create a financial crisis for them. That's an example of one of the things I like about it. I've always thought very highly of Lester Thurow as dean. First of all, because of his fame as an economist, I think it reduced the number of people who would say to me, "I didn't know MIT had a business school," because once he was the dean I could always say, "Oh, perhaps you've heard of our dean, Lester Thurow," and everyone had. Abe Siegel, who preceded him, was a wonderful dean. But so was Lester Thurow.

He was known worldwide. In fact, I think the Australian prime minister said Lester Thurow was his favorite economist. He had an international reputation, so having him as dean was good. But some people thought maybe he wasn't paying as much attention to it because he was so much a part of the other world. I can only tell you that in the time I needed his attention, believe me, I got it the same day. And he meant what he said. No one said, "When are you coming back? When will this end?" It was an example of one of the ways I feel very lucky to have been here.

G: So let me go back. One thing I meant to ask you earlier: you said you did the airplane safety studies based on your own interest. What did you find that convinced you, or changed your mind, or gave you comfort in flying?

A: The statistics are very comforting. In fact, one way I put it sometimes – and I get e-mails now from people who are afraid to fly—I say, "You know, if you see a kid, let's say, at Boston Logan Airport, that kid is twice as likely to grow up to be president as to meet harm on

today's flight." So if you look at the kid and say, "He'll never be President," well, that should make you feel comforted. The risk is extraordinarily low, and it's gotten much lower, even in the time I've been looking at the data. We're getting to the point where it's not that the crashes don't exist, but they get further and further apart. In the same way, crashes on the subway still exist, but they're so rare that we don't think about them. The ceiling could collapse. Ceiling collapses do exist.

G: Yeah. There was just one in a parking garage in Miami.

A: Yes. Funny you said that. I just remembered I'd seen it. But when the risk gets low enough, it becomes part of a vague, background, low level of risk you just live with. I think flying is moving the same way. There are fatal accidents on escalators, etc. But when we get on an escalator we don't think, "Gee..." We don't see our lives flash before our eyes as we go up. So, no. The findings were very encouraging.

Not only that, I was doing quantitative work, analyzing data about aviation safety, and I was asked by the FAA and by other parties, "Let's look at specific questions, like the risk of mid-air collisions, or the risk of collisions on the runway. What about the risk of terrorism?" And because I had started the work on aviation safety, I wound up being invited to be involved in some of this other work. That's the way these things happen. There's a certain random element in it. You start something.

It's a bit like the exhibit at the Museum of Science, where they drop a ball from the ceiling and it hits various nails on its way down, and you see where it finally winds up on the floor. It can bounce somewhat by chance alone, to the left, sometimes to the right. In the same way, you may start working on a topic, and all of a sudden some work begets other work, which begets interest.

So I've had some very satisfying experiences organizing two major experiments about aviation security, and doing lots of projects.

G: I know you're very well known in that field. That was partly why I wanted to go back to that. Some of that has been a draw from the outside world. Have there been inflections in

your direction from your colleagues here, or other things going on at MIT, that have moved you in new directions? Or did that just happen, and it's not easy to recall?

A: As far as aviation, no. It wasn't that people said, "You should work on this." It's that they created an environment where, if I wanted to work on it I didn't feel I was somehow letting my colleagues down. I thought, "Let's see what happens." And people had a broad conception of what's important. And if it provides new information on a topic people care about, then you could say that, by definition, they'd say it's important. So, there was certainly encouragement.

But there were other things. For example, there was an opportunity – not so much through Sloan, but through the engineering school (the borders are very porous from one group to another) involving the East Japan Railway. The East Japan Railway, which operates the commuter system in Tokyo and a number of the Shinkansen high-speed lines, is the busiest passenger railroad in the world. People from their safety lab came to MIT. This railroad has its own safety lab, to worry about safety problems, even though it had almost none. I got involved in projects there regarding the safety of the East Japan Railway.

In one case, they had done a brilliant job of dealing with all the human errors that could cause crashes, such as collision risk. But the one issue they hadn't focused on as much was earthquake risk, and what an earthquake could do, given that Japan is very much in an earthquake zone. I thought the attitude of the railroad was, "An earthquake is an act of God, and we can't be responsible if something goes wrong during an earthquake." I perceived that they were not as concerned about mitigating earthquake risks as mitigating other risks which were, in fact, far more remote.

G: And we've since learned earthquakes also mean tidal waves, which are another thing you could potentially account for.

A: Yes, that's right. In fact, the East Japan Railway lost a great deal of its track, although none of its trains. There were no deaths associated with it.

I remember when they said, "Well, it's an act of God," I was tempted (although, especially in Japan, you're supposed to show a certain tact) to say, "You know, there's the old

slogan, ‘God helps those who help themselves.’” Maybe if you do everything you can to mitigate earthquake risk, you’ll be in a better position than if you just say, “It’s fate.”

G: Well, certainly the building industry’s had to, right?

A: Exactly. The way I put it a little more diplomatically was to say there is enormous respect for the East Japan Railway now. And if, in a tragic earthquake, the railway comes through unscathed because of its precautions, the respect will be all the more profound.

Anyway, they did actually (I’m not saying because of me) do certain things to strengthen the earthquake structures on the Shinkansen so that even if they’re.... These trains are going so fast they can’t stop immediately; it takes a few miles to stop. And if there’s a big break in the track because of an earthquake, it could plunge off the track.

Anyway, this is an example of the kind of adventure that develops quite naturally at MIT, some of it within the Sloan School, some of it without. But the fact that I could go outside without having a sense that I was in dereliction of duty is one of the things that’s always made the Sloan School so exciting for me.

G: One thing that happened to the Sloan School in the late 1980s, early 1990s, is the development of research centers. I wonder what your role and experience with the research centers has been in terms of influence on your work or drawing you in. Was it any different than what was going on anyway?

A: It depends on what you mean. For example, there is the Operations Research Center, one of the oldest. That’s been around since just about the same time the Sloan School was founded, the modern Sloan School. About 1952, 1953. It was founded by the physicist Phillip Morse. I’ve been involved in that center from the beginning.

As far as the centers here, I wouldn’t say that they have had a profound influence on my work per se. There are opportunities, though. For example, I haven’t really worked so much on sustainability issues. But if I wanted to – and maybe I will in the coming years – there will certainly be opportunities. People here who’ve been thinking about it, who can perhaps offer guidance as to where my skills might be relevant.

I know there's a question of modeling the consequences of climate change, and there's a great deal of controversy about that. That's one of the things I like to do, to look at models and say, "How do we know this is a model worth trusting?" That's one of the themes in my work, the model validity. I'm hardly the first person to raise the question. But thinking about how to assess the trustworthiness of a model, that's something.

But I wouldn't say I've been directly influenced by the centers here. I might mention, by the way, I met my wife here.

G: Was she a student here?

A: No. She was working in the Admissions Office at that Sloan School. I remember on the first day I was teaching at Sloan, I had ordered a textbook. In the math department, where I had been an instructor, the instructor got a complimentary copy of the book on the first day. So the first day came, and I didn't have one. So I went down to the office, and Harriet, my wife, was there. I said, "Where's my complimentary copy of the book?"

She said, "We don't have one."

I said, "This is outrageous." I used to have a stick that I waved at the class; an actual stick, rather than a pointer. I said, "This is outrageous. Then I'll cancel the class. You tell them if I don't have the book by the end of the day," and I'm waving the stick, "tell them I'm armed and dangerous." And I walked out.

She turned to Miriam Sherburne and said, "Miriam, some nut was just here."

We started arguing all the time and realized we might as well institutionalize the argument and get married.

G: *[Laughter]*

A: So that's another advantage to me of having been here.

G: So you've seen many changes in the whole operations of the school.

A: Oh, yes. Yes, there have been changes, obviously. A lot of things have changed. One thing that's changed enormously over the years – although not so much at Sloan – is that

now the business school is nothing like what it was 50 years ago when I was a college student. The only people who went to business school were losers, some said. Now very bright people from all kinds of fields, after they finish college, many decide either to go to law school, or business school, or medical school, and we get some of the brightest people.

G: We get the brightest. We're very good at attracting them.

A: And people with very high IQs, and motivations, and social skills. That isn't such a profound change at Sloan, because when I was here in the mid 1970s, I remember thinking, "These are bright kids." Then it was sort of quirky to go to Sloan. It was a small business school. It wasn't mainline in the way Harvard was. We always had a very interesting student body. So I don't want to make it sound as if the students now are orders of magnitude different from those I encountered here. I was lucky to be in the right places at the right time. The business school is now a very big focus of education.

Of course, we have Mitt Romney, the presidential candidate, who's considered very much an MBA product. The way he expresses himself in a very organized way, as we saw in the recent debate, that's the kind of thing you see a business leader doing. Whereas, President Obama, more in the legal tradition, was perhaps not as incisive in terms of citing facts and putting everything together.

G: Let me ask a question that's come up in a couple of the other interviews, that has to do with the shift we've seen. I noticed when you came here you were doing studies that had to do with the public sector. At that time we were called the School of Management, and had a number of programs. There was a program here with the deans of medical schools.

Now we have much more shifted to what people would say is truly a business school, where it doesn't have the broad management orientation it once did. Is that something you've seen? Do you have views or thoughts on that?

A: I don't know whether I totally agree with that. For example, I don't work so much now in the medical area, but there are certainly people around the school who do. In the Operations Management Group, there are people who go over to Mass General Hospital and talk

to them about how mathematical models can help. So I think if one looked at the portfolio of the School, it's not the case that issues like health are absent from the curriculum.

Certain parts of the school seem to be growing. For example, now we have a Master of Finance program, and we're expanding the Finance faculty for that reason. Finance has always been one of our great strengths. The Black-Scholes model with Merton's amendment. All three of those people spent time here, and now Bob Merton is back here.

I heard a talk, for example. Did you attend the faculty meeting this year?

G: I did.

A: With Kate Kellogg? I think Professor Kellogg.

G: Yes.

A: As I recall, she was talking about innovations in hospitals. But that's happening now. I guess you could say the distinction between public/private gets blurred a bit.

G: I think it has more to do with where the students go when they graduate.

A: That's true everywhere. My daughter went to Princeton, graduated in 2008. Timing is important. That year, it seemed no matter what people were majoring in, whether English or history or operations research, they really wanted jobs in finance. Fortunately, perhaps, the financial collapse that occurred later that year has reduced this obsession. If the obsession can happen at the undergraduate level to students who studied liberal arts, I guess it's bound to happen among students at business school.

Rightly or wrongly, there are enormous incentives to go into the private rather than the public sector. The financial incentives, the financial differentials are enormous. And, of course, it's something that builds upon itself. It's almost like system dynamics: when you have the coolest and the brightest people going to work on Wall Street, other people who like to think of themselves as cool and bright want to go to Wall Street for that reason, and don't want to

spend their time figuring out how to save Detroit. I'm thinking of the City of Detroit, not so much the auto industry.

Let's put it this way. I think there's been a societal shift. It's so interesting about the kinds of incentives that occur. When I graduated college there was an understanding – we're going back to 1969 – that you tried to get the highest educational degree you could get before flunking out, meaning if you could get a PhD you should. There was a certain sense in the air.

G: And that was with the war going on and wanting to stay in college, too.

A: That was part of it. But beyond that there was a sense that this is what you might do. So I never doubted that I was going to try to get a Ph.D., somehow. Of course, people do have grave doubts. In fact, a Ph.D. is considered somewhat eccentric for people, which means I have all the more admiration for people now who go to Ph.D.s, because they've made a conscious decision to go against the trend lines.

So, a lot of things change. We like to think that somehow what happens to us depends solely on us. But we really are affected by all kinds of societal forces pushing us here or there, whether we realize it or not. But that has helped the Sloan School in that lots of bright people think about what they want to do in life. They decide after college, and typically after working a few years, "I really want to get a business degree. I really want to understand better finance and economics and accounting and labor relations," and they see the importance of that.

G: And they come here.

A: Yes, and we get great students.

G: Have you seen, in the time you've been here, major changes in the way the School is operated?

A: Have I seen them? No. That, itself, is a good thing. It means we don't have an autocracy, where people keep changing the way you do things. There have been changes. For

example, when we had 350 students, we couldn't continue to have the Probabilities Statistics course, which I offered, in only one section. We now have six or eight sections of the basic course. There have been changes, but not enormous changes.

In terms of the teaching, I remember when they went toward a different model for the basic Probabilities Statistics course. I didn't really like it, and I said, "I'm not going to teach it." In other environments people might have said, "Hey, that's your job. They're paying you to teach that. If you want to go on strike, fine, but don't come for a paycheck."

Here, people said, "Look. You should have a course load, of course, but if you want to develop courses that are beyond the first course, and the courses you develop and therefore you are comfortable with the content, go right ahead." So I was able to do that early in my career, and I'm able to do it later in my career. Now I teach a course called Statistical Consulting. Of course, the word "consulting" has a certain erotic interest for some of the students.

G: It attracts students right away?

A: Yes, it does, and it's very nice to have the students in the class. In fact, I'm very happy to – well, I shouldn't mention because it's immodest – but I have a Facebook page. The students set up a Facebook fan page, and I'm very happy about that.

I'm so lucky to be here. To be doing what I want to be doing, and get appreciated for it – it doesn't always happen that way.

G: When you look back over the 43 years?

A: 43 years since I started at MIT. I've been here, I guess we'd say 38 years.

G: Let's say 38 years. When you look back over those years, what do you think are the highlights of your contributions?

A: Oh, gee. I don't know.

G: It sounds like Statistical Consulting might be one of them if the students set up a Facebook fan page based on your teaching of that material.

A: I think I have contributed to the teaching program over the years. By teaching probability and statistics in an MIT style, which is to say, not squeamish about every technical detail. Yet, we're not going to use anything unless we understand it, which is the same way finance and economics are taught here.

I do believe I've contributed to the teaching program. Maybe, in my own way, because my work has been publicized, it may contribute a little to the overall perception about what the School is as an interesting place.

G: Airline statistics in the news mentions that have your name associated with it.

A: Yes. I don't want to be crass and make it sound as if one is doing that for publicity, but I think when the road warrior reading *USA Today* in the motel sees an article about my work on aviation safety, and it's identified with the Sloan School, this helps a little bit.

I think if there is a main contribution that I've made it would have to be to the thousands of students I've had. I think people have to recognize their strengths and weaknesses. My strength is not that I'm a mathematical genius, but that when I do understand something in mathematics I'm pretty good at explaining it, and saying, "Let's make sure we understand why this makes sense." To the extent I've been able to help the students be more comfortable about using statistics because they know what it is. Some of the major premises of statistics really are based on folklore. In fact, I tell students that one of the major rules about hypothesis testing is the old-fashioned principle: "better the devil you know than the devil you don't know." That's why we focus on some things rather than others. It really doesn't go anything beyond that.

I think that there is a contribution, not a contribution administratively; I have no administrative skills. One of the nice things about being here is that I don't have to do administrative things. I try to help the school in other ways. I speak to the alumni quite often at alumni gatherings. I speak to groups of prospective students. What do they call it? ADMIT

weekend? I'll give a talk about what the Sloan School is like, so I hope to help the current students. We have something called Iron Professor, where professors who are considered interesting are asked to present their research. I'm supposed to do that October 22, and I'm glad to do that, I'm glad to contribute. So I believe I contribute to the teaching program, and maybe a little bit to the profile of what the school is like. Because this is probably the only business school in the galaxy in which I could really feel so comfortable. You never know, for sure, what things would be like elsewhere.

G: But, if you're so comfortable, why bother to look? Just be happy.

A: They say the grass is always greener on the other side of the fence. Here I imagine the grass is shriveled on the other side of the fence. Here I am, "How green is my valley," now.

G: Let's shift from your own work to the management science area, because I'm from BPS and Organizational Studies. You've mentioned the Black-Scholes model as something, and Merton's contribution from the economics side. But other management science contributions have contributed to preeminence here. What do you see they are, important mentions that have come from the Sloan School that have affected all the field of management in that management science area.

A: That's an interesting question. We have a lot of people who work in optimization research, mathematical optimization. Collectively, the contribution has been large in an area like that. In terms of information technologies, we have some very interesting people. I'm not really thoroughly informed about that work, but we see visibility. Erik Brynjolfsson helps the school because he gets lots of mentions.

G: Right, with Andrew McAfee and *The Race against the Machine*, is a big topic.

A: I'm not really up on that. But I think marketing is still part of the management science school. There are a lot of contributions to marketing that have occurred. Over the years, the work of John Little, John Hauser, Glen Urban, and others have certainly been among the

strong contributions. Initially, I didn't think marketing belonged here. Now I learned more here about marketing as a new field than almost any other field.

G: Certainly very statistics based, isn't it?

A: Very much a management science of mathematical marketing.

John Little was one in the early days. Now it might seem almost prosaic. But when they first started using the electronic cash registers, he said, "This is an enormous and fascinating source of data." Instead of all kinds of conjectures, we can now look at these data and start analyzing and finding out things. He recognized that decades ago. Now it's gotten to the point where, based on your purchases, the coupons you get at Stop and Shop print out for the next purchase. So the computer's doing all kinds of things. But he was there at the beginning. So I think there have been contributions.

G: The last thing I would ask is your thoughts about what makes the teaching program so great for the students here?

A: I should be careful not to make all kinds of grandiose statements about the teaching program. I think what makes it great is the perspective and the talent of those who do the teaching. I've never really been taught finance in any formal way. But everyone seems to say that a book like Corporate Finance by Brealey and Myers is a paragon of lucidity. And when I hear Stew Myers talk about how he teaches, certainly his aspirations are the same as mine. He says it's not to get people to memorize this or that technique in finance but to think financially, to understand the issues. The same when Bob Pindyck teaches economics. You have a wonderful expositor, and a person who thinks deeply. I think, as you go across the disciplines, you see interesting people saying interesting things. The MIT tradition of *Mens et Manus*, has an applied emphasis but with a great deal of intellectual integrity, saying it's not enough to know a technique, for example; you have to understand things. Your understanding is in the service of applied work. But it's a prerequisite to doing good applied work. If you don't understand what you're doing, if you're using a formula and if there's the slightest deviation from the ideal

conditions you have no idea what to do, then you're not nearly as helpful as someone who understands what the formula is doing and can build a way around an obstacle that develops.

So it's a very creative and energetic faculty. Some of these new projects in sustainability, these international aspects, g-labs, e-labs, q-labs, whatever.

G: We've seen a lot of changes, haven't we?

A: We really have seen a lot of changes. We've had a near quadrupling of the size of the student body, and of course a much bigger school, although still small relative to Harvard, for example. But I think we offer a very, very good program, and we attract students who seem to love it here, and like each other, and learn from each other.

I sometimes go with the students out to dinner. In fact, in the charity office I offer to take people to dinner if they'll donate to charity. I say, "If you donate a lot, we'll go to a nice restaurant. Otherwise it's Papa Gino's."

G: Right. So make sure you – isn't it a silent auction thing?

A: Yeah. But I never get to know exactly how much they bid. But in any case, it's a pleasure to talk to these students. They have lots of ideas and energy.

G: Great. We've concluded what I wanted to talk about. We've covered all of it. Is there – I know you said you had prepared some things, and had been thinking a little bit. Was there anything we didn't cover that you might want to talk about?

A: Not really. When I was driving here today, one thing I wanted to mention was about Lester Thurow and the autism And I wanted to mention the strange circumstances when I came here thinking, "I don't want to be in business school," and then I realized I did. I wanted to mention that I felt very free here, that I met a wife here. Those are the main points, probably

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I guess this also perhaps marketing or psychology, indicates revealed preferences. Sometimes what you say really indicates your priorities, even if you don't consciously prioritize. But if anything occurs to you at a later time, which you want to talk more about, let me know.

END OF RECORDING