

**INTERVIEW  
WITH  
STEVEN EPPINGER  
SLOAN ORAL HISTORY INTERVIEW  
February 26, 2014**

S: Steven Eppinger  
B: Bob McKersie  
G: George Roth

G: It is February 26, 2014, and this is George Roth, with Steven Eppinger and Bob McKersie. We're interviewing Steven for the Sloan Oral History series.

S: I'm pleased to be part of this. Thank you.

G: Please start by telling us how you came to the Sloan School.

S: I'm an MIT product from the School of Engineering, Department of Mechanical Engineering. I have three MIT degrees in Mechanical Engineering. I was completing my doctorate in 1988, and doing research in design, manufacturing, and artificial intelligence. I was in the MIT AI Lab, finishing my doctorate, doing engineering research related to robotics and controls. I had a strong background in manufacturing, having put myself through school as a machinist here at MIT, as well as at TRW, nearby. When I was a graduate student, I was doing work that we thought would be applied in industry -- robotic manufacturing and assembly.

G: Where did you come from when you came here as an undergraduate?

S: I grew up in Stamford, Connecticut. I came as an undergrad in 1979, and finished my doctorate nine years later, in 1988. The research that I was doing related to robot control. We said, "Well, this has industry applications, but not right now. Maybe, as it gets more advanced." And we were really proud here at MIT that we could have this funding with a 50-year time horizon, which basically means we had no application today that is practical. And that kind of bugged me. So when I was finishing that up I was on the job market, essentially in robotics. I had

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a job offer, for example, from Carnegie-Mellon. They had a robotics institute, maybe number one in the world -- certainly right up there with MIT. I had an offer where I could teach engineering and do robotics research, and be part of another great technical institute. But I could see the career path ahead of me. However I said, "I could continue doing this robotics research, but it's just not applicable, yet." While it's true that 20 or 30 years later that field would take off, I just didn't want to wait for that. I wanted to find a way to do research that would be more connected with industry. That was it. That was what I was looking for. And I said, "Well, rather than an engineering school, maybe a business school would be more connected with industry. Before that time, I had literally not stepped foot in the Sloan School -- ever. I had not taken a single class in Sloan School. Nothing.

G: Even through your undergraduate and through your masters, you had no interest in and economics or management?

S: Essentially no. I had some economics classes -- from Course 14, but not in Sloan. I did what is called an undergraduate humanities concentration in economics, which consisted of three courses. So yes, I had some exposure to economics, but I had not taken a Course 15 business course.

So after turning down CMU, I looked around and, sure enough, Harvard Business School was quite interested. In fact, Kim Clark, head of their Production and Operations Management group, told me, "Steve, we've got to bring more technology into our business school."

At the same time, Lester Thurow, our dean, was saying the same thing. In fact, I went to a talk he gave about his vision for the Sloan School. Lester had just become the dean, and he was talking about his strategy in an open forum, so I just showed up. There were only Sloan students there, and me. Lester talked about his priorities. Actually, technology was a big deal. The connection with MIT School of Engineering and technology-based businesses was an important aspect of what he wanted to do with the Sloan School. His other big initiative in the strategy was to grow our international exposure, starting with China.

I went up to him after his talk, and I said, "Dean Thurow, you ought to hire someone like me from MIT Engineering." This was the time when we were starting the LFM

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program, which was going to admit its first class and start later that year.

Lester said, "OK, let's talk. Call my assistant and set up an appointment." So I did. When I met Lester, he said, "Talk to our Operations Management Group. Talk to Gabe Bitran." They had a search, they were looking.

Actually, I received an offer from POM at Harvard, and I ended up with an offer from OM here at Sloan. While I had not taken a course in OM, I had worked in manufacturing as an engineer doing machining and setting up machines, so I had a good understanding of factories, but not so much about Operations Management. Nevertheless, both these schools wanted me. Why would they want me? I was doing control system stuff. But what they liked is that I was a modeler. I could model systems, make analytical models and simulations, and connect the models to what happens in the real world. That is what we do here in Operations Management.

I was told, "If you could just apply that type of modeling to operations rather than lower-level machine control systems, even one or two levels up, that could work really well. It would be fresh, and it would fit with what we're trying to do." Essentially both schools said something like this to me. Harvard said this because they wanted to have some people who had a more technical flavor on their faculty to help students connect with technology-based businesses. MIT wanted this because we were starting LFM, and we were going to have all these students who were in a dual degree program with the School of Engineering.

Since I had these two offers, I sat in on a class at Sloan (John Sterman's system dynamics) and I spent a bit of time over at Harvard. At HBS I said, "Boy, this is an odd place." It's very different from what I'd known here at MIT. I sat in a couple of classes, and it was just quite unusual for me, particularly the strong disconnect I felt between the students and the faculty. Also there was an attitude of the students and the faculty -- an elitist attitude, which really bothered me.

G: Of the faculty relative to the students?

S: No, the student body, as a whole, seemed to have a disconnect relative to the world. On the other hand, when I came here to the Sloan School, it felt quite comfortable to me. It's a little different from the School of Engineering, but much less so than Harvard.

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But more importantly, I looked at the expected trajectory. What would my career be like? At Harvard, it would be writing cases, and HBR articles, a couple of other journal articles, and maybe a book. That's what a tenure case looks like at HBS. What would it look like here? It would mostly be about world-class research. HBR articles and books aren't our primary currency here. I just felt that MIT Sloan would be more genuinely me. The offer at Harvard was a little bit more money, but I came here, and I've not regretted it.

G: And you started in the fall of 1988?

S: That's right. Started in the fall of 1988.

B: Some others were hired at the same time, as I remember. You had a large class, a cadre of new faculty.

S: There were a dozen of us, or something like that, it was quite a group. A subset of us got together as a little junior faculty support group. There were six of us who became really close friends, and we had a junior faculty cabal. That's what we called it, The Cabal. We received some advice from senior faculty that this could be a good thing to do, so we formed our support group.

Another member of that group was Karl Ulrich, who was hired with me. We both had the offer from Harvard POM. We both had the offer from OM here. We were actually officemates in our graduate program. We both turned down Harvard, and both chose to come here. So Karl and I were in this cabal.

From BPS it included Marcie Tyre, Rebecca Henderson, and Rick Locke. The sixth was also Wanda Orlikowski, also from Management Science. It was quite a nice group. We would meet six or eight times a year, maybe roughly once a month during the semesters. We would have dinner, and talk about one of our papers. This would rotate so that once or twice a year you'd get to take a paper that was a draft working paper, almost ready for a journal, or maybe under review even, and kick it around with a group of really good colleagues from different areas. We weren't all in the same, narrow discipline. We'd get a different kind of review than you could get from the journal. I think that helped to make our papers a little more broadly

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applicable and understandable. The cabal disbanded, essentially, after we went through the tenure process. But it was a good thing leading up to that. Some of us got tenure here, and others have done well elsewhere.

G: We've heard about that group, and having that cabal, which I think is significant, a somewhat unique experience, given other people's entry here.

S: At the time we weren't very good at junior faculty mentorship. We didn't have formally designated mentors for junior faculty. So I didn't have a mentor. I surely had a few mentorship conversations with Tom Magnanti, who was not even in my group. He was the Management Science Area head. But, he's the one who sat down with me and said, "Let's talk about how you're doing, and where you are, and what you've got to get done." I can think of three or four things he told me that were helpful. Those conversations were the closest I had to any mentorship, and it was very informal.

Now we have formally designated mentors for all junior faculty. But the junior faculty cabal – that connection among peers – serves a different role. You can just talk about the stress of going through the faculty promotion and tenure process with others who are in exactly the same position at that time. We're all doing our reviews at roughly the same points in time. The cabal provided a different kind of support than one would get from a mentor. Furthermore, I think that each of us today is a better mentor because of having this particular experience.

B: As you came into the OM area, you mentioned Gabe Bitran. Who else became close colleagues?

S: Others in my group... Charlie Fine and Steve Graves. Those were the senior faculty in the group. There were also other junior faculty – Larry Wein, and Anant Balakrishnan – in addition to Karl who joined with me.

Larry rocketed through tenure and after a little while went to Stanford. He's still there, and doing great. Anant Balakrishnan joined the same year as I did, but wasn't a member of our cabal. He did not get tenure. He left and went to UT-Austin, where he's doing really well. Karl was also denied and went to Wharton where he has been phenomenally successful.

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B: And what courses did you teach? How did you account for your time?

S: Right off the bat I started to teach Operations Management, which, as I mentioned, was a subject I didn't really know very well. I literally watched Larry Wein teach it in the mornings, and then taught my course in the afternoons.

G: That's a good way to do it.

S: Obviously, you've got to do a lot of prep because you have to be ready to teach it, even though you haven't seen it taught. But a lot of reading and prep, and discussions with Larry. Karl was doing the same thing. So the two of us would sit in the back of Larry's class. That worked. It was a bit of trial by fire. By the way, I was 27 years old when I joined the faculty. So I was the average age of our masters students. I had very relevant industry experience for what I was teaching. Of course the students that age had some relevant industry experience, too. In fact, they had more of it than I did, since I spent time on my doctorate, and I was doing other things. My industry experience was largely summers where I worked as an engineer. So I didn't have a lot of industry experience, but what I had was deeply relevant for what I was doing. So that helped me – gave me some confidence. I'd spent more time in operations and factories than the students had. Nevertheless, I was teaching them the concepts. I wasn't too far ahead of them in the textbook, so to speak. But it worked well. I even won teaching awards – a couple of honorable mentions, and one year I won whatever the big award is, Teacher of the Year. So it was a bit of a challenge to learn the material, but it wasn't beyond me.

At the same time, Karl and I created a product design course. We experimented quite a lot in the early years with exactly how to structure it. The idea was to create an interdisciplinary product development class. That's something I'm still teaching today. It's evolved quite a lot, but I've been teaching it for 25 years, and it has been tremendously successful.

B: That's this stream of entrepreneurial innovation which is so central to the School.

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S: Right. The design course has an entrepreneurial flair, but it's really more on the innovation side. It's about developing new products and services for a business, whether it's a new business in an entrepreneurial setting or it's an established business, they still need new products all the time. How do we create them? What's the process of understanding the market and the customers and the competition? What's the process of developing concepts, the whole creativity aspect of that? How do you turn that into something real, from specifications and prototypes to testing and qualification, and getting it into production and deployment?

Today the class has interdisciplinary teams of students. I have over 90 students in the course this year. They're in 12 project teams of about eight students. We have students from the MBA program, and they have marketing or operations or some kind of business focus. They might have a technical background, but they're studying business. We have students from our manufacturing-related programs – the Leaders for Global Operations (LGO), which used to be LFM. We have students from the MEng Manufacturing program in engineering. We have also students from some other technical masters programs – like Mechanical, or Media Lab. We have business and technical students with different foci, depending on their background and current program of study.

In addition we have students from the Rhode Island School of Design. We created a collaboration with RISD, which is now 23 years old, where their Industrial Design students, which is art applied to product design, take our class as their senior capstone experience. So they're undergrads, for the most part, a few grad students but mostly they're undergrads in Industrial Design. Today at RISD, the ID students have two options for their senior design project. They have what they call the Senior Studio, and then what they call the MIT Studio, where 20 of their students come and take my class and work in project teams with the MIT students. It's an amazing collaboration.

B: When you started this, were we really ahead of other business schools in putting this subject into play?

S: Yes. At the time, business schools were not really teaching a product development course at all. We were actually ahead of engineering schools doing it too. Engineering schools were teaching students generally about machine design, with very little understanding or even

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discussion of customers, prices, economics, making money, and market segments, or—for that matter—human factors and ergonomics, which the design students would be doing. This idea of interdisciplinary product design education is something helped to pioneer. We weren't the only ones. Michigan and Carnegie-Mellon at that time were also starting to experiment with it in the late 1980s and early 1990s. But we developed a way to do it really, really well, despite the fact that we don't have an art school. Carnegie-Mellon and Michigan had art students. We do not have an art school here at MIT. We developed this collaboration. We could have worked with Mass College of Art, but RISD has amazing students, a great brand, and a very good collaborative spirit in working with us. Even though they're a bit further away, it's worked very, very effectively with them.

Since then, Karl and I wrote a textbook that is the most widely used textbook on the subject of product design and development in the world. We wrote it because we didn't have good material for this course, and no one else did, either. We took a product development approach to writing the book. We talked to customers: "What do you have? What do you use? What do you like? We talked to faculty around the world, and so forth. We developed the materials. We beta tested them in our classes, and got other faculty to beta test them. We developed that book starting in the 1990s. The first edition came out in 1995. We are writing the sixth edition this year. It is used in hundreds of schools across the US. It's actually used in several different courses here at MIT. It's also used in hundreds of schools around the world. It has been translated into several languages.

B: That's terrific.

S: It's been very successful. It's partly because of the trend to teach interdisciplinary design education. There are several schools that wanted to do that, as Carnegie-Mellon, Michigan, and we were doing, and this was the right book for that. It has also been one of the leading books for the senior mechanical engineering capstone design classes.

B: It's a great story. Really important. Now, in terms of new faculty, younger faculty, becoming the new leaders when you get to the point of retiring?

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S: We don't yet have a succession plan, unfortunately. We hired one potential successor more than 10 years ago, Thomas Roemer, who came to us from UCLA-Anderson. He's an engineer and he did his doctorate in a business school in operations management. Smart guy. He was on our faculty for six years, but he wasn't able to engage effectively enough in his research. He wasn't going to get tenure, so he left and went to UCSD, which has created a new business school, the Rady School. He has been teaching there in a position of lecturer. Now, as you both know, Don Rosenfield, who has been director of the LFM and LGO program for 25 years, is retiring this year. Thomas Roemer is going to take Don's job, starting this summer.

B: Oh, I hadn't heard that.

S: Yes. We've just hired Thomas back. I don't think that means he'll follow in my footsteps and teach product design. He could; he's well qualified to do that; our plan was to have Thomas do that. When I went to the Dean's Office, Thomas took over and taught my product design class for a number of years. Then Thomas left. I had somebody else teach it for a few years, and now I've taken it back to teach.

B: You mentioned that LFM (now LGO) was starting up when you joined. You connected very quickly.

S: Right. I connected right away with LFM. As you know, LFM was started by Engineering and Sloan School together, by our deans and a group of companies who would support it – and they did. We got several million dollars from companies to fund its start-up and operation for several years. It's a dual degree. Students get our MBA degree plus they get an Engineering Masters degree in one of the Engineering departments. The students do a Masters thesis as part of that by spending six months on site in what we call an internship. It's not what most people think of as an internship; it's kind of an applied research period – we call it internship – for a summer and fall. Each of those students gets two thesis advisers, one from the Sloan School, one from the Engineering School, because they're writing a single thesis serving for both Masters degrees. I've supervised perhaps 75 of them over the years. Every year I do one or more, and that's been a great way to connect with several of our Engineering faculty, because

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each student works with two thesis advisors. It's always a learning experience for me.

More importantly, it's a great way to learn about some really interesting problems in industry that are highly relevant today. They're asking the students to solve important problems. Maybe that's a problem I want to work on further in my research. I have had several research ideas come out of supervising LGO masters students. I've also had connection with LGO through many of the students who take my Product Design and Development class. I was also the faculty co-director from the Sloan School for LFM for a couple of years.

B: It started with Tom Magnanti and Kent Bowen.

S: They were the founding directors. Tom Magnanti was the first co-director from Sloan. Tom Kochan and Steve Graves also served as Sloan co-director. I then followed Steve. After me were Tom Allen and now Georgia Perakis. We've always had two co-directors, one from Sloan, one from Engineering. Then after a few years we added a third co-director from industry. We've maintained that structure.

B: Like Bill Hansen.

S: Yes, Bill Hansen was the first LFM industry co-director. Today it is Vah Erdekian.

B: What year, roughly, was it? Do you remember when you became co-director?

S: It was 2001, and it only lasted two years because I was tapped to come into the Dean's Office as Deputy Dean.

The impetus for the program was to help US companies to be more competitive in manufacturing. It came out of the MIT study on manufacturing and productivity, which wrote *Made in America*. You were on that study, Bob. Out of that came for MIT "We should do something about this. We should work with US companies that want to be more globally competitive, learn the principles of world-class manufacturing, and practice that." That was the mid-1980s. By the mid-1990s, the flavor was a little different. Our sponsor companies were

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doing pretty well. They were being more competitive, Japan was being less competitive.

The big thing in the mid-1990s was the Internet. How is the Internet going to change manufacturing? Does it mean we don't need brick and mortar, and we don't need to manufacture stuff in the US? It was a big, almost existential, discussion. So the flavor of the program changed a bit, to "how does technology – computers and the Internet – change the need for manufacturing, the nature of the manufacturing business?" And "how can we be competitive in that new world?" For a little while that was really our focus. Then, in the next decade—the mid-2000 to 2010—it was about globalization. So the Internet hasn't eliminated the need for manufacturing as we know, but it has flattened and connected the world in some highly effective ways. It has reduced the barriers of communication, and so forth. Now these businesses are globalized. So even though they may be US-based, they are manufacturing around the world; now they're even doing engineering around the world. Now they have partners around the world and customers around the world. So, the program developed a much more global flavor.

One of the things we did is create an LFM program in China for our partner companies. Maybe Don told you about the China – LFM, now the CLFM program. A few years later, the conversation was about how do we manage these global supply chains? I think that was the impetus for the change of the name to LGO, which signaled the evolving change in strategy.

In each of these changes in focus there was a change in strategy of the program in terms of what are we going to work on? At some point we said, "Let's just de-emphasize production and manufacturing and more strongly emphasize what we're doing, which is training operations leaders. The companies are hiring our students for their skills in analyzing and managing operations." We thought a lot about names and branding, and came up with Leaders for Global Operations (LGO). That name change is just one of many strategic redirections of the program.

G: But the foundation is still the same. It's a two-year degree program.

S: The foundation, in terms of the degree, sure. The degree structure, and some of the leadership structure, and the sponsorship structure is largely the same. Some of the details of the fellowship and things like that have changed a little bit.

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B: But we have service companies now as sponsors, right?

S: We have companies that rely on excellence in operations of all types. So Amazon is a retailing company, with a huge supply chain. You could label it a lot of different things, but they don't literally manufacture things. Before that, Dell had joined; they would specify and assemble computers to order. They were brilliant in supply-chain management – supply chain and logistics, but, not quite as much design and manufacturing. We have biomedical companies – Sanofi and Amgen. We have telecom companies – Verizon, for example. Two Boston-area hospitals are partner companies now. It has really broadened to excellence in operations, which is a good thing for us.

B: Okay. That brings us to the Dean's Office.

S: I had a stint in the Dean's Office for five years as Deputy Dean of the School from 2004 to 2009, and four months as Interim Dean in 2007. When Dick Schmalensee was finished and stepped down as dean, the search for the new dean was still underway. The provost asked if I would be the interim dean for a period of time. We didn't know if that was going to be a month or a year because the search wasn't finished. It turned out to be four months until Dave Schmittlein joined us as dean.

As you know, we have one or more deputy deans; usually there are two, but sometimes three or one. Essentially, we split up the school operations into different portfolios. Some aspects are taken by senior associate deans, and others are taken by the deputy deans. The academic and research side is covered by the deputy deans.

My portfolio included five elements. First was non-degree executive education, that is, not Sloan Fellows but all the non-degree executive education. Second, international programs. We had a lot of international collaborations, and we created a new strategy around that. The third one was the undergraduate programs. Fourth was the doctoral program. The fifth area of my responsibility was the research centers and faculty research activity. The other deputy dean handled faculty affairs and the masters programs. So we split it up into those two portfolios.

In each of those areas I think I made important changes and contributions.

Probably the two places where that I spent the most time in my deputy dean role, where I put a

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lot of careful thought into restructuring and improving, were the first two: executive education and international collaborations. I could speak a little bit about each of those.

B:           Excellent. Please do.

S:           Non-degree executive education is a critical aspect of the School's teaching portfolio. It's also a really important way in which we connect with businesses, with companies, and with practitioners. However, at the time I started, it was a fairly small operation, bringing in several million dollars a year of revenue. It had a good business model around it, that is, there was some surplus coming out of it that helped fund other things in the school, notably things like the doctoral program. When you think about our portfolio of degree programs, some of them break even, and others lose money. The doctoral program doesn't take in any tuition. We teach these little classes, and we heap all these resources on the doctoral students. We even give them fellowships, as you know. The doctoral program is a big, expensive investment in our future.

This non-degree Exec Ed is one aspect of the school that brings in money to support that investment. But it had a bit of a "clubby" flavor. Certain faculty were teaching in the executive programs, but most were not. Those faculty teaching in the programs were making, in some cases, substantial amounts of supplemental compensation, additional pay for teaching in them, which created a bit of resentment among our faculty. For those who were doing it, it was great. Everyone else, you're locked out of it, or so they felt. The fact is, there wasn't a locked door. We just didn't have big portfolio programs. But still, the portfolio we had wasn't evenly distributed over the faculty. There were some who were doing plenty, and others who were doing none.

But we wanted to grow it, and the way to grow it was not to keep using the same faculty more and more, even though they were very skilled at it, enjoyed doing it, and appreciated the compensation. We needed to find a way to grow it with more faculty involved. Of course, we also needed to grow the staff in order to do that. My predecessor in this role as Deputy Dean – Don Lessard – had just landed a major custom program with BP, so we were in growth mode for this set of programs. Until that time, we had a portfolio of primarily open enrollment programs, which is people from industry taking a class for a day or a week, or and we had five or six of those programs. We had very few custom clients, such as BP and IBM and a

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few other companies. It just felt like we were under scale. Wharton, Harvard, Stanford, Northwestern, INSEAD, and IMD all had bigger operations in executive education, and we needed to have a stronger presence in this area.

I worked hard to find ways to grow it. I realized that we had a resource problem: we did not have enough faculty teaching in it; we did not have enough staff to run the programs; and we did not have enough space in which to operate the programs. So I went about systematically addressing all three of those resource constraints. On the faculty side, I worked really hard to change the culture so this isn't a closed club, it was a really open thing. We said, "We need more faculty teaching it. It's different from teaching an MBA class, so it's not for everyone. But if you're interested, let's talk about how do it." Then I ran faculty development workshops to train faculty, to explain to faculty, show them, how do we teach these programs? How are they different? What is it like? Right down to how is it compensated, and how is it supported? There's not an army of TAs. We have dedicated staff to support it.

On the staff side, we worked hard to build up the staff as we needed it for the program. We said, "Look, if we're going to grow the programs we can't do it with the same staff. We have to grow that office." That involves working with the other deans to be sure we can hire them. Finally, on the space side, we ended up using seven different hotels in the area. We would run some classes on campus during spring break, and in summers we ran classes over at Endicott House. But it was really a matter of saying, "We can't be resource-constrained. We're going to have to grow the resources on all three of these dimensions in order to grow the programs."

By the time I had finished in the Dean's Office, we had doubled the size of the programs, and executive education was bringing in more annual revenue than the MBA.

B: And that was including BP?

S: Yes. It included all our custom programs as well. And, most importantly, I it became a professionally run operation. It was very much a group of professionals with an attitude of, "We're going to deliver first-class, quality education at a premium price." And that's how we made it something that was beneficial to the School's budget, also. Other schools do this for somewhere between 0% and 20% margin. We had margins even higher than that. It became a really important activity for the school. And it remains so to this day.

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B: On the staff side, was it Rochelle who ran the program?

S: The executive director, when I started, was Marie Eiter. Marie retired, and we had a search that I chaired. Rochelle was on our staff and applied for the job. We had four or five other qualified candidates on our short list. We interviewed them all and decided to give it to our internal candidate. Rochelle was just tremendous. So for three of those five years, I worked closely with Rochelle in leading that program. And Rochelle is now retiring.

B: Yes. Amazing.

S: In fact, the guy who's taking Rochelle's place, Peter Hirst, was a senior director in the program and then became executive director when Rochelle moved to the Dean's Office. He was one of the others we interviewed on our short list along with Rochelle. We were very impressed with Peter. He wasn't quite ready to be the director. Soon after that we actually brought him in as a senior director, and then he became executive director, which he is now.

B: Right. That's a great story. The other area was international.

S: I'll tell you a bit about international. As you know, the Sloan School has a lot of international collaborations. Business schools have many, many opportunities to do those kinds of things. Part of my job was to make some sense out of it. We had some strategy, but we were also quite opportunistic. We were doing some interesting things, and some less interesting things, I would say. The challenge was to be a little bit more strategic about it. First of all, why should we do this?

We had an International Initiatives Committee, which was a group of faculty and staff who worked with Alan and me to talk about our international strategy and its implementation. So we articulated our strategy, which was: the reason we have international collaborations with other schools around the world is to provide opportunities for our faculty and our students to learn about international business in those regions. Therefore we want to be in the key regions where new business activities are happening that are different from here. Western

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Europe, for example, has a business culture that's a little different from the US, but globally not so different. China, on the other hand, has a business culture that's completely different from the US. India, very different from the US. Middle East, very different, etc. The idea was to seek collaborations in places where the business culture and operations are different from what we have here. So it was a BRIC strategy – Russia, India, China ... and Brazil, but it took a little longer to develop. I spent a lot of time working on Russia, India, and China. After that, the Middle East, finding collaborations there. Alan and I, supported by several other people, spent a lot of time developing relationships with key schools in other places.

The second aspect of our strategy was: We don't want to dilute our faculty by sending them to these foreign schools to do a lot of teaching. That is not good for what we do right here. It's not good for our students. It's not optimal for our faculty, in general, either. If they really want to do that, they do it in their sabbatical, but they don't need to do it in all the other years. So we've created this model, which we call "institution building," which was started by Lester and by Alan, before me. But we formalized it. We said, "This is the right way to do it." We tried other things. We actually have. We tried doing it in a way where we'd spend quite a bit of time teaching elsewhere. The "institution building" model is sort of "train the trainer." The idea is to help these other schools to grow somewhat in our image – they're partnering with us because they like our model. We teach them the model, essentially, and we do that by having their faculty come here as International Faculty Fellows for a semester or more. Typically it's junior faculty in an advanced post-doc sort of mode, where they are paired up with one of our faculty, maybe see how they teach, what they teach, be prepared to teach that when they go back home, develop some research collaborations while they're here. At the same time, we train some of their staff. How do we do admissions? How do we do alumni relations? How do we do career placement? How do we run a Masters program? And so forth. That worked very, very well in China, in Korea. We're doing that in India, today. We tried to get some things going in the Middle East. We did several things, but never developed a really strong collaboration. Nevertheless, our institution building model has proven to be quite successful.

G: Gives you a chance to scale more easily than trying to do it yourself.

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S: Yes, it's a matter of leveraging our scarce faculty resources. If we show them how to teach a few classes, they can be offering those for years and years and years without any additional effort on our part. On the other hand, our School of Engineering has worked on the other model. They have been sending their faculty to spend whole semesters, or six months at a time.

B: Tom Magnanti in Singapore.

S: Yes. Or become the president of a university. I actually don't think that model is the right one for us to be doing. Formulating our international strategy where we can say, "Here's why we should do this program, and why we should not do this other program." We also ran the international activities in a way that we had good, strong financial backers, and it didn't cost us all that much to execute the program. So those helped us balance our budget, too. Exec Ed and international are two of the most important revenue areas for the school.

G: And both of those have grown. And, as you say, they've been net financial contributors.

S: Yes, they have. Both of those. When you think about it, we have five important sources of income in the school. We have tuition, which pays some of the cost of education, but not all of it. We have international activities, which run for a surplus. We have executive education, which we run for a surplus. We have expendable gifts to help us run our operations. And we have endowment. We can't run this School with tuition alone. There are schools in the US that try to do that, and they don't have the kind of resources we have. We're really fortunate that we have all these other sources. But the two we just spoke about – international and executive education – we grew substantially over the past 20 years.

G: You've talked a lot about what you've done programmatically in teaching for the school, but I don't think we've given you a chance to talk about your own contributions.

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S: Well, my research has been highly successful. I started out at Sloan doing research related to manufacturing process improvement. I didn't find a way to make a great contribution there. So I pruned that branch of my research portfolio before tenure.

The other area I started working on is in the area of managing engineering design processes. I developed a way to extend this pretty basic network modeling technique that had been around for a while—but no one was really applying it—called design structure matrix. I extended it with a whole range of ways in which we use it to look at the structures of systems, sets of interacting things. I've used it primarily to look at the structure of engineering processes, such as complex design processes. We make task-based models about how tasks interact with each other through information flows. We have been able to study the behavior of engineering design processes using these DSM models to really effective use.

We've also looked at the structure of other aspects of complex engineering problems. We've looked at organizational aspects – how do the different people interact together to work on complex projects, sometimes very, very large projects, and how are they grouped and organized and how does that map to the work that they need to do?

The third way we've applied it very successfully is looking at the structure of the system itself that they're creating, the complex automobile or airplane or computer software system, whatever – look at the actual system architecture, in terms of interfaces among all the components that have to work together to make the system work. That line of research has been very fruitful.

Of course, I wrote lots of papers, got pretty well known for it, got tenure in that area. I've written a book on that, which came out with MIT Press a couple of years ago. The book covers quite a bit of the history of this research, as well as lots of ways it's been applied. The DSM method is being used by many companies to gain greater understanding of their processes. Some companies have built this into their standard procedures for how they organize engineering processes. There's a whole research community around it, an international community. There are hundreds of research papers every year now using DSM. We have an annual conference. It was in Australia last year. It's going to be in Paris this year. So, it's got a life of its own now.

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I'm a senior member of that field, having really built it. But it's been very gratifying to see my work have connections to so many companies and places around the world. So yes, I've been pleased with that aspect of my career as well.

B: Well, you've hit quite a few great spots in this time we've been together.

S: Yes.

G: We still have one more thing to talk about.

S: Do we really? What's the last one?

G: We talked about it before we turned the tape on. I thought you made some really good comments about the relationship between the Engineering School and Sloan, which I have not heard as clearly from other people. I think in many ways you embody it, because you brought that here and have been successful in the management school. Not just in your own research, which we talked about, but in the contributions to actually running the School and its programs.

S: Right. It's true. When Lester hired me, it was probably because he wanted to enable LFM to have strong connections between the Sloan School and the Engineering School. Over the years I've played that role of connecting the Sloan School with the Engineering School to the point where I have a joint appointment in the Engineering Systems Division. I work with a lot of engineering students in my class, as well as supervising doctoral students and masters students in both Engineering and Sloan. I've helped to run some of our joint programs — LGO, and the one I'm currently running, the System Design Management (SDM) program, which is also joint with the School of Engineering.

I guess the comment I was making earlier, which I'll repeat, is that this is one of the really special aspects of MIT. We're not the only business school that has programs and connections jointly with their engineering school, but I think the way we do it is uniquely compelling. It's particularly effective for the Sloan School. I think we have a more techie student body than other business schools. We also have a way of collaborating that's been very effective.

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There are other top business schools that don't even have an engineering school, like INSEAD, or London School of Economics. They aren't connected to an engineering school, they're a stand-alone business school.

B: Or Chicago.

G: We talked about Harvard, too.

S: Yes, there are others that are part of a university that does have an engineering school, but it's not a world-class one — like Harvard. Maybe that's going to grow and become something big some day. But right now, and so far, it's not a big player.

And there are others that have a great engineering school with a great business school, but they don't connect really effectively. So you think about University of Pennsylvania, Northwestern, or Stanford, where yes, they have great engineering, great business, but they just don't have the ways to connect and work together that we have at MIT. We have this culture where we can work across this boundary. It's not that there isn't a boundary. The Sloan School is different from our School of Engineering in 25 ways I could explain. So we are different. But that doesn't stop us from working together. It doesn't stop us from teaching jointly, from advising students jointly, from having joint research centers, joint research projects, and all that, and—in the case of some of the big things we've done—having truly joint, collaborative programs. I think that's one of the very strong aspects of the Sloan School that I'm really proud to be part of.

B: Yes, I'm glad we got that on the record. It has certainly been great for the School.

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