Interviews of the Margaret MacVicar Memorial AMITA Oral History Project, MC 356
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Katharine Stohlman – class of 1979

Interviewed by Nafisa Syed, class of 2019

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MIT Libraries

Margaret MacVicar Memorial AMITA Oral History Project

Katharine Stohlman (SB Materials Science and Engineering '79) was interviewed on August 5, 2017, Kate's 60th birthday, at her West Cambridge home by Nafisa Syed (SB Biology '19). At the time of the interview, Stohlman was the Vice President of Quality and Regulatory Affairs at Corvia Medical, a company that develops structural heart devices for the treatment of heart failure.

After MIT, Katharine Stohlman worked as a metallurgist at Supercon, Inc. in Natick, Massachusetts, where she manufactured wire for physics projects, as well as MRI and NMR. Stohlman then attended Harvard Business School and subsequently went to work at Hewlett-Packard's (HP) Medical Division on cardiac ultrasound technology. Since then, Stohlman has focused her attention on technologies involved in treating heart failure patients. After her time at HP and Agilent, the company that branched off of HP's Medical Division, Stohlman joined a start-up involved in the development of catheter-based techniques for heart valve disease called Viacor, where she served as the Senior Vice President of Clinical and Regulatory Affairs. She then served as the Chief Operating Officer at Thermedical, another medical device company. Stohlman went on to co-found MitraSpan, Inc., a company focused on developing a medical device for the treatment of mitral regurgitation. At MitraSpan, Stohlman also served as the Vice President of Clinical and Regulatory Affairs.

SYED: Could you start by telling me a little bit about your childhood and upbringing?

STOHLMAN: Sure. My father was a thoracic surgeon, and he and my mother went to England to study in 1956. That's where I was born. My father had been born in England, and so he had a lot of family there. That was why it was appealing to him to be there.

Then they moved back to New York City, and I lived in New York City for 10 years. I was the second of four children. We lived in an apartment on the West Side, and my father worked at a hospital. He decided it was too hard to raise four children in New York City, moved the family to the Boston suburban area, and went into private practice.

I went to public schools in Massachusetts. I went to high school in Cambridge – to a very nice girls' school called Buckingham. There I met people whose parents worked at MIT, and I became very interested in MIT. I always liked math and science in middle school, and in high school. Then, one day, one of those parents came to my high school. He was a materials science professor at MIT and gave a lecture on polymers and rubbers. I'd already been interested in metallurgy – that's because the first Earth Day was when I was in middle school. I went to visit one of my New York friends, who at that point lived in Scarsdale, New York, and she had gotten herself involved in the first collection of aluminum cans for recycling. Her middle school was collecting aluminum cans on a Saturday, so I started to learn about the lifecycle of an aluminum can. That was kind of interesting to me. And then this professor gave this talk about rubbers and plastics, and that was interesting to me.

So when I wrote my MIT application, I said, "Well, I'm really interested in aluminum can lifecycle." Now, this was, of course, many years later. But I remained interested. I wasn't especially expert in that topic; it was just an interest. I had done really well in math and science in high school, so my teachers were encouraging me to consider technical majors in college – and MIT was a really logical place to apply to.

I was really happy to get in. I didn't actually get into a lot of different colleges, but I got into MIT, and I was thrilled. I declared materials science as my major the day my foot crossed the threshold – and it was difficult!

SYED: It sounds like you had a very supportive environment in which to explore your scientific interests. Could you maybe tell me a little bit more about that, specifically?

STOHLMAN: Sure. The Newton junior high school that I attended had an explorers club, where we would go spelunking and look at the rocks and minerals. And the science classes at the junior high school were really well done; we had really good teachers. And so that any emerging interest was, I would say, well supported by good teaching.

And then when I went on to high school, the girls' school was very small, but it had very, very good science and math teachers. And then we merged with another school, the Browne and Nichols School [known now as Buckingham, Browne and Nichols], and so there were a lot more science classes available. And they had really good teachers, too.

You have to turn the clock back to before there were computers available. There was no such thing as a PC. The internet hadn't been invented yet. But our high school had a direct link to an MIT computer.

SYED: That's so exciting!

STOHLMAN: It's because we were in Cambridge. We had a computer room, and we could punch in code and have it read by a computer at MIT. We weren't being taught how to program, but we could explore topics after class. The chemistry and physics classes were really super strong. Class sizes were small, so it was a great learning environment. Four of us from my high school class went to MIT. And my MIT freshman year roommate, Carol Cesari [Carol Cesari Tourgee '79, SB and SM Electrical Engineering], was one of my best friends from high school. She and I are still very close friends.

SYED: That's amazing.

STOHLMAN: She's recently moved back to Cambridge and is now in my book club. So what goes around, comes around. And since it was such a small school, we all had all our classes together for several years, so we knew each other pretty well arriving at MIT.

My mom was a stay at home mom. She was very egalitarian. My brothers and sisters and I all had very different strengths and weaknesses and interests. And yet we were all the same in my mother's eyes, which was really wonderful for family harmony. We remain very close and very supportive of each other. My little brother was very athletic; he now coaches high school. My sister, a very caring person, she's a counselor and a social worker. And my older brother works at a library; he's very bookish. We were very different from each other, and everybody got parental warmth and support in whatever it was we wanted to do. But we also understood that we were very fortunate, that our parents could financially support the things we were interested in.

That meant that there wasn't a college debt when I graduated, and I know that graduating without college debt meant that I had a lot of freedom – take time to find a job and consider all sorts of things. That's a freedom that I really value. It's something that I think is one of the problems in the United States, relative to other countries: It takes money to have that kind of freedom, and therefore, there's a perpetuation of income strata that's not necessarily in the best interest of the social construct of our country. I know it benefited me personally, and it will continue to benefit my family.

Anyway, I think I was pretty typical of someone in the '70s going to MIT. I came from a family that could afford to give me the opportunity, and I lived in a community where college was an expectation. Massachusetts has a very strong social expectation of sending kids to college. My grandparents went to college. My grandfather was a college professor. His parents went to college. The social support was deep.

SYED: That's wonderful. So could you tell me what the general atmosphere at MIT was like when you got there?

STOHLMAN: I'll start in high school, because it's the '70s, the middle '70s. I graduated in '75. Harvard Square, Cambridge was very liberal – a hippie culture. All the girls dressed like boys. We all wore blue jeans and turtleneck sweaters. The boys had long hair, the girls had long hair. The drinking age was 18. We could drink, we could smoke pot. I had friends who were making drugs in their basement. It was a liberal time in an extremely liberal place. Sex and drugs and rock and roll were very much part of the social structure of my school and neighborhoods.

I wasn't especially into those things myself, and I think if I had been, I would have had a hard time going to MIT and succeeding. But even at MIT, there were a lot of those things in the social environment. I lived at the girls' dorm my first year, freshman year, at McCormick Hall. I lived in a double, with my roommate who was my high school friend. She played in the MIT orchestra, and I sang in the choir. We were pretty typical of the girls that were there. McCormick Hall was this great melting pot of women like us from all over the world.

SYED: Yeah, it's still like that.

STOHLMAN: I lived on Fourth West [also known as 4th West and 41W], and on one long hallway were all girls from Puerto Rico, so you go to that side of the building and everybody's speaking Spanish. And there's nail polish, and hair curlers, and bright colors and wonderful aromas from the food they're cooking in the kitchen together.

And then on another hall is a bunch of Asian girls. Some had grown up in New York and California, and others were matriculating from China and Japan. And then there were me and Carol, the Boston natives, the New England public and prep school girls. And then there was this group from the mid-Atlantic states.

McCormick, Fourth West, it's a big floor. There were dozens of girls all sharing the kitchen, which was the center of the social identity of being a woman at McCormick Hall in those days. The big kitchen had three big stoves and four refrigerators, and lots of counter space. And everybody was cooking food familiar to themselves. No one was on a meal plan. We all cooked our own food for ourselves – every day, every meal. What was good about that is that it was a very low-key social environment without the pressures of sex and drugs and rock and roll, which we knew was out there. When we were back at Fourth West, things were very much under control.

That was a good, safe environment. And the classroom experience, I'm sure, hasn't changed a whole heck of a lot, you know? The coursework was very difficult. You had to go the recitations in order to understand the lectures. Grading was tough. I had to take some classes twice. I did really well in math, but I really struggled in physics, even though I had come in having had a very good physics class in high school.

So it was so great. Freshman work was pass/fail. I think it still is.

SYED: Yes, it still is.

STOHLMAN: It's kind of remarkable that so many things are similar. The concept of the classroom was lecture and recitation, lots of homework, lots of problem sets. Difficult problem sets, and work that benefits from working with other people to work through the concepts. I didn't do that much of the group homework activities. I did go to recitations, but I very much struggled on my own, plowing through my problem sets. I think it would have been good for me to have been in some kind of a work group freshman year, to get through those. But everybody finds their own way.

There were a lot more guys on campus than girls. Every year they published a freshman picture book, and that brought home the message of there's a lot more guys than girls [at MIT]. But the freshman picture book is just one class. In my class, the women were outnumbered about three to one, which isn't that bad, you know? They made a big, deliberate push to bring more women into MIT, and I definitely benefited from that. You can go to a classroom and hear other women in your class. And that was true for all the classes. I was never in a class without women.

In the Materials Science Department, in particular, that was true. There were women in every class, and that was helpful. I think, though, that when you got to the graduate school, the numbers were much more intensely in favor of the guys. If you just looked at all the graduate students at MIT when I was a freshman, it was probably 8 to 1. So when the freshman picture got published, all the freshman women started getting calls. That was because there were not enough women on campus. I would get calls at my dorm room: "Do you want to go for a date?"

[LAUGHTER]

I finally figured out – well, and this might sound a little strange, but I think what was happening was that the graduate students were looking for wives, because a lot of them were not American citizens. They were looking to meet American women. And here they were at MIT, on campus, and there were a lot more of them than there were of us. So there was this sort of activity at the beginning of the semester of cold calls from people you never heard of and never met, who had found your picture in the picture book and started calling.

SYED: That does sound surprising.

STOHLMAN: But anyway, it was one of the things that brought home the message that 'women in engineering' was sort of a relatively new phenomenon. That stratification of the frequency of meeting women changed, year by year, as you got older.

One of the really great things that I bumped into when I was a freshman was this IAP activity called the "Guerrilla Guide to the Pinstriped World."

SYED: That sounds great.

STOHLMAN: It was led by these two women, MIT graduates; both were practicing engineers. They were at least 15 years older than us. They were probably in their late 30s or early 40s – I'm not certain how old they were. But I know that Lita Nelsen [SB Chemical Engineering 1964; SM Chemical Engineering 1965; Sloan Fellow 1979; director of MIT's Technology Licensing Office 1992-2016] has remained close to the MIT community throughout her whole life, and still does do things for the MIT community.

She and Christina Jansen [SB Materials Science & Engineering 1963 (third woman to graduate from the department); SM Materials Science & Engineering 1966; Ph.D. Materials Science & Engineering 2971] ran this course. It was over IAP – something like four evenings. Maybe four 90-minute meetups. How to write a resume, how to have an interview, how to dress, how to be confident – to realize that you have something that they want and that they need, and that you don't have to sell yourself short. You have to recognize that as a woman, the social construct within which we grew up often put women in a support position. Cooking, cleaning, taking the kids to school – the traditional roles for women in the United States were very much the support structure. You have to break out of that thinking if you're going to be a leader in your work team – that's what they were trying to convey. But those social conventions are very strong.

SYED: They still persist, to this day.

STOHLMAN: This Guerrilla Guide course-- I attended something like two or three times over the course of my time at MIT, even though the course was the same every year. One of the things that was good about it was the women students talking to each other. You were freshmen, and you were talking to seniors. They'd had a couple of summer jobs, and might talk about how to get a summer job. It was really good. We all let our hair down. They also would talk up things like AMITA [Association of MIT Alumnae, sponsor of this oral history project], and occasionally other graduates would come in and talk. I know that was going on for decades. It wasn't just in the '70s, they were doing it in the '80s as well.

Then, I think, it just became less of a problem for women because there were a lot more women engineers out there. The faculty became more integrated, also. Once you got into the mid-'80s, the integration of the MIT faculty was very deliberate and much better.

SYED: You had spoken a little bit about the Materials Science Department. I was wondering what was your experience there during your time at MIT? Did you start taking classes in the department right away, or did you wait until later?

STOHLMAN: I took 3.091 [Introduction to Solid State Chemistry] as a freshman. It was one way to satisfy the chemistry requirement.

SYED: Yes, that's still there.

STOHLMAN: Once you took 3.091 to satisfy your chemistry requirement, you were sort of blocking off other majors. You couldn't then become a biology or a chemistry major. At least that was true then. It was good for the people who were planning to be engineers.

3.091 was a fun class. You know, lots of demonstrations. I had declared Materials Science on my application to MIT. I imagine that's something that helped me get in – the fact that I had really thought about what I wanted to do at MIT and could articulate that in my application.

I actually explored quite a few different courses, but the Materials Science Department was small, Mert Flemings [Merton Flemings, Professor of Materials Processing] was the department head. Mert was a very nice guy, very personable. He understood that being warm to people that expressed interest in material science was important, because he needed to make sure that there were enough students declaring material science as their major to keep it relevant. It was at a time when the “heat and beat” aspects of material science – and I say that with a certain amount of anxiety, because people don't like hearing metallurgy called heat and beat, but that's what we called it from within the department – was declining in importance and electronic materials was rising in importance. And it wasn't clear that the Materials Science or the electrical engineering Department was going to retain electronic materials. Polymers had had great promise, and never broke out into being a big component of the department. So metallurgy was still the foundation of the department – the head of the department was a metallurgist.

There were a number of very interesting, dynamic professors, and some old ones. The guy that taught crystallography [Martin Julian Buerger, Institute Professor of Mineralogy] – he taught until he was in his 80s, and we loved him very much. The classes were very small. Crystallography had about 12 people in the class. It would include some graduate students who hadn't had that course when they were undergraduates at other schools. We had great equipment. Scanning electron microscopy and different crystallography measurements. We were looking at transition temperatures. Very much an equipment-heavy activity to be in the laboratory.

We also did great things like smelting, casting, forging, and turning – the very traditional things that they've been teaching at MIT since MIT was first founded. Hundred-year-old, 2,000-year-old technologies. In some respects, it was hard to really characterize it as engineering.

I would say, "I'm studying the black art of metallurgy. I'm in the kitchen cooking up something in my cauldron." A lot of the research was empirical. You do something, you measure the results, and you communicate what you did. But it didn't normally get brought down to first principles. Industrial practice was very much ahead of academic knowledge, with no apologies. "Please understand what you're doing is learning methods. And when you take these methods to industry, you will find that industry does it better than we do, and come up with results better than what we do. But what you're learning is a language, and a way thinking, and a way of doing experiments. The knowledge isn't necessarily founded here." I think metallurgy has remained sort of a doers', and not a thinkers', academic pursuit.

Material Science it was a great department socially. It was small. People cared about each other. They were supportive of each other. And when I was trying to think of what to do next, I got a lot of help.

I also had three summers of UROP [Undergraduate Research Opportunities Program] jobs in metallurgy, all doing research with artificial hip joints. The professor who headed up that artificial hip joint research team, he had a very strong industry ties. He had, in the laboratory, actual hips from several hip-manufacturing companies. So when we were doing tribology experiments, we didn't have to make our own hips; we were doing it on just industrial-strength hips. Our interest was in the wear properties of the acetabular components, and looking at the characteristics of different versions of machined polyethylene, high density, surface cross-linked, and low density. It was great UROP, a great educational experience. Occasionally, one of the doctors from Mass General would come in and learn what the most recent findings were from our ongoing experiments.

My freshman year, I had this horrible UROP assignment where I was filtering the cow blood which was used as the lubrication for this hip-wear experiment. I was filtering it to get the wear particles out of it so that I could weigh and measure the size of the particles. Were the particles of metal? Were they particles of the plastic? Does this plastic have more particles that that plastic? But filtering blood all summer, I can you, was a dreadful summer job. That was back before there was any air conditioning in the buildings. If we had three consecutive days over 90 degrees, they would close the Institute because was too hot! I remember that summer being especially hot.

But the weekly meetings – with all the other engineers, and professors, and doctors – were great. I just felt like part of the academic community that was moving the industry forward. Senior year I got a summer job at Mass General Hospital working with an artificial hip joint surgeon, and I saw it from a different perspective. Here was a guy who was implanting artificial hips every day of the week. He had problems that he encountered, and he also had some research money to study the glue that was used to put the hips in place. A great summer, again, a UROP experience, across the river [in Boston] this time. My lifelong interest in medical devices is not so surprising, given that there were medical books at home.

SYED: Thank you.

You had spoken a little bit about your professors, and I was just curious to know: were there any professors or classes in particular that stayed with you?

STOHLMAN: I really liked working on my thesis. I would say 3.091 was fun. I took a version of calculus that was more practical applications oriented. Great, because they were small classes and had really interested people teaching. I took a semester with [Professor George B.] Thomas, who wrote the book on calculus [*Calculus and Analytic Geometry*]. He was a wonderful professor.

I loved the biochemistry – it was really the only biology class that I took. If I were to go to college today, I would probably study biology, not engineering.

SYED: Yay!

[LAUGHTER]

STOHLMAN: There is one special thing, because of my UROP experience I was permitted to take anatomy at the Harvard Medical School, along with the HST [Harvard-MIT Division of Health Sciences and Technology] students. It was an experiment that probably, in their minds, failed, but for me it was extremely valuable.

Academically, I was nowhere near as prepared or capable as everybody else in the class. I was an undergraduate, and they had all finished college and passed their medical school admission boards. I had done none of that. I was just very curious. It was very brave of them to let me do that. I don't think they did that anymore after I left. The class was three hours a day, three days a week, at Harvard Medical School, doing a human whole body dissection. An immersion in medical technology, in medicine, that was extremely valuable to my education.

SYED: There's a medical device class with HST that my friend was able to take with HST students [*2.792*/HST.542/6.022/6.522, Quantitative Physiology: Organ Transport Systems], and she was able to dissect hearts and insert devices.

STOHLMAN: That's wonderful. In fact, for many, many years, I did cardiac pathology work with an MIT laboratory, as an industry person purchasing preparation and analysis services. The MIT vascular lab is actually world-renowned for their invention of methods for studying medical devices *in-situ*, cardiac implants in particular. Stents and valves that use nickel-titanium cages, put in place with a catheter. Elazer Edelman [Thomas D. and Virginia W. Cabot Professor of Health Sciences and Technology], who was an MIT professor and one of the founders of HST, is extremely respected around the world as an innovator of cardiac pathology methods, as well as cardiac therapies. He was a really important person in the field. But I learned that after I'd been working in cardiac device development work, which is pretty late in my career. It didn't start up cardiac therapy research until 15 years ago.

SYED: You had mentioned that your father was a thoracic surgeon. And kind of how medicine had kind of been around a lot. How do you think that impacted your decision to work on medical devices later?

STOHLMAN: Oh, it certainly had a big impact. Because when I was looking for a UROP job, as a freshman, I was 18. I had no other influences besides growing up to help guide my search for a UROP job. Here's artificial hip joints. It's material science and it's medicine? Sign me up!

Yes, of course it had enormous influence. But then once you get into the topic of the use of industrial materials in the body, there's so much there that it will absorb you. But it's not like I didn't get continuing support. My father was interested in what I talked about. He worked really hard. I hardly ever saw my father when I was growing up. I'd see him for dinner on Sunday afternoons. So keeping that engagement was something that I really valued. So, as an undergraduate, I looked at artificial hip joints. But I came back to cardiology soon in my career when I went to work at HP [Hewlett-Packard].

I wasn't the greatest student. I was very into my work. But academically, I didn't get all A's. Got through my whole degree, but it wasn't strong enough to get accepted as a graduate student at MIT, and so I had to go find a job. A women with a bachelor of science in metallurgy – that turns out not to be a very common job seeker, and there weren't that many jobs out there in 1979 due to a recession. So picture of me in a room a lot like this room, because I was married at this point. And we had an apartment – a little bit like this one – in Belmont. I had a typewriter, and down the street, there was a printing shop. So I wrote my resume, and I took it to the printing shop. And they would give me typeset 50 copies of my one-page resume on beautiful paper. God forbid I had typed in mistakes, because I had spent a lot of money getting that printed! And then I had my typewriter, and I would type my cover letters, every keystroke perfect.

I'd pick up the *Boston Globe* newspaper every day and look at the engineer job postings. There was no such thing as the internet back then. That was my only resource for finding job openings after I graduated, and none of the on-campus hiring mechanisms had picked me up.

I probably identified 50 jobs that seemed, in my own mind, that I was well-qualified to apply to. I wrote to those companies and never heard a single word back from any of them, not the first word. Nobody picked up the phone to call me, and nobody wrote me a letter. But fortunately, I was married at the time; I wasn't destitute. Professor Flemings, who had been my thesis advisor, called me up and said, "Kate, are you still looking for a job?" And I said, "Well, yes, yes, Professor Flemings." He said, "Well, why don't you come down here this afternoon and meet Dr. Wong?" [James Wong, SB '48 Mechanical Engineering; SM '50 Materials Science & Engineering; SCD '55 Mechanical Science & Engineering]. And so I got a job – my job as a metallurgist in Natick emerged from that.

Dr. Wong had gotten his Ph.D. in metallurgy at MIT many years earlier. He owned Supercon, Inc., which was a superconducting wire and cable company in Natick, and he hired me to be a metallurgist. There were five of us running this little company, 30 people in the factory manufacturing wire. We were making wire for superconducting magnets for high-energy physics projects and NMR. MRI hadn't been invented yet; but it happened while we were there. MRI as an imaging modality was invented in the early '80s using superconducting magnets.

When we would go to the high-energy physics academic meetings, imaging with MRI was the hot new topic.

A lot of money was being spent still on high-energy physics programs by the government, Argonne National Laboratory and several others. Those laboratories were buying superconducting wire for their proton-smashing projects. Over time those projects became fewer and bigger; a small company like ours could not participate, so the emerging field of MRI imaging became an important source of business. I was at Supercon for three years, and I learned a lot of about business.

Then I had to decide: did I want to get a graduate degree, was I going to do it in engineering or in business? I chose to do it in business, so I went to Harvard Business School. B-school was interesting; they filled each classroom with 90 people who were all very different from each other, a really strong environment to learn from, 90 people with different backgrounds all talking about the same thing from their point of view. They gave everybody something to study the night before and then discuss, then all those different points of view teach you about different aspects of business. There were people with finance, education, military, marketing, engineering backgrounds. Everybody had worked somewhere, everybody had an interest. Over time, you got a very broad insight into how industry works.

Then I went from Harvard Business School to HP's Medical Equipment Division. HP Medical had their headquarters in Andover, Massachusetts. I had a summer job there in ’83 while I was a graduate student, and then I started there full-time right after graduation from Harvard, pregnant with my first child.

SYED: What was working at HP like?

STOHLMAN: In '84 was when I started as a full-time employee – HP was the pinnacle of new industry. It was [Hewlett-Packard founders] Bill [William Hewlett '36, Electrical Engineering and Computer Science] and Dave's [David Packard] garage. It was a California company. Their human resource practices were recognized worldwide as breaking new ground. And their medical business had been an acquisition in the '60s. They didn't start a medical division; they bought an existing medical company in Massachusetts, and that became the medical division. And that company was making EKG recorders. [Hewlett and Packard were co-winners of the Lemelson – MIT Lifetime Achievement Award in 1995.]

In the 70’s, at HP Labs in California, they had ultrasound imaging research going on, and they sent those inventions to the Massachusetts headquarters to build into new products, and into the first ultrasound imaging systems in the world. I was really interested in imaging because I had been studying MRI imaging at Supercon. I was totally into the medical uses of imaging technology.

You can picture an ultrasound piece of equipment: You've got this supercomputer on wheels with a screen, and then attached to that is a thick cable with a transmitter at one end. My job was the process engineering of the piezo-electric-ceramic crystal and mating that with the electronics.

I actually wasn't god's gift to engineering, but it turns out I was a really, really good engineering manager. And, fortunately, HP ran that experiment. They said, "OK, Kate, you run the process engineering department. Let's see how it goes."

It was a time when ultrasound was a very small business and was about to become a very big business. And since I had been to MIT, I was recruiting new graduates out of MIT; I was on HP's MIT stellar recruiting team, headed up by Jim Banks (MIT ’76). I would go on campus, and I would interview students. And I'd get my “pick of the crop” of MIT graduates. Mechanical engineers were typically what I was looking for, because process engineering is developing the methodology for manufacturing. I was recruiting for all of HP Corporation, which was an excellent position to assure skilled growth of my department.

So I headed up the manufacturing and process engineering for ultrasound transducers for a long time, from 1985 until 1999. During that period, I started with two engineers working for me, and I ended up with three teams of 10 engineers and seven transducer production departments. We had 24-hour-a-day operations where we would be manufacturing ultrasound transducers. And we were part of all the new product invention teams for ultrasound transducers – because if you're going to design the invention, you had to process the invention. My team was doing the process development of the invention. So we collaborated at the very beginning of every project.

Even though I left HP Medical in 1999, I can tell you that Philips HealthCare cardiac ultrasound transducers are still recognized as some of the finest in the world. And the work that my team did is still very much the way they produce ultrasound transducers today.

In any case, you asked me about HP as a company. Bill and Dave were still making the rounds back in the '80s. But Dave Packard retired not that long after I joined the company in 1983. Manufacturing wasn't really considered one of the glory functions, but engineers were treated very well at HP. And you didn't have to be a manager to be treated very well as an engineer.

They had a hierarchy of engineering – individual contributors – parallel to the hierarchy of the managers from a pay point of view. They also had stock option programs, stock purchase programs and 401(k) programs, and very generous health benefits. So HP was considered one of the very generous and progressive companies. I definitely benefited financially from being with that company for so long.

Also, during those 19 years with HP/Agilent, I had three children. For 14 of those years I was managing a group with three shifts and lots of engineers, lots of production people. I was working Saturdays and Sundays sometimes. My job was very much the focus of my time. So family life was very much run by my husband, Tom. He is an architect. And instead of working in another office, he brought his work home and became an individual sole proprietor with his architectural work. But he also ran the household. So it was a different construct than the one I grew up in. But you know, the kids all are wonderful, and we've been very fortunate that my parents live nearby, and they were able to help out. We've had a good family life here.

And HP, even though I was very active at work and worked a lot of hours – I would often miss dinner or breakfast, go on business trips – in general, HP was very receptive of family responsibilities. HP also had family events so that the families could meet each other and spend time together -- you know, picnics and waterparks and what have you.

SYED: So after HP, where did you work?

STOHLMAN: HP went through some reorganization: they split off their technical products into Agilent. And then Agilent sold medical to Philips in 1999. During that phase I stopped working on ultrasound and worked on Agilent corporate projects: three years of very intensive global travel to lead a business transformation. Leaving medical to lead the Agilent project, unfortunately led to being stranded in Massachusetts in 2002. I could have gone on to a very good job in California. But my whole life was here in Massachusetts, so I didn't really consider moving as an option.

So I left Agilent and had an opportunity to join a start-up company with other people that I had worked with at HP. This new company, Viacor, had five employees, and they hired me to be the sixth employee. My job title was manufacturing manager, which I knew how to do, but of course, we never did any manufacturing in the eight years that I worked there. When you work at a small company, you have to wear a lot of hats. The first thing I did was I wrote a quality system. I'd had built several generations of medical device manufacturing and development quality systems at HP.

I started at Viacor in 2002 doing quality and then regulatory work: you're writing to the FDA and to the hospital saying, "OK, here's our protocol and here's our device. Let me describe them to you. Can we be authorized to do human research?"

And it turned out that quality and regulatory work – I started to like it, and I started to get good at it. And I've been doing that work, quality, regulatory in medical research, ever since and pretty much all of it in cardiology.

HP Ultrasound, was all cardiac ultrasound, so my imaging knowledge was all cardiac imaging. And it turned out the Viacor procedure could be done using ultrasound. So my experience in ultrasound was very valuable from the anatomical understanding, understanding the limitations to imaging and describing the role of imaging within the clinical research applications and papers.

During those years, the new cardiac 3D transesophageal cardiac ultrasound became available. And that was hugely important to the success of our procedure. We were able to partner with a German hospital that had been the first to use 3D cardiac imaging to do our first procedures. Very valuable to have our new device in the hands of intervention cardiologists who already had experience using 3D ultrasound to guide other procedures.

All of these things kind of build on each other. You're not always aware of how you're going to use that learning in your next square, but it's extremely important. Sometimes that's because of the social connections you've made with people who help with the next challenge, and sometimes it's from the technology that you've learned. You have to be open to both. You have to think, "OK, who can help me get over this challenge?" And you think not only about the people who have the technological know-how, but the people with whom you have social connections. They're almost just as important.

That's one of the reasons why it's very good to have a real mix of people, even on a small team, people with social skills, people who come from different places, because all of the things in your work team enlarge the pool of people that can help you get through the next challenge. And when you're at a start-up company, holy cow, there's so many challenges. It's remarkable how much help you really need, because five people isn't nearly enough. You need the five people plus all their friends!

SYED: MIT has quite the start-up culture now. Did you ever return to MIT as a resource while you were working with this start-up? Or have you worked with any other companies?

STOHLMAN: Yes, I joined the MIT Enterprise Forum in 2014 and was paired up with a start-up company, which I still provide mentoring to, Ras Labs, led by a very creative woman, Lenore Rasmussen. Ras Labs has developed an electroactive hydrogel. Electroactive hydrogels polymers which change size or shape in the presence of an electric field, properties which make them an artificial muscle. And, through Harvard Business School, I became a mentor to Alexis Turjman, an MIT Ph.D. with a start-up vascular therapy company, Cognition Medical. I'm on the scientific advisory boards for both companies.

What I bring into those companies is mostly regulatory advice. Neither one has yet gotten to the point where they have to do regulatory filings. I'm not a consultant to the companies; I'm not going to do their regulatory work. But I can tell then when they need to do regulatory work, and I can help them find the right resources and also give them advice on how strong a quality system or their experimental write-ups need to be in order for those experiments to hold up to the judgment of regulators who will read them later on. The animal experiment protocols, for example. I can look at the animal experiment protocols and say, "Oh, if you don't measure this other thing, you're going to have to go back and do another experiment. You're much better off spending the extra money now so you don't have to go back to the animal lab again."

It's fun to work with young people who have a vision, and help them shape their understanding of their trajectory. I don't have a lot of time for it because my own work is very time-consuming.

SYED: I read that you were part of a company called Thermedical. Are you still working with them?

STOHLMAN: No. While I was working at Thermedical [a medical device company specializing in cardiac ablation therapy], I was a founder of another company, MitraSpan [a medical device company developing mitral valve repair techniques for heart failure patients]. But Thermedical was a wonderful experience. It turns out that two other MIT guys founded Thermedical. One of them, Patrick Hamilton [SB Electrical Engineering '81] was an electrical engineer, and one of them was Michael Curley [SB '81, SM '84 and PhD '88 Mechanical Engineering] a mechanical engineer. They both had Ph.D.s, and they were both very technical. And they needed somebody who was more of a generalist to join the team, so they hired me as the COO. And the first thing I did was I built a quality system. Déjà vu all over again!

I loved working at Thermedical. It was a therapy company, and their vision was to have a cardiac ablation therapy for treating ventricular tachycardia. We did wonderful medical research in an animal laboratory at the Brigham and Women's Hospital with the electro-physiology team there. We published an important paper on that topic and continued to do that cardiac research. In the meantime, we did also a liver ablation project and I brought that through the FDA 510(k) approval process.

But nights and weekends, I was working on the mitral valve project. At the point where MitraSpan needed to leave the animal laboratory and consider first human studies, I started working part-time at the two companies. Thermedical hired an experienced woman to share the job with me, and she took over the position when I left a year later. I was a founder at MitraSpan, a micro-surgery device project, funded by venture capital, that lasted about three years.

In January of this year [2017], I took my current job: I'm head of quality and regulatory for Corvia Medical. Corvia is also a structural heart repair, cardiac implant device company. My first project at Corvia was getting FDA approval of a very big clinical study, where we would involve 700 patients from around the world. That's the project I'm working on now – it's very interesting.

Treating heart failure patients has been the focus of all of the start-up companies I've worked for since I left HP. For the last 15 years, this is the fourth start-up I've worked for on that topic. Treating heart failure with a device is a very noble goal and hard to achieve. A lot of start-up companies have come and gone in that space. It's very exciting and very compelling work. You see these heart failure patients, and if the implant that you provide to them makes them feel better – sometimes it's a very dramatic change. It's very heartwarming.

That's what I'm doing. I'm applying my entire life of cardiology device research to my daily work. I'm not doing any metallurgy, but I know metallurgy. I can listen, speak and write with a lot of understanding about bimetallic alloys, and defects in the cross-section of nickel titanium devices that are very small, and what constitutes a critical defect, and what's the metallurgy and the crystallography of the defect.

When I'm working with the engineers who are doing the research, I can take their understanding and their information and make sure that it's understandable to a broader audience – the auditors and the regulatory reviewers, even doctors – who want to be certain that your company knows enough about what it's doing to avoid sending out something that's defective.

When it comes right down to it, the metallurgy in the implant is terribly important to its success. You're looking at a fatigue environment where, in order to last for 15 years, that's 600 million cycles of movement. And the heart is a strong muscle. You have to really understand, well, how much movement is that implant going to experience during its 15 years of implantation? How does that movement translated into stress and strain, is 15 years a reasonable expectation of how long it has to last?

All these things you have to study and justify when speaking to the regulators. You have to have confidence that your engineering team has explored the limits of its use in this patient population. Some of those explorations you can do in animals, some on benchtop equipment. And some you have to do by implanting patients.

We live in a society where people feel grateful about the lives that they've had and they want to contribute to science. As they get older, they look for opportunities to contribute in ways beyond giving money. We're very fortunate that this is a prosperous country with people that have enough satisfaction about their position in life that they are willing to participate in experiments. That moves forward pharmaceutical research and medical device research all over the world, but especially in countries where the prosperity and medical advancement are high, because that's where the personal satisfaction about one's life sits. So it's challenging, but it's rewarding, too.

SYED: If we could jump back to your time at MIT, I understand that you were a key member of WILG [Women's Independent Living Group] during your time there? And do you still work with them today?

STOHLMAN: Yes.

SYED: Could you tell me about your involvement in WILG?

STOHLMAN: As I mentioned, I had that UROP job on campus as a freshman—

[AT THIS POINT IN THE INTERVIEW, TOM STOHLMAN ENTERS AND INTRODUCES HIMSELF TO NAFISA SYED.]

STOHLMAN: Tom is the architect. He was at MIT three years ahead of me, so when he was a senior, I was a freshman. We met at a Kappa Sigma party that my roommate and I both went to.

TOM: --a party that I wasn't going to go to because I had work to do.

[LAUGHTER]

STOHLMAN: WILG was a concept in the minds of some alumna. It was an initiative of AMITA members and women students who wanted an alternative to the dormitory, one that wasn't coed. MIT owned the building, 355 Mass Ave, and they were inclined to run that experiment. Can a women's co-op function? They'd had a lot of very positive experience with the fraternity system; the fraternity system had been there for many decades successfully, but there were no sororities.

And so when this women's co-op concept came up, the administration was supportive. And there were some particular people like Dotty Bowe and Bonnie Kellermann who were in the Dean's Office and worked with AMITA and found ways to connect money and a building with the concept.

Planning had been going on a while before I joined up in the summer of 1976. They wanted, at that point, an architectural team. And since I was working at MIT that summer, I could join the team because it met after work on the MIT campus every week for a couple of hours. So I joined the design team, and that was really fun.

MIT had already decided, "OK, you guys can have half of this building." The architect was the same for both halves of the building. ADP [Alpha Delta Phi] had been selected as the fraternity to take one half, and WILG was going to get the other half. The student on the design team for ADP was a friend at church from Newton, Massachusetts. So we were in dean's office together, and the dean was saying, "Well, OK, here's this building that's split 55/45 in terms of square feet. What do you want? And I said to Bill, "Bill, you know, I think us girls would prefer the smaller half. Is that OK with you?" And Bill said, "You know, quite frankly, I think the boys would prefer the bigger half." It took literally one minute to make that decision. (I didn’t mention that my preference was driven by the significantly better access to sunshine that the west wing enjoyed.)

The architectural teams worked in parallel, the architect was the same. So she would talk about common space and things that we'd be sharing. It was a really nice design they came up with. We shared a roof deck and some basement space. But for the most part, each group was pretty much all on our own.

Because of that experience, I was the house manager. So we were designing in the summer of '76. In the fall of '76, I stayed at McCormick [Hall], but some of the upperclass women moved into the unrenovated building. The women lived upstairs, and the men lived downstairs in the side of the building that became ADP. But it was just around 15 women students.

In the spring ‘77, I moved in to the apartments. During that year, I was on the purchasing team for all of the equipment and furniture. And so in the fall of '77, when the construction was done, I became the house manager for the movement of all the new furniture into the house. The first year, 45 students, women students, were living in the house. We had all new carpets, and all new paint, and all new spoons, and all new refrigerator and so on – stoves and bunk beds. MIT gave us the purchasing power from the MIT dormitory services so we would furnish it with quality materials. They loaned us money. And that was really important: they facilitated the whole process from the beginning to the end, so that when we launched, it was completely successful.

SYED: Oh, that's amazing.

STOHLMAN: I got married the same week I graduated, so I was off to my new life. I worked as a metallurgist, went back to school for graduate school, and then had some kids. And I didn't really put much thought into it WILG, although I did attend the reunions. They had a reunion at 10 years, and then at 20 years and 25 years.

When I was at HP, I was able to hire out of MIT, and I hired a couple of WILG graduates. One of them was a WILG corporation president. She was much younger than me, and she had served as a corporation president for a number of years, five years or something like that – Hashi [Sravana] Chakravarty [SB Mechanical Engineering 1989], a wonderful woman. You should get to know her. I think all in all, I hired three WILG women engineers into HP.

That put in my mind, "Oh, there's life after graduation with WILG." But it wasn't until about five years ago that I started attending the WILG corporate meetings. I became a corp member and then the corp treasurer. And now, I've been the corporation treasurer for five years. It's challenging! [LAUGHS] It's probably one of the more challenging volunteer jobs I have. But it's good, too.

I've been blessed to work with Susan Woodmansee [SB Chemical Engineering '97], who was the WILG corporation president for at least 20 years, ending just this past April. I learned a lot working with her. She's been a great nurturing force for WILG.

We've been there [WILG] for 40 years, and there were aspects of it that needed a major overhaul. About three years ago, the corporation and the students worked together to completely rebuild the kitchen. Susan was good at raising money, and I put my house manager hat back on and worked with the student design teams. We also hired an architect and contractors and got the whole thing launched and finished. Everybody loves it. It's worked out really, really well.

SYED: It's a beautiful kitchen.

STOHLMAN: Oh, you've been there?

SYED: Yes, I'm living at WILG this summer.

STOHLMAN: Oh, you're living there this summer.

Well, now the WILG student house manager is running the balcony replacement project. I don't know if that's been very disruptive, but that's underway right now.

WILG takes a lot of pride in saving up to do major maintenance and renovation work. Some of these projects are very expensive. Repointing the brick exterior – was a $200,000 project and the kitchen was $250,000. But we saved up our money over many years to do these projects. We've also saved money and now can do the balcony project, essentially ripping down everything except for the uprights and putting in all-new safe railings and floors so that the balconies can be used again. They've been off-limits for about three years.

It's good work, and the students are wonderful. I love meeting the new students. I love the way they-- Just like when we were students, they can't sustain attention on a house project every day. They have to swoop in and do bundles of work when the time allows. But there's a lot of ownership and delight in doing things. And we recognize the learning from managing construction, hiring architects, and picking colors. There's a lot to it!

SYED: Do you have any advice for women at MIT in general?

STOHLMAN: I think that there's a lot of different ways to derive learning from the MIT environment. As I mentioned, there were few courses that really were especially memorable. The UROP was an amazing experience – but that's me. And I was hugely disappointed that I couldn't go on to graduate school at MIT, but I learned so much from the WILG project and working in a start-up that I was able to get into Harvard Business School.

So it's sometimes hard to predict what's going to be valuable to you. But what really matters is that you find something you like doing and you continue doing it, and you find other people that are into that too.

I think that so many MIT students had to work so hard and get good grades in high school in order to get in, but then when they get there, they realize not all high schools were the same. And having been the top of the heap where they came from doesn't guarantee that they'll continue to have that degree of positive feedback. And they have to learn to live with recognition of mediocrity.

[LAUGHTER]

And that's an important lesson, too. It's like you get filtered in, and then you realize the filter gets tighter. But there's so much to learn from that new environment, and it's just a matter of finding your spot in it.

SYED: Thank you so much. Is there anything else that you'd like to add that we didn't touch on that was really important to your MIT experience?

STOHLMAN: I think that the institution has become much more concerned about engaging alumni constructively, and I give the school a lot of credit for that transition. I also applaud the current administration for recognizing that education is too expensive, and we can't just keep growing the cost of tuition, and that the social fabric of the United States is at stake, and that MIT wants to be contributing to the democratization of higher education. I see their efforts to do edX distribution of knowledge. I think it's just an amazing construct and a wonderful endeavor. So MIT's doing a lot of things that I really admire.

SYED: Well, thank you very much. It's been lovely to talk to you.

STOHLMAN: Well, thank you. As I said at the beginning, I think I've been really fortunate, and I'm happy to contribute.