SWE GRASSROOTS ORAL HISTORY PROJECT

Beth Holloway Interview

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Houston, Texas

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This oral history interview was recorded as part of the SWE Grassroots Oral History Project on November 10, 2012 at the Society of Women Engineers WE12 Annual Conference in Houston, Texas. A copy of the audio recording of the interview has been deposited at the Walter P. Reuther Library and Archives of Labor and Urban Affairs, Wayne State University. The interview may be used for research and educational purposes only.

TROY ELLER: Today is November 10, 2012. This is a SWE Grassroots Oral History Project interview with Beth Holloway. The interviewer is Troy Eller. We are at the Society of Women Engineers Annual Conference in Houston, Texas. Beth began her career in industry at Cummins. In 2001 she became the director of the Women in Engineering Program at Purdue University, where she is also pursuing a PhD in engineering education. This year, she is the recipient of the SWE Outstanding Faculty Advisor Award in recognition of her work with the Purdue SWE collegiate section. Thank you for joining me today.

BETH HOLLOWAY: Thank you.

TE: To begin with, can you tell me when and where you were born?

BH: I was born in Burlington, Wisconsin, a very small town in the southeastern part of the state. And when? In 1970.

TE: Okay. [00:01:00] And can you tell me about your family growing up?

BH: (laughs) Yes. So I have one brother and my folks, and we were—I don't even know how to talk about my family growing up. Let's see, my mother is a nurse and my father's an electrician. And it was probably really sort of a boring and normal childhood. Nothing—yeah. (laughs) Not a whole lot. It was just a regular childhood. My folks like to travel and so we packed up for a couple weeks every summer and went somewhere different. We always drove. I'm not ever sure why they took us because we fought like cats and dogs, my brother and I. But we always went somewhere new. That was exciting. [00:02:00]

TE: Okay. How did you become interested in science and math and engineering as a child?

BH: You know, I don't know that I was ever so interested in science and math, but I always liked to understand how things work and what was the best way to do something. I remember particularly, I must have been five or six, we—my dad washed the car every Saturday, both of the cars every Saturday. And my brother

and I got to help. (laughs) And we all had jobs of what we were going to do, and one of my jobs that day was to clean the inside of the windows on the car. And we finished and it was time to clean up, and there was so much stuff that we had out for cleaning everything, and we had to take it all back in the house, down to the basement. [00:03:00] And I remember thinking, I don't want to take five trips to get all this stuff, so I started—I had these overall shorts on. I started putting everything somewhere, hanging off the pockets. And my dad looked at me, he laughed, and he said, "Oh my gosh. You should be an engineer." And I don't know why he said that, but that's probably the first time I remember thinking about becoming an engineer. It was more that than the science and the math.

TE: Okay. When did you decide that that's what you wanted to pursue?

BH: That was probably a little bit later, in high school. So he was an electrician and he worked construction projects, commercial construction projects. [00:04:00] And, of course, there's a lot of engineering that goes into that. And he was also a very handy guy, always working on the cars. And between those two things, he didn't always have very positive things to say about engineers. So he would say, "They don't know what they're doing," or, "They never actually had to fix a car, and they didn't keep people in mind who had to work on stuff," or—. So I heard this a lot growing up. And he came home one day, very frustrated, and he said, "They wouldn't listen to me. I had this great idea of how we could do something faster and better and probably cheaper, and they won't listen to me, the engineers." So I said, "Dad, what's an engineer, really?" And he said, "I don't know. (laughs) I don't know what engineers really do, but I know this. [00:05:00] If you want to be a part of how decisions are made, and what products get made, and who gets the final say about something, you have to be an engineer. You can't be a guy like me."

So, at that point, I really equated engineering with having a voice and, I guess if you will, a bit of power. I thought, Well, that sounds good. (laughs) So that, more than probably anything else, is what got me interested in engineering. I liked

chemistry at the time. That was a science class that really struck my fancy. And math I was good at, but I never particularly liked it. So I had the skills to do the engineering—so I was told—and I thought that the having a voice and being part of what gets made and what gets created was the interesting part. [00:06:00]

TE: Okay. How did you decide to study mechanical engineering at Purdue? Why that particular field, and why Purdue?

BH: (laughs) Well, Purdue—that decision came first, the college. And so when I was thinking, starting to think about schools to go to, it wasn't really very easy. In many ways, I consider myself a first-generation college student. My brother went to school, and that ruled that school out. I didn't want to go where he was. It was a small school and I didn't think it was big enough for both of us. So I was looking for a much larger experience. [00:07:00] I'm not sure why I wanted a big school experience, to be honest, because I was not a very—I was a very shy person and a lot more of an introvert, but that's what I thought I wanted.

So, they used to in those days publish a great big handbook every year called *Peterson's Guide to Colleges*. And I knew I was going to apply to [University of] Wisconsin–Madison. And then I started looking through this *Peterson's Guide*. You know, who else had engineering? I didn't really know much about engineering. My brother is an engineer, so he was already studying engineering, but I didn't really know much about it. I didn't know what were the good schools for it, so I did a bit of research. And I drew kind of a two hour circle around my hometown. I didn't want to go further away than that. [00:08:00] And I ended up thinking, Well, University of Michigan. I've heard of the University of Michigan. They're a good school. University of Illinois is a good school.

And then, in this book, I found this school called Purdue, and I thought, Huh. I wonder if that's a good school. And you look and yes, the reputation—I remember talking to my folks. I go, "I found this school. It's called Purdue University." And the first question was, "Is that a private school?" "No. It says in the book it's not. It's a public school." And they had—at the time, I was looking at

chemical engineering, and they had chemical engineering. So those were the four schools that I looked at and I applied to. And then when it came time to do visits, I had already ruled Michigan out. It was a little too expensive. And I ruled out Illinois because I just couldn't see myself going to school in Illinois. And so that left Wisconsin and Purdue, and we went to visit Wisconsin and Purdue. [00:09:00]

I went to Wisconsin and I was not ready for the Wisconsin experience. It's a very dynamic campus, lots of energy, lots of stuff going on all the time. That was the late eighties, which was a very interesting time in fashion. It was a very large punk experience happening at the time, and there was lots of students on campus that were expressing themselves in that way. And someone from a small rural area was like, Whoa. I don't know about that. And there was all this traffic and the streetlights. Our tour guide talked about a building that they had specifically designed in a way so that student protestors couldn't take it over. And I thought, I don't know that I'm ready for that. [00:10:00] I went to talk to the admissions office and we did it in a group, and I wasn't expecting that. I was expecting more of a—"I have some questions and I'd like to ask you and—". Anyway, in this group, I didn't really feel comfortable asking questions. So, it wasn't a great visit.

And then I went down to Purdue and it seemed more like what I had envisioned in my mind of what a college should look like. It was beautiful. The town around it is a lot smaller, so there wasn't nearly the traffic. There's a lot of people around, but they were a bit more conservative, if you will, than some of the folks in Madison. And we went to the admissions office and I had a one-on-one appointment. [00:11:00] And I remember I didn't want to announce to everyone that I was a visitor by carrying a map around, although I'm sure that my mother and I—we were walking around. We looked like we didn't know where we were going, but I refused to have the map out and she was very mad at me about that because she was like, "I don't know where we're going." But anyway. So, at one point, I broke down and pulled the map out so we could figure it out and

someone came up to us and said, “Can I help you find where you’re going?” And it would—it seemed like people were just very nice and open and welcoming, and I got a very good feeling from the visit. And so, really, that’s how I decided on Purdue.

The mechanical engineering part is a bit longer story. (laughs) I said I was interested in chemical engineering and so that’s where I started thinking. And when—at Purdue, the first year is a common year. [00:12:00] So I came in thinking chemical engineering, but you don’t really do anything about that until the second year. So the first year I went all through and it was fine and I was still thinking chemical engineering. And then over the summer between my first year and my second year, I had some pretty serious doubts, and I decided maybe that’s not exactly what I wanted to do. So I shifted my focus to more biomedical-kind of engineering. And at the time, Purdue had a program called the Interdisciplinary Engineering Program, and I always kind of think of it as create-your-own engineering. And I did. I created my own plan of study and I had biology classes and chemical engineering classes and mechanical engineering classes. I was creating this very interesting collection of things, and I started down that path my sophomore year.

And then partway through my sophomore year, I started looking at internships and job experiences, and that’s when I figured out a couple things. [00:13:00] Number one, I figured out that the program was not accredited. And given my lack of experience with college stuff, I didn’t really know what that meant, but that didn’t sound good. (laughs) Like, I’m not sure what that means, but that doesn’t sound right because all the other programs were. So I thought, Well, there’s something there. And then I realized that companies don’t come to recruit biomedical engineering students at Purdue, because I was, like, the only one. So, why would they come for that? So I thought, Well, this might be a little riskier than what might be good for me. So, in all honesty, I ended up in mechanical engineering because I looked at my plan of study and I thought, Well, what school am I taking the most classes from? Mechanical engineering. I’ll go see if

they want me. So I did, and I transferred into mechanical engineering. [00:14:00] It was—I sort of fell into it. It's a great study in 19-year-old-person logic, which is not very logical. (laughs)

TE: At that time, did you know or have an idea of what you wanted your career to be, or not yet?

BH: No, I had no idea. I had no clue. No idea. (laughs) I didn't know—I didn't really know what I wanted to do, and I didn't know what I didn't want to do either. I was clueless.

TE: How did you figure that out?

BH: Well, I just wanted a job. (laughs) I mean, really, to be honest, I just wanted a job. I went to—let's see. After my third year—well, during my third year, I went to a job fair, a SWE job fair on campus. [00:15:00] And I had no more idea how to walk up to a company representative and sell myself than—I was very ill-prepared for how that worked. So, there was a—the electric company in Wisconsin was there, so I went over to talk to them because it was someone from Wisconsin. And I probably talked to them for maybe ten minutes. They asked me for my resume, which I gave them.

Two months later I got a letter that said, "Will you come in for an interview?" Okay, so I called to set it up. And it was not so easy for me to go home. I didn't have a car on campus. It was two hundred miles away. It was kind of a pain-in-the-butt trip to make, going through the city of Chicago, so I actually hadn't planned on going home until the end of the year. [00:16:00] So I said, "Well, I'll be back in Wisconsin on this day in May," and they were like, "Okay, you come in then." So I did, and it turned out I came in for a drug test and I was starting the next week. It was the strangest experience I ever had. I don't ever remember being interviewed. They just assigned me a vocation. I thought, Well, okay. (laughs)

So I worked at the electric company for two years, two summers. And so that taught me I didn't want to do that. It was a fine summer job and I really liked it, but I didn't want to be an engineer at the electric company.

So I had met someone—through the Women in Engineering Program [at Purdue]—had met someone from Cummins. [00:17:00] It was my freshman year, and she was one of those folks where you just look up to her and you go, Oh, I would love to be her someday. She's so—I mean, she has everything. It seems like she's got it all together. She's got this great career, and she has this family, and she does these cool things, and she's very poised and—. She just seemed like that. I wanted to be like her. And we kept in contact over the years. And when I was looking for an internship after my fourth year and before my very last semester, I had contacted her and I asked her if there was any possibilities of me working at Cummins, which was the company that she worked for. Because, again, I didn't really know what I wanted to do. [00:18:00] I just wanted a job, and I knew I didn't want to work at the electric company again. And she said, "Well, I don't know. Let me see." And it ended up I was invited down for an interview and I got an internship position.

And it wasn't that I ever really wanted to work for a company that made diesel engines. I didn't know how they worked. I couldn't tell you the difference between a crankshaft and a camshaft. But it was interesting, and I had had a little experience with engines and automotive kinds of things with my dad, who always worked on the cars and we always helped. So I wasn't completely ignorant, but I was close to it. But it seemed like a good opportunity and I figured, Well, if they have employees like that, this could be a good place for me. So, again, I didn't really plan it. [00:19:00] I fell into it sort of, in a strange way. One thing I knew I did not want to do was be a designer. That was not something that was part of my coursework that I ever really enjoyed.

So, when I went to Cummins for that internship I worked in a group called Heat and Fluids, which—very descriptive. We did everything to do with heat transfer

and fluid flow through the engine, and that was really interesting. And so, at the end of that summer, I interviewed for a full-time position and they offered it to me that day, and I accepted that day. So I didn't—I haven't had a lot of experience interviewing and looking and searching for jobs, actually. I just kind of fall into them. So most of my career is—all of my career is completely unplanned. [00:20:00] So I don't know. I still don't know what I want to be when I grow up.

TE: (laughs) Can you talk about your experience as a female engineering student at Purdue?

BH: Yeah. So coming into Purdue as an engineering student, I didn't even know enough about engineering to know that women weren't supposed to be engineers. I had no clue that it was mostly men. I don't know why, how I missed that tidbit, because in my calculus class there were only two of us girls and the rest of the class were guys. You'd think that would have tipped me off, but it did not. So I remember going down to sign up for classes the summer before school started, and my mom was with me. [00:21:00] And the advisor was saying, "You need to take this, you need to take this, you need to take this." Okay. And then the advisor says, "There's a class called the Women in Engineering Seminar. Do you want to take that?" "Well, what is it?" "Well, it's just one credit hour, and it's just once a week. It's not really that big of a commitment." I said, "Yeah, I don't think so." And my mom said, "Yeah, she wants to take it." And I said, "I do?" (laughs) She said, "Yup." I said, "Well, okay." So I'm glad that I did. It turned out to be my favorite class, and it turned out to be the class through which I met my mentor at Cummins. So in all, it was a very good thing.

In terms of my experiences—that was the only class, though, that I went into and it was all women and it was very comfortable. And the other classes, you're just a little—I don't know. [00:22:00] My undergraduate experience, I don't remember a lot of funny looks. I don't remember necessarily being discriminated against by my peers. I don't remember a lot of bias. But I do remember that I liked hanging out with my girlfriends who were also engineers. So I was a member of SWE,

although not particularly active. I didn't hold any leadership positions or anything. There was an engineering sorority on campus, and my sophomore year I joined the sorority. And that was a very helpful thing. [00:23:00] It was my support group of women who were all engineers, and there were quite a few of us who were mechanical engineers, so that was a really good experience.

I remember being tired a lot, and stressed a lot. (laughs) And I didn't have a lot of—a lot of my friends had study groups that they were very connected with, and as they progressed through the curriculum they all took the same core classes at the same time, and they had these groups and they would just study for all of those classes. And it turned out that because I had transferred into mechanical engineering, I really wasn't on the same schedule as anybody. I was sort of ahead in some things and behind in some things, so I didn't really have a group that was going along with me at the same time. [00:24:00] So I didn't do a lot of studying with other people. And I wasn't really looking for that, either. I guess I was a little too independent. And I would encourage all students to not do what I did, (laughs) to use groups and study together, because I think I made it more difficult than it really needed to be.

My roommate was an engineering student as well. We did not know each other before we got put together our first year. And I think it was really helpful to have a roommate who was in engineering. She ended up in industrial engineering, and we lived together for four years. And that was a really good connection. I think it would have been harder if I didn't have someone who I lived with who was also, I suppose, really tired and really stressed and really worried about school all the time. [00:25:00]

I'm trying to think of what else about my undergraduate years that were noteworthy. I worked. When I came down to campus before school started, it was before any of the—it was at a time when they didn't do orientation programs, so you just showed up. They told you, You can come anytime between this day and, you know, whenever you get here. And move yourself in, and there you go. Go to

class on Monday morning. (laughs) So, I didn't know what the heck I was doing. We were clueless altogether. But I moved in and I got there before my roommate, who I hadn't met. And my mom left, and it was just me in the room. [00:26:00] And it was getting to be dinnertime and I didn't even have a clue where the cafeteria was. I had no idea of anything. Someone walked by my room and asked me if I was going to eat, and like an idiot I said no, because I didn't want to admit that I had no idea what I was doing. I think she saw right through me. She said, "Just come with me."

So I came with her and then she wanted to know after dinner—she wanted to know what I was doing. Nothing. We didn't even have a TV in our room. We had zippo. And she said, "Well, come to my room." So I went up to her room with her to hang out, and her roommate had just gotten there. And her roommate worked in the cafeteria in the dorm and was a—they called them waiter captains, but they were like shift supervisors. [00:27:00] And she looked at me and she said something about, "Are you a freshman?" And I said, "Yeah." And she said, "How's it going?" You know, whatever. Anyway, she found out I needed a job and she said, "Great. Come work tomorrow." So this was Thursday. By Friday I had a job, and I was working in the cafeteria. Hadn't even started school yet. So I did that for five semesters, and after the first semester I became a waiter captain, and that was kind of interesting.

But as I got further into the engineering program—and being a waiter captain, I was working about 20 hours a week and it was—. That, for me, it was too much. I could not do that anymore. [00:28:00] So I started talking to one of my sorority sisters, who seemed to have a really good gig as a tutor in the mechanical engineering help room. And she tutored thermo [thermodynamics], and I thought I could do that. So she hooked me up with the professor that hired the students and vouched for me. So I stopped working in the cafeteria and I started being a tutor in the help room. So I tutored thermo for—I guess it was four semesters I kept doing that.

And not too long after I started tutoring, one of my other sorority sisters was on the track and field team. She was an industrial engineer and she had to take thermo. It was part of their curriculum. And she said, “Can you tutor me?” And I said, “Of course. Come by the help room.” She goes, “I don’t have time to come by when you’re there, so I want to hire you outright.” I go, “Oh, okay. That’s good.” [00:29:00] She goes, “The athletic department will pay you.” I said, “Really?” And she said, “Yeah.” They paid, like, eight bucks an hour, and back in the early nineties that was good money. So I’m like, “Oh, sign me right up for that.” So I became also a tutor on the side for the athletic department. There aren’t that many athletes that were taking thermo who wanted a tutor, but I tutored my friend Kelly and then a few others. And that worked out really well. So, generally, my undergraduate life was about my sorority and working and studying a lot. (laughs) That was about it.

TE: Okay. Do you remember any particularly encouraging or discouraging people or events?

BH: Yeah. I had a professor in mechanical engineering who was really encouraging. [00:30:00] Like I said, I was tutoring in thermo. And it was after I had taken the second thermo class, and because I was a little off on my schedule, I had taken that class earlier than many of my cohort, compared to some of the other classes I was in. And I really liked him. He was a really nice guy. And he found out, after I had had his class, the semester later is when I started tutoring in the help room. And he saw me in there, and then he wanted to know if I wanted to be a grader for him. I had forgotten that. So I graded thermo labs for him. And he was always really encouraging. I would walk in his office with the labs graded and he’d look at me and he’d be like, “You don’t look so good.” And I said, “Well, you know I have this test,” or, “I was up late,” or whatever. [00:31:00] He was like, “Oh, you’ll be fine. It’s okay. You’re doing great.”

I think it was my last—yeah, it was my last semester. I came in one time and he wanted to know if I was taking the EIT [Engineer in Training] test, which is now

called the FE—the Fundamentals of Engineering. At the time it was the EIT exam. And I said, “No, I wasn’t going to do that.” And he said, “Why not?” I said, “Well, I don’t think I want to be a professional engineer.” He said, “Well, how do you know?” I said, “I don’t, but I don’t think I need to do that.” He goes, “Well yeah, you do. You don’t know what your career is going to be.” And I said, “Well, okay. I don’t have time to study for it.” And he was funny. He said, “You don’t have to study for it.” I said, “Well, everybody has to study for it.” He goes, “No, you’re a Purdue mechanical engineer. We have a 98 percent pass rate. You don’t have to study for it. Just take the test.” And I have no idea if he was lying about that or if that was actually true, but I signed up to take the test. [00:32:00] I did not study for it. At that time, you could bring in anything you wanted with you as a resource, and I bought—my studying consisted of buying the review manual. And that’s what I brought with me, the only thing I brought with me. (laughs) It was interesting. But he was very encouraging. And I owe a lot to him in keeping me going during some of the times that I thought, This is never going to work.

I also had a professor in mechanical engineering who was not very encouraging. He was a trip, too. (laughs) I didn’t get the full force of interacting with him until senior designs. It was my very last semester and he was my senior design professor. [00:33:00] And at that time, we did three different projects throughout the semester and we would work in a different group in each project. And there were—I graduated in an off semester, so there were maybe thirty people in my senior design and that was it for all of senior design, I think. But, of those thirty, I’m thinking probably six of us were women. And, he came in probably the second class period and he said, “I’ve randomly assigned groups, so these are your teams for the first project, and here are the last names.” And, he called them out and he said, “Go get together and start talking about things.”

And it turned out that it was a group of three, and we were all women. And we were so excited. [00:34:00] The three of us had never had a team that we had been placed on where we were all women, and we thought it was great. And we

knew each other already. One of the three was one of my sorority sisters, and the other was someone that I had in some other classes. And so we were really excited about it. And the professor came over and looked at us funny, and said something to the effect—was telling us that he really did randomly assign the groups. And we looked up at him like, Okay. And then he asked if we wanted him to redo the group assignments. And we said no, because we thought this was a pretty good kind of a deal we had going on there, and we couldn't figure out why he wanted to think about redoing all of the groups. And then he came out and he said it. He said, "Do you feel technically disadvantaged?" (laughs) [00:35:00] And we said no.

It was not an easy semester for the three of us. At the time we felt like he was giving us a really hard time. I don't know if he was just pushing us very hard. But the other thing that he did not like was he told us all that we needed to elect, if you will, select a team leader, and it would be the person in charge of the team. Well, there were only three of us and we didn't feel like we needed a team leader. So when it was time to have our meeting with him, to tell him who our team leader would be, we said, We've decided not to have one. And he was really mad about that. (laughs) [00:36:00] And later I've come to understand he probably had a very hierarchical view of how teams should function, and there needed to be somebody in charge to make other people accountable. And we had a much flatter view of how a team should be, and we felt like we all could keep ourselves on track. And we had split the project up in a different way, and that each of us was leading a subpart of it. You know, we felt really comfortable with how we were doing it, and he did not like that that whole semester.

But, you know, we got through it. I'm glad that I didn't run into him, though, until later, because I'm not sure how I would've dealt with that several years before. And then I had already had a great professor who was very interesting and encouraging and all that.

TE: Okay. So switching over to your career at Cummins, what was your first position and what were your job responsibilities there? [00:37:00]

BH: That was a really long time ago (laughs) to remember my job responsibilities. So my first full-time position, I was—my job title was Engineer, Heat and Fluids. I've got to think about that. That particular group in many ways acted as a bit of a group of consultants to the rest of the company. Most of the engineers in many ways were broken up by engine family. So, this is the group that worked in this engine family, and this group worked in this engine family. And within those engine families there were—well, this is the research part of it, and then this is the production part—or, not the production, but the development stage, and the testing stage, and then the production stage. [00:38:00] So it was very—in some ways you can think of it as kind of siloed.

And my group worked across all of that. So when a particular set of engineers or a team had an issue that had to do with either heat transfer or some fluid flowing around, then we would be called in to help them. So, for example, in the development stage we would create models of the lubrication system, for example, and we would work with the designers. The designers would say, I'm thinking about this configuration in these sizes. And we would model it and then we would say, Yeah, that's not getting enough oil to whatever. It needs to be this big, or smaller, or whatever. [00:39:00] Or if there was an issue in production, had failures, something was going wrong, we would help figure that out. Or there was some new research they were thinking about doing and they needed to understand what the air flow within the cylinder was going to look like, because they were changing the bowl design or something like that. So we really did a wide variety of things.

And when I came into the group, I was given small projects. And I was assigned to be the engineering support of a test rig, so I supported the lubrication pump rig. And we did pump performance tests and I wrote eight million reports on lubrication pumps that we tested. [00:40:00] I have trouble remembering what my

particular job responsibilities were because that was actually the only department at Cummins that I worked in. So over the whole almost 10 years—I interned in the group and then full-time—so it's hard to remember what I started doing because I remember, I guess, more of what I ended up doing.

TE: Can you talk about how you progressed through your career there?

BH: Yeah. I'd had some conversations with people about whether I should stay in one place or move around. And a lot of people were very much in the, Well, you need to spend a couple years in this group, and then go to a different department and do a couple years somewhere else. And I kept thinking, But I don't know everything that my group does yet. I don't want to move until I understand what everybody in my group does. So I wanted to get a more complete experience, if you will. [00:41:00] And, at the same time, when I hired in I noticed very clearly that I was the only one in the department that did not have an advanced degree. And so I started on a master's program, and I wasn't sure that I wanted a new job while I was still in the midst of the master's program. So over time, I did lots of different kinds of analyses for heat transfer and fluid flow. I worked on the lubrication system. I suppose at a system level that was my area of expertise. And then at a component level, I did a lot of work with piston cooling nozzles and lubrication pumps. And over the course of my years at Cummins I was eventually called the corporate expert on that. [00:42:00] All of this institutional knowledge, if you will, ended up residing with me.

But I did a lot of work in cooling systems. I did work in a few projects in the fuel system. I did work in the combustion system, the engine performance cycle, matching turbo chargers, improving fuel economy—or doing fuel economy predictions, and how to improve that. Messing with the—in a modeling sense, messing with the timing and what we would call the parasitics, the draw off the engine to run the accessory parts, making those accessory parts more efficient. I didn't really get into cost stuff. Someone else was doing the cost part, but then we would analyze, Well, if you do this as a cost reduction, what does that do to

the performance? [00:43:00] And so almost everything I did was very performance-based. And I always count myself lucky in that I was able to do both modeling—which I really enjoyed until I hated it. (laughs) You know, until you run into a problem and you're like, I can't do this anymore. I need to go do something else. And then I also got to do experimental work. And I think very few engineers really, on a weekly basis, get to do both of those things. And then on the experimental side, you couldn't get a piece of equipment to work, or you find you have some new part machined or whatever, and so you'd want to put that away and you go back to your modeling. So I got to go back and forth. And there were times that I got to do a model of something, and then test it, see how close I was, and then tweak the model to validate the model. It was very exciting, I thought. I really liked it.

So, over time, I worked on lots of different components, systems, I worked across all of the engine families. [00:44:00] I don't think there was—by the time I left, I don't think there was an engine family that I hadn't done some significant project for. When I finished my master's degree, I got a promotion. I was pretty excited about that. I had had one in the middle of working on it, but I got another one and I got to supervise people. I was very excited about that. And I was mentored through the process of how to be a good supervisor. But that was fun and interesting, and when I left, the—I think—I'm trying to remember. I think all of the Heat and Fluids group reported to me, both the engineers and the technicians. [00:45:00] So I came in from being the new person on the block to having a lot of knowledge about things. And I got to do lots of different kinds of projects. One-dimensional modeling, two-dimensional, three-dimensional. A variety of tools. There wasn't anything that my group worked on that I hadn't, at some point, done. And that was—it took me almost 10 years, but that was actually what I wanted to do.

And near the end of my time at Cummins, probably for the last year, there was a big push to write down everything that we knew. They called it "standard work." So if you were designing a new engine, you could go to these documents and it

would say, “This is how you design and validate a lubrication system.” [00:46:00] And, of course, one of those steps is something about a lube pump. And there would be another document about, “This is how you design and validate a lubrication pump.” So it was a pretty extensive set of documentation. And I led the whole lubrication system and all its subcomponents. I did the cooling system and all of those components. And the dipstick—I don’t know how I got the dipstick. I don’t know anything about dipsticks, and I never did. But I had a good team and they knew about dipsticks. (laughs) I still don’t understand that one. “You’re going to do the dipstick.” I’m like, “Really? What do I know about the dipstick? It’s not part of the lube system.” “Well, it measures the oil level.” “Well, okay. That’s fine and fantastic.” That was kind of funny. [00:47:00]

TE: Were there many women in your department?

BH: It depends on the year. So, over the time I was there, there were times I was the only woman in the group and there were times that I was—it was about half and half. So, it really changed over the years, up and down. That particular group seemed to have more women, generally, than many of the other areas. I don’t know why, necessarily—if it was the subject matter. It seemed like, in many ways, in mechanical engineering the women sort of gravitated to the heat transfer and fluid part of the—and less of the machine design. But I don’t know. But it changed over time, and people would come and go. [00:48:00]

TE: Do you think that that impacted your career at all, or how you viewed your career, or how comfortable you felt?

BH: I don’t know as if the fact that there were more women in my group impacted how I felt about my career. I will tell you that my boss impacted it a lot. He was amazing. He was a really—it’s funny. When people get promoted in engineering, a lot of times they get promoted based on their technical competence. But they get promoted to managerial positions, and they have no clue how to manage people. And Tom was an excellent manager, and he was probably the smartest person I have ever met. [00:49:00] So he had the technical competence, but he

was really good at managing people. And so when I came into the department, he had been managing for a while already. And so he knew how to mentor young engineers along and make sure that they were making progress and having a good experience, and if they were having issues, how to problem solve with them to keep it going. And he was very open to different kinds of people, and he didn't have a stereotype about what a good engineer looks like. He was really all about performance and output. And it was a real treat, actually, to work for him. And I was very upset when he left the group, actually. [00:50:00]

TE: Okay. Do you have any career successes that you were particularly proud of?

BH: Well, I think I did a lot of good work. One of the things—I was really excited about one of my first big projects. It was very big. (laughs) A lot of analysis and then a lot of—so, a lot of model generation, data generation, analysis of the data, recommendations. [00:51:00] It was the biggest project that I had gotten to date and I was—I cranked through the model development, and the data generation, and the analysis. But my boss, Tom, was very, very, very intent on when you finish a project, you have to write a report. And there were some departments that they weren't quite so vigilant about the report stage. They were on to the next thing. But Tom was very much about, We have to write it down. You have to have it all there. And I got stuck. So I had all the stuff and I'm done, but he said, "You have to write this up." And I struggled making progress on it because I wanted to move on to something else. And I remember him—finally, I remember him saying, "Okay, look. When you get this report done, I'm going to submit your promotion paperwork." (laughs) And I said, "Oh. Okay." [00:52:00] So I did get a little more motivated to finish that report. I thought it was a brilliant motivational strategy, actually, because it was all up to me about when my promotion paperwork went in.

And the standard work stuff that I did at the end, that was a lot of coordination of people. I did nothing myself. I had to work across lots of parts of the company, and lots of groups, and get lots of people together. And there wasn't always a

very positive feeling about doing the project. It felt like an add-on, instead of something that was really going to help the company. (sighs) “Oh, I have to write all this stuff down.” So, it was sometimes hard to get people’s knowledge out of their heads. In the end, I was really proud of how many documents we were able to update and create. [00:53:00] And it was a—I was pretty proud of that, too.

TE: Okay. Did you enjoy managing?

BH: I did. I did. I really liked managing people. I especially liked the new engineers. That was really, I thought, the best part, because they would come in so eager and full of energy and clueless. (laughs) And it was a lot of fun to get them started out right and mentor them up through their first experience. Around the time that I started managing people, the company created a rotational program, a development program. [00:54:00] And they had a choice. There were three stops, and they had choices for each of the stops. And my department was one of the choices for either the first or the second stop. And it was a year-and-a-half commitment, so it was a bit longer than a typical—than many of the newer developmental programs.

So I had quite a few of those new engineers come in who I knew I was only going to have for a year and a half. And for me, the—and they were all top-notch engineers. And the trick for me was to get them going and independent quick enough so that I could get some payback from all of the effort that I had put in to getting them started off. And it was great. It was a lot of fun being part of that developmental program, or being a manager within the developmental program. [00:55:00] After the first couple years, the company stepped back and said, Okay, these are people who are not good at managing people in a developmental program, and these are the approved managers for the developmental program. So they didn’t let just anybody work with those engineers. Because, I mean, really, you had to stay on top of it because it was a very short—a year and a half doesn’t sound like a short timeframe, but in the role

that I was in and the depth of the technical knowledge that you needed, a year and a half was really fast. So, yeah. So, that was fun. I had a good time.

TE: Okay. Can you talk about your decision to leave Cummins for a new, related career path?

BH: That was a hard decision. [00:56:00] It was a very hard decision. I liked my job. I liked what I was doing. At that point, about a year before I left, I'd gotten a new boss and he and I were still trying to figure each other out. But I really liked working at Cummins and the company, and I thought that they had always treated me very well. And around the same time, I was working on the recruiting side with Purdue. And there were a group of us that had organized—I almost say self-formed, but we did have some help from HR to find each other—of women engineers from Purdue, alums from Purdue. And we organized ourselves and started working on the relationship between women at Purdue and Cummins, trying to get more women from Purdue to come work at Cummins. [00:57:00] And so we had some connections with SWE. We had some connections with Women in Engineering [Program at Purdue], some other random connections. And so I had a lot of fun with that, too.

I had been doing that for several years and we had created a mentoring program for the interns when they came down. And we were very well dispersed throughout the company so we figured if we got an intern connected with one of us, that we could use our networks to find them a placement for the next summer and kind of work around the system in that way. So, I was doing that in addition to my technical role. At one point, I was doing all the coordination of the interviewing schedule and who was going up there to recruit. All of that stuff. [00:58:00] Not just for women, but generally for the whole Purdue recruiting team. And kind of as a part of that, I got pulled into—the Purdue SWE section had an industrial advisory board, and still does to this day. And one of our Cummins folks—my mentor, the reason I went to Cummins in the first place—she was on that advisory board, and she started bringing me along to those

board meetings. And it was a lot of fun working with the students. It was a bit of an extension of working with the new engineers, only they were just a little bit removed from that. And I had a lot of fun. They had a lot of energy and it was so exciting.

And I remember the last board meeting I went to, turned out—as a corporate person—they, the students, had made an announcement that the director of Women in Engineering Program had retired. [00:59:00] And they passed out a job description and they said, If you know anyone at your company who might be interested in a position like this, here's the job description and this is what you do to apply. And so I looked and the job description and it just looked like a lot of fun. It was about mentoring people and encouraging women to be engineers and—it was a little more than that, but that's what I read into it. And I thought, Oh, God. That would be a dream job. That's so much fun. And at Purdue, no less, my alma mater.

So when I got home my husband and I talked about it, and we decided that I should apply. And I really thought there was no way Purdue would hire me. [01:00:00] I'm not an academic. I'm an industry person. I've got almost ten years in industry. I don't know anything about academic administration. I don't know programming, student development. There's a lot of research and literature in those areas; I knew none of it. At least I knew I didn't know any of it. But I thought, Well, I'll apply because if I don't apply, I'll probably regret it. And so I applied, and then I got a phone call. "Will you come interview?" Okay. I was not expecting that at all. So I did and they said, "Well, you know, as part of your interview, you have to give a presentation." [01:01:00] I'm like, "Oh. (laughs) On what?" "Well, you know, issues of women in engineering." I'm like, Oh my gosh. So I had to do a lot of research about that, because I knew my issues, but I suspected it wasn't—and, you know, how to make suggestions for the program at Purdue. And I'm thinking, I don't know how universities even work. It was a little nerve-wracking, but it must have gone well enough. But, I still didn't think I was going to get the job.

And then I got the phone call, and I got offered the job. And I was surprised. I was shocked. And I said, “I need some time to think about this.” Because we hadn’t really—my husband and I hadn’t really talked about it, if I was going to accept if I got offered, because I didn’t think I was going to get offered the job. And it was a hard decision for a lot of reasons. [01:02:00] The first is, Cummins and Purdue are about two hours away so it was not commutable. So it meant that we would have to move, and he liked his job a lot. At that time he was working at Cummins as well, and he really liked what he was doing. And that’s not an easy thing, to say you’re going to leave a job that you really like doing for some unknown, in the end. And the other really big part of that is we had had twins, and at that point they were not quite a year and a half old. And we had a really good support system in Columbus. We didn’t have any family there, but we had a lot of really good friends and a lot of people that we could count on, great nanny, all this stuff. [01:03:00] We had it all set up and it was going really well.

And then we had to decide, are we going to uproot and move everyone, and is that going to be a good thing? It’ll be hard in the short term, but is it going to be worth it in the long term? So the job itself was a huge draw, but that wasn’t the only thing that we really had to think about when we were deciding whether to go or not. And it was a hard transition, really. But we decided that it was a once-in-a-lifetime kind of opportunity. We didn’t think that jobs like that came along very often, so we took a chance and we decided to move to Purdue. [01:04:00]

TE: Okay. Tell me about starting, or taking over the program. What did you want to accomplish?

BH: (laughs) When I started at Purdue I met with the associate dean that I reported to, and he said, “Okay, so this is what I’d like to see. I’d like to see you really focus on increasing the percentage of women who are here studying engineering. We’ve been stagnant for a number of years and we really need some new energy around this.” So really, in a lot of ways, that was my primary

focus, on what do we need to do to increase the number of women who are studying engineering? [01:05:00]

I was incredibly lucky in that my predecessor, Jane Daniels, was a great administrator and had built an amazing program over the years. So when I came in, I came into something that was functioning really well, had a lot of thought behind it, and a lot of research behind it, a lot of corporate support behind it. There was a whole lot of things that I didn't have to focus on, and I was really grateful for that. It wasn't probably until several years later that I realized that I was lucky in that way because, really, I didn't know enough about the whole academic thing to realize that it was good the way that I had set it up. [01:06:00] And people would ask me, How does it feel to—and this was after a couple years—How does it feel to step into Jane Daniels' shoes, to be Jane Daniels' replacement? And you know, when I started the job I had no idea, (laughs) really, how well known, well respected Jane was. I knew her, but I knew her from—I was a student and I knew her, or I was a corporate representative and I knew her. I didn't really know her reputation nationally, and so—. It's probably a good thing, because I might have been a lot more intimidated about what I was taking on. But, yeah, so my priorities were really, well, what do we need to do about increasing the representation of women.

TE: Okay. And how did you tackle that?

BH: Well, you know, from an engineering perspective. (laughs) [01:07:00] Once you are an engineer, you always think in the same way. So the first thing I wanted to know was, well, what's the data say? Where is the data? And so I went and asked for a lot of data, and studied a lot of data, and figured out—you know, are we having retention problems? Is it recruiting problems? We have this output that we don't think is enough, so where in the process do we need to adjust?

And it turned out that we needed more women to come in as first-year students. So then I really started looking at, well, that whole recruiting and admissions process. And the admissions office was very helpful in terms of helping me

understand what that process was like, to be able to look at the data and have it mean something to me. [01:08:00] They really walked me through all of that. And I said, “Well, if this is my goal, how many do I need at this stage, and then this previous stage, and then the previous stage before that?” And when we finally ended up going through that whole process, we decided we don’t have enough applications.

So a lot of the work, then, was to figure out what do we need to do to increase the number of women who apply to Purdue Engineering? And so that created a whole new set of data questions like, well, who does apply to Purdue Engineering and where do they come from? So we looked at a lot of trends in those directions. And I had put together a small group of people, some from admissions and some from the engineering recruiting side, a few others to help me think through all of this. [01:09:00] And we came up with a plan and we started working the plan. And we increased the number of applications from women into the college pretty significantly over that time period.

TE: Okay. Okay. Why do you think that it was so important to Purdue to get more women into the program? Why have the program?

BH: Right. Yeah. You know, that’s a really interesting question. I think there’s probably a lot to that. Purdue created the first Women in Engineering Program in the country in 1969, and so they were thinking about women in engineering long before many others. And several years before Title IX was passed, which was at a time when other schools were going, Oh, yeah, maybe we should think about women. [01:10:00] Purdue was already there. And I think that, because that was so long ago, that that consciousness about women in engineering was really institutionalized.

In I think it was 1990, the director, Jane Daniels, started a national organization, WEPAN, what is now Women in Engineering Proactive Network. And Purdue has, as far back as I remember, when I started as a staff person, Purdue has always been really proud about the fact that we have the first Women in

Engineering Program. [01:11:00] That Jane Daniels, while she was at Purdue, started, was one of the co-founders of WEPAN. That our SWE section dates back to the 1950s, 1954, but that there was a student organization that existed before it became SWE—it was Pi Omicron. That our first woman who graduated from engineering was in 1897, in this very long history. From anyone that I've talked to in the administrative part of the College of Engineering, there's a lot of pride about that.

And so I think that when I came in—I talked about my associate dean and what he had said. The other thing that he said to me is, "We want Purdue on a national stage with regard to women in engineering." So we want the visibility and we want to be out there, because we think we should be, because we have led for so many years and we want to continue to have that leadership role, because we think we should. [01:12:00] And anyone that I have worked for since—any of the associate deans that I've worked for since—has always mirrored that perspective, that Purdue has a long history with regard to women in engineering and that's something that we're proud of and we want to make sure that we continue with that. We don't want to fall off. We want to stay in a leadership position with regard to women in engineering.

TE: Okay. Okay. You talked about how you decided that you needed to get more women to apply. What were some of the strategies that— [01:13:00]

BH: Yeah. What did we do? Some of the things were really simple. And I'm sure there were reasons why we were doing the things that we were currently doing, but I thought, Well, we could change this, and that's not a big deal. We would host—and we still do—host two days a year where we invite high school students to come to campus. And at that time, we were only inviting students from Indiana and the surrounding states. And so I asked the question, "How come we don't invite everyone?" Nobody knew, so we just started inviting everyone. I figure, if someone wants to fly in from Washington to come to this event, they should at least know about it. If they want to, they can. [01:14:00] If they don't, at least they

know we hosted something. So I couldn't figure out a downside to doing it. I mean, it cost more to send more invitations, but I couldn't figure out a downside. I mean, if somebody wants to come we should make it easy for them to come. And if they can't come, at that point at least they know that we have a program that's for them, tailored to them. So that was one thing. Again, simple thing.

The other thing that we did was, at lot of times when you look at who applies—at that point, we would still send what they would call the "viewbooks" out to whoever was in our database. And these were the applications, if you will. And you could still get an application if you didn't get one sent to you, but you had to go request it. Again, it wasn't an easy thing. [01:15:00] So then we started looking at, well, who is in the database and how many of them are there? And we decided there weren't enough people, women, in the database. So then, well, how do people get into the database, you know? So every question I asked—I decided, well, there's not enough here. How does that work? So we just kept going backwards and asking more questions, and that's when I found out about how the College Board and ACT—I can't remember the name of their parent company—but how they sell names, and that's how a lot of colleges get their prospects list. I'm like, Oh, okay, well that's interesting.

And you find out, well, the Office of Admissions has routinely for many years—they buy names. Okay, great. But then you find out what their strategy is about buying names and it's a very—it is very strategic and meant to further the goals of the university as a whole. [01:16:00] But I'm sitting here going, I need more women interested in engineering and the buying strategy does not buy the name of every woman interested in engineering in the country. So, I'm just going to do that. So I wouldn't buy in the same areas that they—. Anyway, we did a complementary kind of a—. So I supplemented that name buy so that those students would be—those women would be in the system so that they would get the viewbooks, so they would be invited to apply and not have to just figure out how to get an application.

So, we did simple things like that, more so than great big, strategic, huge programs or whatnot. They were just small things. And it came from really understanding our data and what we knew, and asking the question, Well, why do we do it that way? Or, how does this work, and how can we make that better, or broader, more expansive? [01:17:00]

TE: Okay. So, once you attracted women to Purdue, what was the role of your program? What did you offer women that maybe they wouldn't get without your program?

BH: So, there's a lot of things that the program offers undergraduates. And I kind of break the focus areas of our program into three groups: outreach, recruiting, and retention. What you're asking about really amounts to that retention focus. And to be honest, with students I don't call it retention. It's not. It's community-building, it's networking, it's engagement, but it's not retention. [01:18:00] And it's not a support program either, because those are not words that resonate with current students. But we do offer things that are complementary to other things that are offered on campus. You can get similar kinds—not exactly the same, but similar kinds of things elsewhere. Most of time when that happens, it's because we developed it and then someone else took the idea and adapted it to what they were doing. But we also offer things that I think a lot of other schools don't offer. So, in some ways, some of those programs help us with the recruiting—you know, the existence of those programs.

So one of the things that we still do is offer the Women in Engineering Seminar class, the one that I took as a freshman that I didn't think I needed, which turned out to be my favorite class. [01:19:00] We still offer that class and it's still one credit hour and it still meets once a week. During that class, we bring alums in to tell their stories, and that's what they do. And it's inspirational and that's really, in many ways, what the students get out of it—is they get inspired to do great things. They get inspired to think about engineering in a different way.

Sometimes they just get inspired to stay (laughs) for another week. And those are all good outcomes.

We have a residential program, and this is something—and I should say, none of these programs are things that I developed, or that have been developed since I've been here. They are all things that were developed previously, and of course we've changed and tweaked and improved things over the years, but the basic ideas were there in place. [01:20:00] But, there's a residential program where we cluster first-year engineering students in the residence halls. And there are three floors in one hall, Earhart Hall—chosen very specifically because it's named for Amelia Earhart—and one floor in an adjacent hall, in Harrison Hall. And that's expanded over time. It started out as one floor in Earhart and, you know, we've gotten bigger over the years.

But being clustered with other engineering students is a really positive experience for most of them. It's really easy to find people to study with. The RAs [resident assistants] that are generally assigned to those floors tend to be engineering students. Housing is really great about that. [01:21:00] You're all taking the same classes your first year anyway, so the night before the big chemistry exam there's not some TV watching party going on next door that you really want to—but you should really be studying instead, and you have this willpower thing that you may or may not win. That doesn't happen. Everybody's studying, so it's so much easier to say, "Fine, I'll study too, because everyone else is, too." So there's the residential program.

There is a tutoring center that's in Earhart Hall. It's open in the evenings. We run that with the Women in Science Program. They also have a floor or so in Earhart. And it's just convenient. There's lot of help rooms around campus, and this one happens to be in the residence hall, and it's convenient for students when they're in their rooms studying in the evening. And then there's our mentoring program and that's probably one of our—well, I don't want to say probably. At the moment, it is our biggest program. And it's our undergraduate mentoring

program, and we have participants who are freshman through seniors. [01:22:00] And there's two options: there's a one-on-one option, and then peer group option, and I think about 350 students are in that this year.

So there are lots of different ways for students to be engaged. And we have always had our programs set up so that students choose which of those they're interested in. And some students want to do it all, and it's great, fine, wonderful. Some students want to do just one thing, and that's fine. And some students really don't want any part of it, and that's okay, too. So it's not like you have to do this program and then you get access to these other resources. It's really—I call it our a la carte menu. You can put it together in a way that makes the most sense.

TE: Okay. How is the program received by engineering students and engineering faculty? [01:23:00] I'm thinking particularly of men, but other women as well.

BH: Well, you know, as with anything there's a wide variety of opinions about it. I think, generally, the majority of people think—faculty and students think it's a positive thing. I think there are a lot of our male students who don't get it, who don't know why it's needed, who ask interesting questions like, Why isn't there a Men in Engineering Program? And—yeah. But I would say most of the faculty are very supportive. There is certainly a few I've met over the years who don't understand why we do it. And they are not—as a general rule, they are not overtly negative about it. [01:24:00] They may not be the most supportive, but they tend to not to be vocal about their—and there's not very many of those. Most of the faculty, I think, think we do a good job working on the things that we work on. And many faculty encourage students to be a part of what we do if it would be helpful to them.

TE: Okay. Do you think that the female students would not get these experiences otherwise? Like, they wouldn't find mentors otherwise or—

BH: I think it would be harder. So there are other mentoring programs on campus. The Honors Program, for example, has a mentoring program. The first-year engineering program in general has what they call a peer mentoring program, but none of them are on the scale of what we run. [01:25:00] They're all much smaller. And you can make a chicken or an egg argument about that, saying, Well, maybe they'd be bigger if not as many women were involved in what you were doing in the Women in Engineering Program. But I think that it's easier, in many ways, for students to access what we do. So for example, to be in the Honors mentoring program, well, you've got to be in Honors. We have lots of students who are in Honors, but if you're not in Honors you don't have access to that. Our mentoring programs, anybody can be part of that.

And, we work very hard every year to be sure that we have enough capacity for the interest levels that we have. [01:26:00] So it pains me (laughs) a great deal when someone wants to be part of what we do and we don't have space. So that is one of the things that we have worked on in recent years, is to be sure we have enough space. So I talked about the residential program and its growth, and that's to make sure that we have enough space for everyone that wants to do that. The class that we offer, we have two sections and we used to say, Well, we want to be in this room because it's really convenient. Well, it turns out that room is not big enough so we've switched rooms. We're in different places on campus, because we want a big enough space so that everyone who wants to take the class can have a seat in the class. And the mentoring programs, we've expanded a great deal recently. Within the last few years, it's expanded by 50 percent, because we want to be able to accommodate everyone who wants that experience. [01:27:00]

And for the first-year students, I suspect that many of them participate in our programs because their parents told them to. You know, like my experience. I did the class because my mother said I should. I didn't know what was going on. And I find that when I talk to prospective students they don't really think that there are issues. They think, you know, "My grandma's generation fixed those. And

whatever was leftover, my mom's generation fixed, and I don't see that there are gender issues left. I don't see gender bias." To be fair to them, they probably don't in their high schools. You look at high schools these days and the women are in leadership positions. They're leading great clubs and they are taking advanced classes, and they're salutatorians and valedictorians. Many of them are. So they don't see that there may still be issues, because it's not part of their daily life. [01:28:00] And that's great, that they don't have that yet. But I think a lot of the parents go, "Well, you know, this might be good for you. You could meet other women, at least," and try to sell it that way. And that's exactly how we talk to them, too. This is a way for you to be engaged, to meet students across all the disciplines, to make friends, here you go. But I think a lot of them participate because their parents said, "I think that'd be a good idea."

TE: (laughs) How successful has the program been?

BH: Well, how do you measure success? (laughs) I don't know. I mean, I can say by my measures I think it's been very successful. [01:29:00] If you look at the participation of students as an indicator, that's a very—we have strong participation. I have never really figured this out because the data kind of makes my eyes cross, but when I think about all of our students, our female students, and what percentage of them at some point in their collegiate experience did at least one program with the Women in Engineering Program, I'm suspecting that number's about two-thirds. I don't really know, but kind of back-of-the-envelope, it's about two-thirds. So I think that that speaks a bit to the success of the program. We do—very rigorously, we do evaluations of our programs. We survey the heck out of the students. [01:30:00] They're involved in the creation of the programs and the implementation of the programs. And we get a lot of positive feedback from that end, so from that perspective I would say we're successful.

Alumni, alumnae are really a huge part of our program. And we have a lot of them that say they want to participate and when can they get in? When can they come? So we have a lot of alums. Almost ten thousand women now are on my

mailing list when I send out my annual report. So it's a big number. So because they want to participate in our programs, as a measure of success I think we're successful. We have some pretty strong alumni donations to the program, so by that measure we're successful. And we have very strong corporate donations to the program, so there are lots of companies who support what we do. [01:31:00] And so, I would say by that measure we're successful. We have, I think, a very strong reputation on campus, and so I would say by that measure we're successful. The College of Engineering likes to talk about our accomplishments, so that's a good thing. But really, in the end, when I talk to a current student or I talk to an alum and they say, "You know, if I hadn't been in that program, I don't know if I would've stayed," I think that's really the ultimate measure of success, and I hear that fairly often.

TE: Okay. Can you talk about how you became involved with SWE again and—[01:32:00]

BH: Yeah. So, I think it was a bit of an expectation. My predecessor, Jane Daniels, she was not only the Women in Engineering director, but she was the advisor for SWE, did a phenomenal job. And so when I arrived on campus—well actually, when I interviewed the SWE officers were part of the interview process, so I interviewed with them as well as many other people. But they grilled me. And when I showed up on campus in August, I don't think I'd been there a week when they came into my office and they had this very formal letter and they said, We'd like to invite you to be our advisor. And I said okay. So it wasn't something that I went out and I said, "I'd really like to be your advisor. This is what I can bring you." They asked me right away. [01:33:00] And again, because I had been part of the industrial advisory board for a few years, just most recently to that when I started, I think it was a really natural thing that I become their advisor.

And I had no clue what I was doing. The role of an advisor, in many ways, is to make sure that the student organizations are following the rules and the procedures of the university—which, given that I'd been there a week, I had no

idea what any of those were—and that they conducted themselves well. And I thought, really, that they should be conducting themselves in a manner that would reflect well on both Purdue and SWE. But we figured everything else out as we went along.

TE: Okay. So what do you see your role as now, and what do you do with the section now? [01:34:00]

BH: So I take that word "advisor" pretty literally, so I see my role as giving advice to the section. I try very hard never to tell them what to do, never to say, "Okay, you have to do this," or, "No, you can't do that." I only say, "No, you can't do that," when it's clearly against the rules of whatever (laughs), which they don't ever—they don't very often propose something that's that far out of bounds. But, I give advice and I give suggestions. And really the mechanism of how I do that is I require the student officers, the four of them, to meet with me every week for an hour. [01:35:00] And when they asked me all those years ago, that set of officers, if I would be their advisor, I told them that that was my condition. Because I wanted to know what they were doing and I didn't feel like I could advise them properly unless I knew what they were up to. So I wanted them to meet with me every week, and they agreed. And since then—you know, it only takes two years for something to become institutionalized in a student organization, so that was really quick. So I meet with the officers every week. And I don't go to as many events as many SWE advisors do. I go to several a semester, but—. It used to be because the children, they were so little and it was a logistical difficulty to do a lot of things. [01:36:00] And now I think a lot of it's because the executive board of SWE is so strong. They don't need me to be there to make sure that things go well, so I just go to be supportive.

I think my role, also, is as a mentor to them. Being in a leadership position—and I talk to the officers every year about, "You're in this leadership position. You do this because you love SWE and you want to give back." Because most people who become officers are either juniors or seniors, and they want to be an officer

because they want to give back to the organization that gave them so much. [01:37:00] And so I tell them I recognize that, but that this is a growth experience for them and they will learn a lot over the course of the year being an officer. And they're not going to get it all right, and that's okay. And that they don't have to be the same kind of a leader as the person before them, that it's a chance to do something a little bit different, or to understand themselves as a leader more. So I do feel like my role is to mentor them through that experience because as awesome as they are, they are all in a growth mode still. And to talk to them about the importance of mentoring the others that are behind them, so that they mentor the directors and to talk to the directors about mentoring the chairs. And to keep in mind that they're only going to be officers for a year, so they have to be looking at who's on the executive board who might make another great officer in the next year or two years out and start encouraging them. [01:38:00] So in the same way that you're still learning and being mentored, you can still be a mentor to someone else. So after elections every year we have some really deep discussions about this. We kind of touch on that throughout the rest of the year.

TE: Okay. What do you think that the SWE members at Purdue get from SWE that they don't necessarily get from the other technical associations?

BH: I think that there's a sense of—how do I say this? Many technical organizations are organized around a particular discipline. [01:39:00] And that's a really positive thing, but I think that SWE is a great experience because it's not discipline-specific. It's interdisciplinary. And students will—they get to connect with people across disciplines and have a wider group of friends, a wider group of people to network with. I think it's a broader exposure for them. And I think Purdue SWE in particular—and really, as opposed to some of the other student organizations on our campus—they're always looking at what they're doing and how they might be able to do it better, and how they can—. What is it that they're all about? They really think about that often. [01:40:00] Not that they do what they do, these programs—which they do, and I encourage them on a regular basis to think about, do they still need to do those programs? Are those the right

things to be doing? But I don't think they define themselves in terms of the programs that they do every year.

I think they define themselves in terms of what they offer and where they are going as an organization. And so they try to say, well—and just this last year, and they've worked on it more this year, they really try to say, Well, what is SWE? What is SWE at Purdue? What does that mean? And so they've come up with these four facets of Purdue SWE. These are the things that we do: we do technical competitions, we do professional and personal development, we do networking, and we do social things. That's the Purdue SWE experience. [01:41:00] And so I think it's very laudable of a student organization to be so introspective of themselves, to say, This is who we are. And of course, they get guidance from National [SWE] about that and making sure that their section mission and goals and objectives are in line with the national mission and goals and objectives. But I think that it's a unique organization in that they actually do that.

TE: Okay. Okay. What have you gained from your involvement in SWE?

BH: A lot of personal satisfaction. I love seeing the students grow over the years, from when they first start and they're a little unsure of things but really excited. [01:42:00] You know, and through the ups and downs and the bumpy parts, and when they come out on the other end, and they're very mature and poised and ready to launch into whatever the next stage in their life is. That's very rewarding. And then to see them as alums over the years and to kind of keep an eye on them from far away, how they're doing, and to continue to watch that growth process. I think what I get out of SWE is more personal satisfaction from that perspective than anything else.

TE: Okay. How has the Society changed since you first joined? Both National and the Purdue section.

BH: [01:43:00] Well it depends on what you mean by "first joined." You know, when I was an undergraduate, as I said I was a member and I actually—I wasn't so involved that I could actually answer that question. I had a lot of friends. It was interesting that many of my sorority sisters were part of the executive board of SWE, and so I knew a lot of people who were involved in SWE and they always did really cool things. I think now that the section makes a more concerted effort to be inclusive and welcoming and open. I think they try very hard to do that. [01:44:00] I think that between the time of me starting at Purdue eleven years ago and now, that the section is much more strategic and, like I said, introspective to define themselves by more than just the programs that they run.

National SWE? I thought it was a really big shift when they created the "Advance, Aspire, Achieve"—I guess it's a tagline, if you will. But that really drove a lot of the strategic thinking about the mission and the goals and the objectives, and it coalesced that, I think, in a way that was probably missing before, at least from my perspective. And so, that's been a very positive thing. [01:45:00] I think that there's a bit more now with the archives, a bit more fascination with the history of the organization. Like, oh wow, that was a long time ago. That was really cool. You know, think about how things organized and what it was like for the women that were pioneers on the early end of SWE. I think there's probably more of an interest in that now than there was way back when.

TE: Okay. What do you think that SWE should strengthen or focus on in the future? Where do you think SWE needs to go?

BH: Well, I'm not sure I'm the right person to answer that question. (laughs) [01:46:00] From the Purdue Section perspective, I think that they're on a really great trajectory and I'd like them to continue along that path. I think that SWE, as maybe its niche market, if you will, really can be all about leadership development. I see what the—and perhaps that's because I see the scale that Purdue SWE works on. It's a big organization. There's about 400 members. Their expenditure every year is probably around thirty to forty thousand dollars, which

is not small potatoes for a student organization, so it's a lot to keep track of. [01:47:00] They do significant amounts of programming and activities, from small events to huge events, but I suspect any given week they have at least two events happening at some level. So they're very active. There's a lot going on. And I think because of the scale of that, being a part of the executive board is an amazing leadership development experience that has direct impacts for transfer into the professional career. And I think that that's really a niche that not many other student organizations can provide.

And if you can figure out how to manage activities and people when they are not accountable to you or work for you, as in for pay—in a volunteer situation, if you can motivate and produce results in that kind of an organization, you can do a lot within the corporate structure. [01:48:00] Because there's so much that's directly transferable. It's hard. I know in many companies, in mine in particular, you're a team leader, if you will. You have a team. You're the leader of the team, but no one on the team actually reports to you. (laughs) You have no authority, if you will, positional authority. You're just the team leader. So how do you get all these people going in the same direction? I think SWE has just very—that's a great incubator for those kinds of skills. And so when I see some other organizations and there's a few others that work on the same scale as Purdue SWE, but I think that the leadership development is really a huge part and I'd like to see them focus a little bit more explicitly on that. [01:49:00] They do it very implicitly, but I'd like to see them focus a little more explicitly on that. But, in the end, it's their decision.

TE: Do you have any advice you'd like to share to aspiring women engineers, or women who are in the beginning stages of their career?

BH: Well—I don't know. Advice. (laughs) I'm full of advice for specific situations, but general? I don't know. I guess I would say that engineering is like many other things. You get out of it what you put into it. You can make it what you want it to be. [01:50:00] If you don't like what you're doing, it's within your power to change

what that is. And I don't mean by that to switch your major. (laughs) I mean by that to approach it in a different way, that there is—I truly believe that there's a part of engineering for everyone, from the most stereotypical type of engineering to the most—something that we haven't even thought of yet. I think there's lots of different ways to be an engineer, and all are valid and wonderful ways, and that it's up to the particular individual to figure out what that is for themselves. But I think everyone can have a happy career as an engineer, however they choose to manifest that. [01:51:00]

And I think, in the end—I always had a quote very close when I was an undergrad and in the first couple years of my—after I graduated. It was, "Obstacles are what you see when you take your eyes off the goal." And so, not looking at the short term, or the short term difficulty, the short term thing that you run into—but, what's the long term? Where do you want to go? And there are lots of ways to get there. So if you run into something that looks a whole lot like a brick wall, well, it's not the Great Wall of China. (laughs) You can go around that. And even if it is the Great Wall of China, it ends somewhere. You can go around that, or over it, or through it, or under it. There's lots of ways. [01:52:00] So I think that sometimes when you're in the middle of something, you get so focused on the something that you forget the long term. I guess I would advise people to continue to think about the long term.

TE: Okay. Is there anything else you would like to add before we finish?

BH: I don't think so.

TE: Okay. All right. Thank you very much for joining me today, and this is the end of the interview.

[END OF INTERVIEW]