SCIENCE HISTORY INSTITUTE

# UMA CHOWDHRY

Transcript of an Interview
Conducted by

Hilary Domush

at

Experimental Station
Wilmington, Delaware

on

24 and 25 August 2011

(With Subsequent Corrections and Additions)

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Oral History Program
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**UMA CHOWDHRY**

| | |
|---|---|
| 1947 | Born in Mumbai, India on 14 September |

## Education

| | |
|---|---|
| 1968 | BSc, Mumbai University, Physics/Math |
| 1970 | MS, California Institute of Technology, Engineering Science |
| 1976 | PhD, Massachusetts Institute of Technology, Materials Science & Engineering |

## Professional Experience

E.I. Dupont de Nemours & Company

| | |
|---|---|
| 1977-1981 | Research Scientist, Central Research & Development |
| 1981-1988 | Group Leader, Research Supervisor and Research Manager, Central Research & Development |
| 1988-1990 | Laboratory Director, DuPont Electronics |
| 1990-1991 | Business Manager, DuPont Electronics |
| 1991-1992 | Director, Best Practices for Manufacturing Quality, DuPont Electronics |
| 1992-1993 | Laboratory Director, DuPont Specialty Chemicals |
| 1993-1995 | R&D Director, DuPont Specialty Chemicals |
| 1997-1999 | Director of R&D and Strategic Planning, Specialty Chemicals |
| 1999-2002 | Director of DuPont Engineering Technology |
| 2002-2006 | Vice President, Central Research & Development |
| 2006-2010 | Senior Vice President & Global Chief Science & Technology Officer |
| 2011-2014 | Chief Science & Technology Officer Emeritus |

## Honors

| | |
|---|---|
| 1986 | Elected Fellow of the American Ceramic Society |
| 1996 | Elected to National Academy of Engineering |
| 2003 | Elected to American Academy of Arts and Sciences |
| 2006 | Chesapeake Bay Girl Scouts' Woman of Distinction Award |
| 2006 | Recipient of Girls Inc. of Delaware Strong, Smart, Bold, award |
| 2008 | Member of Delaware Women's Hall of Fame |

| | |
|---|---|
| 2010 | Recipient of IRI Medal for outstanding technical innovation for benefit to society |
| 2010 | Recipient of Earl B. Barnes National ACS award for chemical research management |
| 2011 | Elected Distinguished Alumnus, California Institute of Technology |

## ABSTRACT

**Uma Chowdhry** grew up in Bombay (later Mumbai), India, one of three children. She attended British missionary schools, which taught in English, and became interested in science in high school. Having obtained a bachelor's degree in physics and math from the University of Mumbai, she wanted to continue her studies in the United States and was accepted at the California Institute of Technology (Caltech). She married for love, against her father's wishes. After two years at the University of Michigan Uma and her husband entered the PhD programs at Massachusetts Institute of Technology (MIT) and Harvard University, respectively. At MIT Uma worked on batteries for ceramics professor Robert Coble in the materials science department and thus became more interested in applied science.

Chowdhry accepted a job as research scientist at E.I. DuPont de Nemours and Company, which she says was a good place for research, with much funding and good equipment. She quickly moved into catalysis, networking with other disciplines, and became group leader, then research supervisor, of a new ceramics group, at which point she gave up lab work. She became a Fellow of the American Ceramics Society. Next she was promoted to leader of DuPont's superconductor group, which produced twenty patents and twenty to thirty publications.

But business experience was deemed necessary, so Chowdhry was appointed Lab Director in the Electronics sector, where she had to learn several businesses. Her sector developed a thick film paste for integrated circuits packaging. As business director of microcircuit materials (MCM) Chowdhry had to learn the manufacturing process, deal with customers, even work on the production line. As business director for Terathane, an intermediate for Lycra, she saw new plants built in Spain and Texas. Next she was made manager of the military market for the Americas, and then she became global manager. From there she became the leader of DuPont Engineering Technologies (DuET). She promoted the DuET brand and engineers to the chairman of DuPont, executives, and department heads, improving morale and garnering much respect for the engineers.

Realizing a dream, Chowdhry was selected vice president of Central Research and Development; then Chief Science and Technology Officer (CSTO). She points out that she has delivered a very large amount of revenue to DuPont and developed numerous products to improve and enrich lives. She retired after four years as vice president and four as CSTO.

Chowdhry has learned much on every job; she loves to learn. She praises DuPont's corporate ideology and purpose and its core values, especially safety. She explains that providing food and energy are DuPont's current focuses. She talks about DuPont's mandate to reduce environmental impact in all new products; and new labs in other countries. Though retired she serves on the advisory board of the National Institute of Standards and Technology (NIST) and the nominating committee of National Academy of Engineering (NAE). She believes that the United States is still best for innovation, entrepreneurism, research and development funding. Globalism results in more women involved, but America is still the most equitable. Chowdhy emphasizes the importance of communication skills, networking, and mentoring. She concludes with a discussion of her awards, hobbies, travel, and family in India.

## INTERVIEWER

**Hilary Domush** was a Program Associate in the Center for Oral History at CHF from 2007-2015. Previously, she earned a BS in chemistry from Bates College in Lewiston, Maine in 2003. She then completed an MS in chemistry and an MA in history of science both from the University of Wisconsin-Madison. Her graduate work in the history of science focused on early nineteenth-century chemistry in the city of Edinburgh, while her work in the chemistry was in a total synthesis laboratory. At CHF, she worked on projects such as the Pew Biomedical Scholars, Women in Chemistry, Atmospheric Science, and Catalysis.

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**INTERVIEWER:** **Hilary Domush**

**LOCATION:** **Experimental Station**
**Wilmington, Delaware**

**DATE:** **24 August 2011**

**DOMUSH:** Today is August 24, and I am Hilary Domush here at the Experimental Station in Wilmington, Delaware, doing an oral history interview with Dr. Uma Chowdhry. Did I say everything correctly?

**CHOWDHRY:** Yes, you did.

**DOMUSH:** Great. One of the first questions that I usually ask people is about how they first became interested in science. I'm very interested in hearing about how you became interested in science, and what influences you had early on, if any, when you were growing up in Mumbai [India].

**CHOWDHRY:** Okay. Well, I was very fortunate to be born into a household in Mumbai in India in 1947 that was relatively modern in its approach to life. In those days, [Indian] women were not really encouraged to get highly educated. [. . .] I was fortunate in that I was encouraged to educate myself, to learn, to begin to love to learn, and was given many opportunities in different walks of life, including art, music, dance, as well as science and math. I was sent to a school that was run by British missionaries. India had become independent [in 1947], so we still had a lot of schools that were run by British missionaries, and they were [excellent] schools, where the medium of instruction was English, and the instruction was very good by Indian standards. My experiences there have stood me [in good stead throughout] my life. They patterned my personality, my likes, my dislikes. They encouraged two things: "Play the game" and "Others," which meant you have to [be fair, respect your team, and] think about others, before you think about just yourself. [My high school physics and math school teacher piqued my interest in science, especially physics and math.]

The thing I remember most was what I was always told by my father, "You've got to go out and get the best education in the world, because that will open doors for you. It will create options for you, change your life, and give you a purpose. You've got to be passionate about learning new things," so what I remember from my early childhood days was the belief that education was extremely important to my life's progression.

The schoolteacher that taught me math and science, fortunately made it interesting, and that inspired me to [work hard at it and] get good grades. [. . .] That wasn't the primary reason for my pursuit of science and math. I just enjoyed it. [My teacher's and father's constant reminders about the value of education] began to mold my personality in the sense that it <**T: 05 min**> taught me the value of working hard and being tenacious until a problem was solved. That hard work, the continual reinforcement with good grades, and admiration of peers kept propelling me to want to continue to excel in science and math.

**DOMUSH:** Now, did you have any siblings that were also in this school?

**CHOWDHRY:** [Yes, my older sister went to the same school and became interested] in economics and history. In those days, science, engineering, and medicine were revered professions among the middle class. It was kind of accepted as I was growing up that, if you became really good at science and math—

**DOMUSH:** I'm going to pause you for one second.

[END OF AUDIO, FILE #1.1]

**DOMUSH:** [. . .] We were just talking about doctors and engineers and how that was a revered profession to go into.

**CHOWDHRY:** Exactly. Not only that, by the time I was fifteen or sixteen, it was well accepted in the circles that I moved around in, that the best education was available in graduate school in the United States. , so I aspired to get to the United States. We weren't allowed to leave the country unless we had a scholarship or we had admission to one of the top schools in the US. [The government] had a list of ten or twelve top schools in the US that one had to get into. It was hard to get into them. So, from the very early days I became a very conscientious student. It became [a competitive] race to get good grades so that I could come to the United States. [The US could provide] the best education the world had to offer, and that became my goal.

**DOMUSH:** Now, had anyone from your family gone to the United States?

**CHOWDHRY:** Yes. My brother who is four years older than I am. He came to Case Western [Reserve University] to get his bachelor's degree in mechanical engineering. I had decided that I

want to come here for graduate school and not for [undergraduate] college. I thought I would do my [undergraduate] college work in India, and then I would be clearer about what I wanted to be before I came here. Also, I was young when I finished high school and I didn't want to leave home yet. [. . .]

**DOMUSH:** Did you live at this school? , or did you live at home?

**CHOWDHRY:** I lived at home, but my school was close enough that I could walk to it. I have very happy memories of my high school days. Then, I went to college in India. I joined Bombay University [University of Mumbai]. It was called Bombay [now Mumbai, India] at the time [until 1995].

Bombay University is fashioned after the British system with [several] colleges within the university. [. . .] I wasn't sure exactly what I was going to major in yet, and so I picked the school that was very highly regarded, and was fortunate enough to get in. During the first two years, I got a broad liberal arts education. By the third year, I [. . .] picked physics and math, because [I felt I would enjoy] it very much.

The [physics] teacher that I had in my junior and senior year took special interest in me and encouraged me to apply to [graduate] schools in the United States. He would caution that it was going to be a requirement to get very good grades, and that I would have to be very conscientious and work hard. [. . .] <**T: 05 min**> My home environment and school teachers [were the factors that] influenced me most.

**DOMUSH:** Did you feel competition? Were there other students that you knew of who were aiming for the same goal?

**CHOWDHRY:** Oh, absolutely there were. They were mostly men. My female friends wanted to [major] in the arts. They were very good at languages, liberal arts, and were doing extremely well in those areas. Not many in math and science. There were a couple, I guess, less ambitious than I was. They were perfectly capable of doing as well as I was doing, but other interests took them in different directions.

However, it's one thing to be exposed to a small group of people [in Bombay] among whom you can excel. When you arrive in a place [like Caltech] where everybody is brilliant, it's a rude awakening. I applied to several schools in the United States and was anxious to come [here]. Then the defining moment came, when [a fat envelope] arrived at home with an admission to Caltech [California Institute of Technology] with a scholarship . . . and [my heart began to race. Suddenly life was going to transform. I thought,] "I'm going to have to leave home, now." It was a scary thought.

**DOMUSH:** Now, had you hoped or tried to go near Case Western, where your brother was?

**CHOWDHRY:** No, because Case Western at the time wasn't on the list of top schools that we were provided, where you could go even if you had to take a loan. I was only going [to leave home] if I could get a scholarship. So, when [the fat envelope from Caltech] arrived, my first reaction was, of course, joy. I jumped for joy. But the next reaction was fear. Oh, my God. What have I done? But I took the courage, got out of my comfort zone, and came to this country.

At the time [in 1968, the government allowed] you to take only eight dollars out of the country. I [bravely] got on a plane with eight dollars in my pocket, and arrived in Pasadena, California. It was a huge leap for me, culturally, academically. Never lived away from home, no friends [in the US], not a soul that I knew. [I was very frightened.] When I think about it now . . .

**DOMUSH:** It sounds terrifying.

**CHOWDHRY:** [. . .] We didn't have television when I was growing up in India, so I hadn't seen what the rest of the world looked like, except in the movies, which is make-believe, you know. Everything seemed so new, so different. It was a steep learning curve. But, anyway, I arrived—

**DOMUSH:** Now, before we move on to your arriving, when the acceptance letter came, and it was clear that you were going to the United States . . .

**CHOWDHRY:** Yes. How did my parents react?

**DOMUSH:** I mean, they had always encouraged you.

**CHOWDHRY:** Right. So, usually in homes in India, the sons are encouraged, not the daughters. So, it was very refreshing for me to see that my parents were quite thrilled and didn't dissuade me at all from wanting to take this step. They were encouraging. They hoped I would return [after graduating from school]. In fact, my father expected that I would go away for two years, and I'd be back. Then he would find a nice man for me to marry. [That was his expectation and] I wasn't going to fight him on it. I didn't know what was going to come my way. In fact, I'm very, very pleased that they were as encouraging and modern in their outlook in those days as they were. I was very fortunate, just luck. Lucky <**T: 10 min**> to be born into [that household].

**DOMUSH:** Do you have any idea of what it was that made your family so much more encouraging?

**CHOWDHRY:** I think because my father lost his father when he was relatively young, he could not pursue the education that he wanted to pursue. He was very interested in learning new things. He loved to learn. So, he would teach himself things, and was very keen that I go into medicine. Very keen, because he wanted to become a doctor, but he had to become the main [breadwinner] in the family when his father died. So, he gave up his ambition and went into finance [. . .]. He became a stockbroker. So there was in him that lurking desire to see his ambition fulfilled through his children. He encouraged all three of us to do what we wanted to do in our lives with education. That was important to him. But none of us went into medicine, unfortunately for him. [laughter]

**DOMUSH:** But you all achieved very high levels it seems.

**CHOWDHRY:** High levels of education. And we went completely different ways. My brother went back to India, became an entrepreneur, and started a new business. I stayed here [for a master's and then went into a PhD program], and stayed here. My sister [got married and became very involved in helping young disadvantaged children. She] didn't come abroad at all.

**DOMUSH:** Now, when you were growing up in Mumbai, did you have extended family nearby? I know that some —

**CHOWDHRY:** Cousins and things?

**DOMUSH:** [Yes.] I know that so many families in India that are big extended families are very close geographically.

**CHOWDHRY:** Yes. I had extended . . . well, not a very big extended family. My father had only one older sister, and they lived not too far away. Her kids were much older, so they were like aunts and uncles, but in fact they were cousins. Nobody had come abroad. Nobody had gone into higher education. Certainly no woman in the family had [done so]. On my mother's side, there were two sisters, and their children lived in a city that was an overnight train ride away, so I didn't see them except at Christmastime and [during the Hindu] New Year celebrations. We were close, but not that we frequently saw each other.

I was very friendly with all the neighbors' children. I had many friends [in high school and our friendship remains] strong even today. We all went different ways. We live all over the world, but usually people come back [to Bombay] in December for the holidays. We have grand reunions when I go back to Bombay. [. . .] We can just pick up where we left off. It's like we never went away.

**DOMUSH:** How wonderful.

**CHOWDHRY:** It is wonderful. Those are the strongest ties, because, you know, we were thrown together for twenty years of [our lives. Those bonds of friendship] are very strong.

**DOMUSH:** Now, is your family—not just your friends, but is your family—still in Mumbai?

**CHOWDHRY:** In Mumbai, yes. My parents are no more. My brother lives in Mumbai. My sister lives in the city where my cousins grew up.

**DOMUSH:** Okay. Maybe it seems a little bit closer now, than . . .

**CHOWDHRY:** Oh, it does. [My brother and sister now] have grandchildren. They're sending their kids here to the US. So my husband and I are pseudo-parents to many young nieces and nephews.

**DOMUSH:** How exciting.

**CHOWDHRY:** It is exciting. We get ready-made adults. We don't have to raise them. [laughter]

**DOMUSH:** So then, when you came and when you arrived in Pasadena, and you knew no one—

**CHOWDHRY:** No. It was very frightening.

**DOMUSH:** You knew nothing.

**CHOWDHRY:** [When I arrived in Los Angeles with eight dollars, there was a gentleman at LAX airport] with a sign that said, "Uma." [. . .] I was relieved to see that there was somebody there to pick me up. I had heard of L.A. [Los Angeles, California] freeways, but that first experience was <**T: 15 min**> terrifying.

**DOMUSH:** I can imagine.

**CHOWDHRY:** It was incredibly terrifying. I was too shy and quiet to chat with the gentleman [who drove me to Pasadena. He was Indian]. I didn't know him at all, and he [was rather introverted]. He dropped me at a house which had newly been opened. It was the first time Caltech had built a house for graduate women to live in. Caltech was [a male-dominated] school. There were [only] twelve hundred people on campus, no women in undergraduate school, and in graduate school there were thirty of us women.

**DOMUSH:** Oh, wow.

**CHOWDHRY:** [. . .] I went into the house, and all the single rooms were taken. There was one double room, which I would have to share. I got that room.

**DOMUSH:** Now, were they all Americans?

**CHOWDHRY:** Yes, they were all Americans and [welcomed me warmly]. One of them came up to me my first evening, and said, "You know, the women here are highly emancipated." I didn't know the meaning of "emancipation." I remember I went to look it up in the dictionary the next day. I was too afraid to ask.

**DOMUSH:** Well, everything's completely different.

**CHOWDHRY:** Completely different. But the professors were incredibly inviting, warm. I just couldn't have asked for a better reception. They had the scholarship money waiting. So suddenly I was rich. I had all of two hundred and eighty dollars. I didn't need any money, you know. The housing was cheap. The food was relatively cheap, in those days.

**DOMUSH:** Now, was the food any sort of adjustment for you?

**CHOWDHRY:** Oh, yes. I was very strictly vegetarian at the time. Never eaten [any meat or fish]. I had eaten eggs and cheese, and dairy products, and lots of vegetables. So, I stayed vegetarian, but I remember it was hard. I remember putting on tons of weight. I had such a sweet tooth, that I would eat desserts, and ice cream. I became very close friends with the women in the house. In fact, two years ago, I tracked one of them down. I had lost track of several of them, but I tracked one down when we were in San Diego [California]. It was such fun. She invited me to her home, and there were pictures in one room of all of us . . .

**DOMUSH:** Oh, how fun.

**CHOWDHRY:** Walking down memory lane is so much fun and seeing all the women now, with grown children, and in different walks of life. It's great. It's really great to meet up with people that you once knew so well, and now doing things that are very different.

**DOMUSH:** Now you said that the professors were very encouraging.

**CHOWDHRY:** They were incredibly encouraging.

**DOMUSH:** How were the classes? Did you feel <**T: 20 min**> academically prepared once you . . .

**CHOWDHRY:** Not at all. [. . .] I couldn't understand what they were talking about in the first class I went to. My undergraduate education did not prepare me for the [graduate level] courses I had signed up for. I came here with the ambition of becoming a nuclear physicist of international repute. That was my passion. Little did I know what that meant. I had no clue what it meant. In today's world, when we recruit people from school, [the graduates are] much more aware of what's going on in the world. Much more aware of exactly what they want to do. During my first year, I was [a bit lost] trying to decide what direction I wanted to go in.

The first semester was very hard. I was not doing well, because I [didn't have the background for] a lot of the work. I worked day and night and yet [struggled. However,] the professors completely understood that I was not quite ready for this level of graduate work. So, they offered me courses to make up for the gap. [. . .] They were determined to help me succeed, which was amazing. I remember one professor saying, "You know, if you're a little interested in this subject, I'll make you more interested." He gave me a lot of projects to do for the summer, taught me lab work. You know, it was probably [undergraduate] level work at the time, but I learned a lot, and because I knew I had so much support in the environment, I felt like I could make it. [I kept saying to myself,] I'll work hard. I am not going to fail. I will remain

determined. The first month though, I was in tears every night. In those days, you couldn't even just pick up a phone and call India. I had to book a call, and it took a week to get through to India. When my father asked me how I was doing, I was weeping. He said, "Well then, come back home." There was no way I was ever going to admit that I couldn't do it. Too much pride . . . .

**DOMUSH:** Well, and you worked so hard.

**CHOWDHRY:** I had worked so hard to get here, you know. By the time I graduated [from Caltech], I was doing well, and everybody had helped me. Even women in the house I stayed in helped me. The other senior graduate students helped me. I couldn't have asked for more. I feel really blessed by the kind of environment I got exposed to and with the kind of professors I had.

Discrimination? I never felt any at all. I would be in my Indian garb . . . you know, I wore a sari every day, so I looked different. I spoke differently. I had an Indian accent. But hey, I was even more special because I was so different, and everybody was extremely warm, [making me feel] very welcome. I don't remember a bad experience at Caltech at all. Not at all. Everybody was very friendly.

**DOMUSH:** Now did you consider staying at Caltech to continue on?

**CHOWDHRY:** Yes. I did consider that. When I was in college in India, I had met a [wonderful man], whom I had fallen in love with. We communicated by writing letters, while I was at Caltech for two years. Then he was coming to the US [for graduate school]. So, I wanted to go where he was. He was going to the University of Michigan. I said, "All right, I'll go to Ann Arbor [Michigan]." Well, as soon as he came we decided let's just get married. We hadn't seen each other in a couple of years, but we knew each other well enough [through our letters] <**T: 25 min**> to have made the decision. So, we got married, and . . . .

**DOMUSH:** Did you go back to India to get married?

**CHOWDHRY:** No, because my parents didn't approve of [the idea that I was going to marry someone they hadn't selected for me]. I was very unhappy about that aspect of it, because I had to write a letter to my father, with an impassioned plea to allow me to do this, but he didn't want me to. I said, "I was very sorry, but this is what I am going to do." I was a rebel, but I was really committed [to the man I loved], and so we got married [and lived in Ann Arbor. During our first year there we] decided we have to try to get into MIT [Massachusetts Institute of Technology] and Harvard [University. [My husband's dream was to go to Harvard.] The risks we took [in those days were amazing]. We were told it was very difficult to transfer from one graduate

school to another mid-semester. So not having much money, not having a car, we got on a Greyhound bus and went across [from Michigan to Boston] in the midst of a [December] snowstorm in Cambridge [Massachusetts]. We walked into the chemistry department, and we didn't even have an appointment. It was the twenty-third or twenty-fourth of December and there was one door open. There was a secretary in there working. She asked if she could help us, and we said, "Well, we don't have an appointment, but we'd like to meet [a particular] professor."

She said, "I'm very sorry, he's very busy. Who are you?" We explained we were graduate students, and my husband said he was very keen to become a student at Harvard. Very, very keen.

So I think she took pity on us, or something, but she allowed my husband to go and talk to the professor. I figured he'd be out in five minutes. One hour later, I'm still sitting outside. He comes out, and he says, "Gosh, that was terrific. We talked about chemistry!" He got in. It was amazing. And I got into MIT, so we just came across [from Michigan] to Cambridge to enroll in graduate school. It was a stroke of luck, just pure luck. The stars were aligned. It may be [that the professors] admired our risk-taking. I don't know what they thought. They didn't know us. Nobody knew us. We walked in off the street, without an appointment, and a busy professor is willing to talk to us. Amazing. Amazing.

**DOMUSH:** What professor was it?

**CHOWDHRY:** He was a professor of chemistry, Professor Frank [H.] Westheimer. He changed my husband's life, and mine, therefore, in many ways. I walked into MIT, and you know, I said, ["I would love to come to MIT"]. I just walked in, [met a professor who looked at my Caltech credentials and said there would be no problem with admission!] We went back to Ann Arbor and waited to hear from Harvard. I figured I [could] get into MIT [because I had a degree from Caltech, which was a] sister school.

**DOMUSH:** And probably good recommendations.

**CHOWDHRY:** [Yes, very good] recommendations. So, it was no problem for me to get into graduate school at MIT. [The professors there] were very kind again. Oh my God, they were so [brilliant]. I have only met the most amazing professors. They became my role models, and so I wanted to become a professor. I wanted to become an academician. By this time now, I had given up my ambition to become a nuclear physicist, and [instead I became] a materials scientist. I had so much fun at MIT. It was a great school.

**DOMUSH:** Now, who did you work for, when you were at MIT?

**CHOWDHRY:** I worked for a professor by the name of Bob [Robert L.] Coble, C-O-B-L-E. He was a fun-loving, brilliant materials scientist that [had authored] many theories in the processing of ceramics. He [was famous in the world of ceramics but] wasn't a very good teacher. However, he was a very good mentor and [exemplary in his encouragement] of students. Lots of parties, we had lots of fun while <**T: 30 min**> we were studying. We were a very close-knit group, and we email each other, even today. It was like a mini U.N. [United Nations]. [In my office there were students from Japan, China, Alabama, Georgia, New Jersey, and] I was Indian. There were [six of us who shared an office].

**DOMUSH:** Now, were you the only woman in the group?

**CHOWDHRY:** I was the only woman. There were some other women in graduate school. MIT had quite a few women, unlike Caltech, but not in my group.

**DOMUSH:** Did that matter at all?

**CHOWDHRY:** Oh, no. You know, I've decided that in science and technology gender and race doesn't seem to affect scientists. They are very interested in science, and so if you're interested in science, they're very welcoming of you. Unlike manufacturing . . . which is a very different environment from a research environment. I have not felt gender [or race] discrimination or [any other kind of discrimination in this country]. In fact, I have felt special. I've had a very lucky set of experiences. So, it's not what many women have gone through and I can empathize with that, as I see other women struggling through their careers to get to wherever they get. It can be a pretty cruel world. I was just lucky. I was born under the right stars, I guess, the right halo above me. I was very fortunate.

Then when we graduated, it was going to be difficult to find two jobs in one place. [My husband's professor recommended him to the head of Corporate Research at DuPont. DuPont's research labs were revered in chemistry and engineering departments in academia, and General Electric was another.]

**DOMUSH:** Now before we get into that, you had said that at a certain point, you had wanted to go into academia and be a professor.

**CHOWDHRY:** Yes. What changed?

**DOMUSH:** Yes.

**CHOWDHRY:** What changed? So, at MIT, I started doing independent research, [something I hadn't] done before. Today it's an expectation even of bachelor's level students, but it wasn't in those days, and to successfully graduate, I had to. The challenge made me think about the kinds of things I would like to do the research on and what it might mean to the world if I did this? How would it make a difference? Could I impact people's lives in any way? Could I make their lives better, because of the research I've done? The funding had come from the Department of Energy, what was at that time called [the Atomic Energy Commission].

Anyway, that was where professors' grants were from, and so we had to do something that was energy-related. I worked on what was pretty basic science. It was the physics and chemistry of solid materials, and the insights gained from that science could lead to applications in things like solid oxide batteries. So, batteries have been a problem ever since I can remember . . . you know, soldiers in the field at the time would want something that was lighter and smaller, [last longer in the field]. The need hasn't changed over the years. We have learned lots of things over the years that made life a lot better, but not good enough. So I became interested in learning about the real world, and how research and science can impact the real world. I thought <**T: 35 min**> [about] academia versus industry and came to the conclusion I could make more of a difference [in real time] if I was in industry. I felt like my interests had started to evolve more into things more applied than basic. While I had come from India with a desire to [do academic research and understand how nuclear physics could have an impact,] I changed completely. All based on the influences of [people I worked with, the source of money for research, and so on].

**DOMUSH:** Well, and as you said, it's sometimes just what sparks your interest.

**CHOWDHRY:** Yes, what sparked my interest at the time. I started learning more about practical things [and how science and engineering improved the lives of people the world over]. GE and DuPont [had industrial research labs that] were the closest we could come to academia and yet be in industry and have the potential to actually commercialize something. So, we applied to DuPont and again had a stroke of good luck, because the 1970s were not a good time to get a job . . . not at all. In the late 1970s, DuPont was going through a lot of soul searching and cutting a lot of costs. However, they had begun hiring, because they had decided they want to get into the life sciences at the time. My husband was a chemist, [interested in] biology and biotechnology. [His advisor knew the head of Central Research at DuPont and gave him a very strong recommendation so we felt confident he would be offered a job.] I wanted to do materials science, and DuPont was interested in materials research with battery materials being explored in its central research labs at the time. So, again, with luck, a great stroke of good luck, we were both given offers.

**DOMUSH:** Now did you guys consider applying maybe in Europe or . . . you'd already made this one really big move from India.

**CHOWDHRY:** No, we didn't. We thought the chances of both of us getting industrial research jobs [in Europe was slim]. By that time, there was a will to hire more women into research at DuPont. We were the first couple to be hired at the Experimental Station. [DuPont had] never hired a couple into the same department. That was unheard of and considered nepotism, but we were fortunate again. We were in completely different divisions and hardly saw each other at work because we were in such different fields. We felt very fortunate to get two jobs in one place. So, we came [to DuPont's Experimental Station].

I remember the first six months, we'd drive up to Cambridge at every opportunity [. . .] because we missed it. [Coming to Delaware] felt like going to the Deep South. Wilmington [Delaware] today is very different from what it was in those days, in the late-1970s. It had very beautiful countryside. But it was not the kind of academic and youthful, cosmopolitan environment we had become accustomed to. Six years in Cambridge—Harvard and MIT—was a different experience [that had spoiled us]. But Delaware grows on you, little by little.

The DuPont Company has been amazing to work in, just amazing. I came into Central Research, which again was a welcoming environment. I cannot say that I ever felt gender [or race] discrimination . . . well, maybe I have a thick skin, and I'm a little oblivious to what people say, but I never, ever heard any commentary that did not feel right. If you were interested in science, well, "go for it," [was the attitude of the management].

In those days, the attitude here [in Central Research] was you hire great scientists and you allow them to follow their passion. They will do good science, and that science will find application." There wasn't a directed program I was given when I arrived. It is quite different today.

**DOMUSH:** Yes, very much so.

**CHOWDHRY:** [Today we are mission- and] project-oriented, market-driven. [When I joined, it] was very much a technology-driven culture. That was thirty-three <**T: 40 min**> years ago, so you weren't even born yet. It was amazing to me that [at DuPont] there was the kind of academic environment [that exists in universities]. I felt I was just in an amazing place. There were experts no matter what subject I was interested in. At school, I had to do everything myself, from building equipment [for my research to learning to use analytical tools to do all the analysis myself].

**DOMUSH:** Oh, wow.

**CHOWDHRY:** Yes. At MIT they had one technician for all the graduate students, and there were many of us. He would teach us how to use a lathe and any other machinery that we needed to. I wasn't very good in the laboratory, is what I decided, but I did enjoy the research and was very happy to have done what I did. I was incredibly happy up in Cambridge, Massachusetts.

**DOMUSH:** But using the lathe and things, that wasn't necessarily for you.

**CHOWDHRY:** It just wasn't for me. I became very interested in microstructures and what goes on at the micro and nano kinds of levels in materials. How does that affect the properties of those materials?

**DOMUSH:** [Yes]. Before nano was such a—

**CHOWDHRY:** Before [nanotechnology became a buzzword].

**DOMUSH:** —key phrase.

**CHOWDHRY:** Exactly. The research environment here at DuPont was very open, and there was money to buy all kinds of exciting equipment. I remember asking [after a few years here,] to buy a one-million-dollar [electron] microscope.

**DOMUSH:** Oh, wow.

**CHOWDHRY:** One-million-dollar microscope. They heard my story. It was amazing that we got approval. This was about my fifth or sixth year that we got approval to buy this incredible microscope. We still have it. You could analyze the chemical content of a material, and you could view it at the atomic level with the kind of resolution [I had only read about in textbooks.] It was just fascinating.

So, the research environment is the part I was very, very happy with. I enjoyed it thoroughly. Central Research was just a perfect place for me to work. [. . .] I began by working on [proton-conducting materials for fuel cells]. Then I slowly gravitated towards catalysis, because so much of the company [depended] on chemical processes that involve heterogeneous catalysis. I started to form friendships with people outside Central Research and started to establish a network of people that I would go talk to. I tended to make friends with people who were considered Fellows—DuPont Fellows or Research Fellows. I would go find the best

scientists I could, because I knew that's where I would get the best advice. I was intuitively a networker. I made friends with people that could [talk excitedly about their research] . . . the banter was very stimulating to be around.

I was very fortunate in that, about four years after I'd been here, my manger suggested that I lead a group. So, they must have seen some leadership potential.

**DOMUSH:** Well, probably going and seeking out [. . .] answers from DuPont Fellows and things like that, I mean . . . .

**CHOWDHRY:** It showed initiative.

**DOMUSH:** It does. It does. [. . .] It shows initiative and confidence.

**CHOWDHRY:** Yes. In catalysis, when you're working on [understanding chemical] processes, it takes a multidisciplinary team. [My management felt] I could lead a multidisciplinary team, because I was good at bringing people together. You know, the egos are very tall among scientists, especially the best ones <**T: 45 min**>. That was not one of my traits, I would say. Ego. I just didn't have any. It didn't bother me to ask for help. It didn't bother me to be one of the team and yet be the leader. That was the transition I went through. I was the group leader of [a catalysis] group, and I also had a research lab. I was one of the people doing the work, but I was also the leader of the group. I would convene the meetings. I would integrate the work of the group, and could [communicate its impact].

**DOMUSH:** But people at this time still had the freedom to pursue . . . .

**CHOWDHRY:** They were pursuing [their ideas within certain boundaries related to our goals]. By then, we had started to get more [mission-oriented]. DuPont already operated the process we worked on in one of its plants, but wanted a new chemical route to achieve the same compound [at a lower cost. We were working on understanding and improving the catalytic process.]

I was [investigating] the microstructure and processing of the catalyst. Our team had engineers doing the reaction engineering. There were people who were analyzing the products, some people designing the chemical reactors. We had about six people from different disciplines trying to understand the fundamentals of the mechanism of the reaction, so that we could improve the process.

**DOMUSH:** Did you have to travel—

**CHOWDHRY:** [Not at that time].

**DOMUSH:** —to the plant or anything . . . .

**CHOWDHRY:** To the plant, no. I wish we had done more of that. I did go once, and I was just blown away by the enormity of it. I learnt a lot in those days. The manager of the group of which I was a group leader was very helpful to me. I can't tell you how I got all this help. I must have been one of those people that needed help, or whatever, but I always found people that provided a lot of help, and I . . . .

**DOMUSH:** That's great, though. That's what allows you to . . . and then, they create opportunities, you know.

**CHOWDHRY:** I [was promoted from being] a group leader to a Research Supervisor. Then I started gravitating towards management, and . . .

**DOMUSH:** So, when you were a supervisor, did you still have a research lab?

**CHOWDHRY:** No, now I had transitioned.

**DOMUSH:** At that point, you were . . . .

**CHOWDHRY:** No longer. By that time, I transitioned. It was about 1985. At the time, I was asked to [build and lead a new ceramics group. I was also asked to try a bold new experiment and] lead a different kind of group, where we would bring together researchers from different [business R&D groups]. I would be the leader of this new corporate effort in ceramic materials, where we would work on electronic applications, but these folks would come from [different departments and different cultures]. This was a very unusual [undertaking] for Central Research to attempt. I didn't know how committed people were [to the new experiment]. I remember looking for corporate commitment before accepting this assignment, because I said, "You know, I'm more than happy to drive the experiment. I have no idea if it's going to work, because people are not going to move out of their departments." But I'm supposed to by influence, manage this group and try to align everybody towards a specific goal. That was a challenge . . . uses a different part of your brain, I guess.

**DOMUSH:** And did it prove successful after time, that challenge?

**CHOWDHRY:** I think moderately successful. We did come up with a product that became commercial, so that's success. It didn't turn out to be a huge business but [did succeed as] a small business. At that time, it was very relevant to what the electronics department was working on. It was very enjoyable . . . and I got to build the group, because I was told I could go out and hire whomever I needed to, to develop ceramic materials for electronic <**T: 50 min**> packaging. That was the goal. My PhD work had been ceramic materials, so the fact that the DuPont Company had become so interested in ceramic materials came as a very pleasant and welcome surprise to me. I knew a lot of people [in university materials departments]. I was part of the American Ceramic Society and had become a Fellow of the American Ceramic Society, so I knew a lot of people in the field. I knew people who were going to graduate and I hired a group of people—

**DOMUSH:** Hired them into DuPont?

**CHOWDHRY:** —into DuPont to Central Research. Several of them are around in the labs. Some have become senior professionals. I built the ceramics [group]. It was a lot of fun, enjoyed it thoroughly, and got a lot of support for it.

About that time [in 1987], there was news in the world that [scientists] had discovered [high temperature superconducting materials]. Actually, it came from IBM labs in Zurich [Switzerland]. People had discovered a superconductor that worked at liquid nitrogen temperature, which was the highest temperature people had discovered to date.

**DOMUSH:** Right.

**CHOWDHRY:** [There was much] excitement. I remember driving to New York City, [New York], to hear about this breakthrough in superconductor physics. There was a big convention in the [New York] Hilton. I remember walking [into the hotel and could not believe the] crowds that were trying to get into the hotel [ballroom for the keynote speech.]. It was impressive. The IBM physicists [Karl Müller and Johannes Bednorz], who later got a Nobel Prize [Physics, 1987], were speaking. I wanted to get into the room and could barely get in. They closed the doors after a while, but they put up closed circuit televisions all over the staircases. I had never seen anything like this [at a scientific conference]! It was the most amazing experience. It was big news. It was in the *Wall Street Journal*, *New York Times*, all over the place. DuPont Central Research management said, "Anybody who wants to work on this may work on it." About twenty people raised their hands. I got asked to lead this group. It was a fantastic opportunity.

We worked night and day. It was a lot of fun. We produced twenty patents, twenty or thirty publications in a very short time, because we were working day and night. [. . .] We did discover a new superconducting material that [could be demonstrated at a slightly] higher temperature than liquid nitrogen. [The world wants a superconductor that can maintain that property at room temperature! No one has succeeded as yet, almost twenty years later!]

**DOMUSH:** That's a big leap: liquid nitrogen temperature [-196˚C] to room temperature [25˚C].

**CHOWDHRY:** Huge leap. But, I remember much excitement in the world, and excitement at DuPont. In those days [the DuPont] Executive Committee and the board of directors was brought [to our Experimental Station] to see this remarkable material called a superconductor. [We could levitate it by putting] a magnet in liquid nitrogen and then having our powerful superconductor float around in the air [above it. It was like magic.] People were fascinated by this levitation. [laughter]

So our group got a lot of visibility and a lot of press. Our source of information was the *New York Times* every day, and the *Wall Street Journal*. There wasn't time to read journals yet. Nothing had appeared in the journals. It was quite a fascinating time in history.

**DOMUSH:** Did you know any of the people at IBM?

**CHOWDHRY:** No. I didn't. There was a professor in Texas who had [discovered a new] copper-based superconductor which was touted as being the most practically useful. Well, we were determined to produce something that was even better. However, we [did go to University of] Houston and obtain licensing rights to the material [just in case it did turn out to be practical].

We <**T: 55 min**> worked at a feverish pace, I remember. I remember coming in at all hours of the night, because it was just an electric time. We had the best time. The group was terrific. So, it was almost inevitable that the [management] in electronics by now had gotten to know me and would suggest that I come and work there—leave my comfort zone in Central Research, and come out and work in DuPont electronics. You know, after having turned down job opportunities three or four times because I loved what I was doing, and I didn't see the need to move into a business group, [I declined at first]. I was a researcher at heart. The fact that I'd been [in Central Research] for twelve years [was considered strange if one wanted to achieve higher levels of management at DuPont]. Today I tell young people at DuPont that the sooner they get some business experiences, the better off they'll be, but I didn't follow that advice in my own career.

**DOMUSH:** Had anyone given you that advice?

**CHOWDHRY:** Not until then. [However, the head of R&D in electronics], came and talked to me [. . .] after I had turned him down three times [over the years]. He said, "Look, Uma. This is the last time I'm going to ask you. You should understand that, yes, you're a research manager, but you're not going to get any more responsibility in DuPont unless you get some business experience." Those were tough words.

But I took them to heart. I said to myself, "Well, I guess I better go, if I want more responsibility," although I didn't see the need at that point in time. There wasn't the ambition, yet, of becoming Chief Technology Officer. So, I went to electronics and was the first woman to get a Lab Director position there.

[Since] I was among the first women in management at DuPont, I was paving new pathways, but, hopefully, making life easier for the next [generation] of women that were coming through the system. By [1988-90, DuPont] had begun hiring a lot of women. [. . .] We started looking at the possibility of reaching 50 percent women and minorities. I remember at that time, our leadership saying, "We really think we should aim at that. We may not be able to achieve those standards, but we ought to try to do that. [There began a new period at DuPont with] a lot of focus on giving women more opportunity.

**DOMUSH:** Now, were you involved . . . I mean, you had said that for various groups that you are in charge of, you got to pick people. You hired people—

**CHOWDHRY:** Yes, I did.

**DOMUSH:** —into DuPont. But were you involved in kind of the general hiring, maybe going out to MIT or to Caltech . . . .

**CHOWDHRY:** Did I go out and recruit? I was not one of the recruiters. The people that I hired were through personal connections with professors. I didn't personally go and do that. It would have been a fun thing to do. I would do some of the [new employee] orientation seminars when they arrived, but I didn't personally go out and recruit.

**DOMUSH:** Okay.

**CHOWDHRY:** [Today] it's different. We ask for volunteers to go out to the campuses to recruit. In [my early years], I don't remember people in Central Research going out to campuses. I don't remember that. Maybe they did, I just don't remember.

**DOMUSH:** [Yes]. We have so many oral histories in our collection about people, especially at DuPont . . . certainly, at an earlier point than this, people always just talk about hiring people in from universities through their own connections.

**CHOWDHRY:** Correct.

**DOMUSH:** They worked for Professor So-and-So. Then, there's kind of a constant stream of people from that professor. But I don't know . . . maybe campus recruiting is a much more recent thing than what I think.

**CHOWDHRY:** Yes. I'm embarrassed to say, I don't remember when it began.

**DOMUSH:** But if you weren't involved in it, there's no reason for you to remember.

**CHOWDHRY:** No, I wasn't.

**CHOWDHRY:** Yes, right. So to continue, leaving <**T: 60 min**> the corporate research lab and going into one of the business-supported research areas happened in about 1988, eleven years after I joined DuPont. Again, I was certainly influenced by the head of the research organization there, who had convinced me to go over. He was quite a great mentor, and allowed me to have a say in how the research [in his organization] was being fashioned.

As a Lab Director— and there's a distinction between being an R&D director and a Lab Director, or [at least] there was in those days— the Lab Director was responsible for all the administration, the facilities, the communications at the site, [and some long-range R&D]. We had sectors in those days. Electronics was a sector with several businesses in the sector. There was sector level R&D. I was given [responsibility for] sector level R&D. I was expected to learn enough about the different businesses and pick a program that would have an impact on one or more of those businesses.

[I remained] at the Experimental Station, [as Electronics Lab Director], in a building up the hill from Central Research. It was a very good group; I had two women supervisors, who cared enough [to want to see me succeed]. One experience stands out. I was a new director in the lab. I'd only managed R&D in Central Research and hadn't managed R&D in a business

organization. One day they came to me and suggested that we go and have a drink before we went home, just to get to know each other. This was about six or seven months after I had joined the lab. We went out to a restaurant here in [. . .] Wilmington. We ordered three glasses of wine, as I remember. After we had started to chat and get to know each other, they really unloaded on me about all the things I was doing wrong. That took a lot of courage on their part.

**DOMUSH:** It did.

**CHOWDHRY:** They were managers reporting to me, but they wanted to help me. Because I had a lot of drive and desire to get things done quickly, I was asking for the impossible in an [unreasonably] short time, and getting impatient when people couldn't deliver. It was a different, [dictator-like] personality that was emerging. I can never thank them enough for the way they told me how insensitive I was being, and that this was not the approach that was going to make me successful. It was very kind of them. I thanked them profusely, and we became good friends. One of them is still [a DuPont manager]. The other one left to go teach high school. [I can never forget the first management lesson they taught me.] The whole group was very good. I became a lot more understanding. I learnt a lot about the electronics businesses. It was all so different after having been in a Central Research environment.

Today, [everything about the company is broadly discussed in a very transparent manner. Details of financial results of various businesses are communicated to all employees each quarter.] Everybody talks about the stock price. [There] was none of that in those days. [. . .] There were more layers of management, and [the bureaucracy made] things [slow]. I had to [teach myself about the world of finance to which I had no exposure in Central Research].

**DOMUSH:** Right <**T: 65 min**>.

**CHOWDHRY:** And it's just amazing to me how different the world is today. Today, when students are hired in, they already know [how businesses are run]. Often, they have minors in business. Not true in those days.

**DOMUSH:** Well, I think I'm going to pause you for one second . . .

**CHOWDHRY:** Sure.

**DOMUSH:** Then I have a couple of more questions about that. But let's just take a quick break.

[END OF AUDIO, FILE #1.2]

**DOMUSH:** Okay, back on after a quick break. We were just talking about all of the new things that you had to learn when you moved into a business unit as opposed to being in Central Research. One of the things I'm curious about, you had said that, compared to when you first started at DuPont, DuPont had moved much more towards goal-oriented research, as opposed to just research that was interesting. I'm wondering—

**CHOWDHRY:** Now that statement was true about Central Research. In the business units, there were always [goal-oriented R&D programs].

**DOMUSH:** Okay. I was curious about how in a business unit, like the one you had moved into, how the goals were decided? You were, if you were part of that decision, how much freedom there was for you and the people you were overseeing?

**CHOWDHRY:** Okay. The desire to have a product that became commercial and had an impact on the business was the main goal of the business units. So, the research was very directed. The new product cycle time would be of the order of two to four years, unlike in Central Research, where you could take on high risk, high reward—longer horizon—programs that took ten, fifteen years, or more, to [get to a practical demonstration]. If you're trying to do something totally new, like the world has never seen, that's going to take longer than doing improvement of existing products. So, in the business unit, the group I had was at the sector level, not associated with any one individual business. Our group had the luxury to take on slightly longer-range programs. I was certainly involved in setting the direction for that in a way that [complemented what the business unit research groups were working on. The electronics businesses were focused on making materials] that surround the active [silicon chip in] an integrated circuit. At the sector level, we were [investigating] a variety of materials that would help build those multilayer integrated circuit packages. [They included various] polymers as well as inorganic materials.

I remember having a group that was working on materials that went into a thick film paste that [customers printed] onto a substrate and then fired to form the conductors, capacitors, resistors, and so on. We were the world leader in [thick film paste] materials for use in integrated circuit packaging. I served in that assignment as a Lab Director for close to two years.

When the [R&D Director] that had brought me into electronics said I really needed some business experience and would have to [leave my Research group and go off to] run a business unit, I said I just wasn't equipped to do that. I could manage research just fine, but that's all I had ever done. Managing a business, becoming a general manager, was something very different. Why did he think [any business] could take that kind of risk? He said, "Well, we

believe at DuPont, if you want to be responsible for higher levels of technology management, you have to understand enough <**T: 05 min**> of what it takes to be in the shoes of a general manager." I said, "Wow, I'm not sure that's what I want to do." [laughter]

People who start their career in sales or manufacturing get [immersed in business processes early in their careers and easily move into becoming] product line managers and business managers. I was already a director [of R&D without having had any business management experience]. So, how could I [possibly agree with what was being suggested for me? Maybe] I would be given a small business to run first, to get my feet wet. Because I had become familiar with the thick film materials business, known as MCM, microcircuit materials business, they suggested I become business manager of that. By now, I had learned to leave my comfort zones, but this again was a big leap. No woman had had this kind of job before. But the fact that they were willing to make an opportunity like that for me, so inexperienced, spoke volumes about their commitment to develop me, and my career.

So, I took on the responsibility . . . and, yes, I faced many obstacles. The person I was replacing didn't really appreciate being given another role. [He didn't] think I was qualified to do his work, so there were some difficult moments, but my philosophy was, I'm not going to let little things affect me. I'm going to rise above it and time will heal all wounds. The group was shocked [to lose their experienced business manager whom they respected. Who] was this new person, and what had she done before in business?

But given that I was going to be [their manager whether they liked it or not], they decided to take on the mantle of teaching me about business, so I learnt from my group. I would go with salesmen to customers to talk about our products. I could talk about the technology of our products. That I could do pretty well, but there were lots of different things I had to learn in managing a business. Managing profit and loss was not trivial for somebody who'd grown up in research. It was a hugely educational experience.

**DOMUSH:** Now, I'm assuming that when you're talking to customers, some of your customers are other business units in DuPont and some are outside of DuPont.

**CHOWDHRY:** No. They were all outside of DuPont [in the case of the MCM business].

**DOMUSH:** Okay.

**CHOWDHRY:** I was given responsibility for the military market in the Americas. It was a global business, but I was business manager for America, about an eighty-million-dollar business at the time. The customers were large defense contractors. So we would sell thick film gold paste for Patriot Missiles for instance, or copper paste for some [US] Navy applications, and so on.

I remember one experience, where we were having quality problems with one of our pastes. We had a lot of black specks in it. I had to go to Syracuse, [New York], to meet the manager in GE, the customer who was building circuits [using our pastes] for the Navy. I had never been yelled and screamed at in all my life like I was [. . .] at that customer's shop. It was quite an eye-opener for me. I had no idea what it was like in the real world. I had led such a sheltered life. Honestly, I never grew up with having been [verbally] abused in any way prior to that experience. <**T: 10 min**>. Oh, they were so angry, because we hadn't been able to solve the problem [and the customer said] I was holding up the US Navy, the Gulf War. [He said he would report me to our chairman, Ed Woolard I will never forget it.] It was a horrible experience.

**DOMUSH:** Was it a problem you were eventually able to solve?

**CHOWDHRY:** Yes, we were able . . . I knew we would solve it over time. I told them I'd put my A-Team on the problem. We weren't ignoring it. [Our manufacturing team was] working very hard on it. We were going to solve the problem, I just couldn't give them a date by when I could solve the problem. By the time I got out of there [I had turned pale]. Luckily the sales account rep with me was very experienced. At the break, he said, "Uma, don't worry. This is normal. These people yell and scream at us every time we come. So, don't worry. Don't worry. You'll be just fine."

**DOMUSH:** And you thought, I never want to come back here.

**CHOWDHRY:** I never want to come back here, I thought. At that time, Ed [Edgar S.] Woolard [Jr.] was the Chairman. The customer was banging his fist on the table: "I'm going to tell Ed Woolard about you. Who are you? What have you ever done? Do they keep changing business managers at DuPont?" Holy cow, nobody at DuPont had talked to me like that.

**DOMUSH:** Oh, goodness.

**CHOWDHRY:** It was an interesting experience. So, there were other experiences, where you have to learn to take "no" for an answer even when you've done your best job to sell a product. That's hard.

**DOMUSH:** As part of learning how to deal with these business units, you learned to deal with customers, and you learned to deal with all of the—

**CHOWDHRY:** All kinds of [customers].

**DOMUSH:** —experiences. Do you also then, start going to the plants and . . .

**CHOWDHRY:** Yes. Yes, very much so. We had a plant in Puerto Rico, which I visited several times. In fact, there were times when business was pretty good, and . . . well, no, I shouldn't say that. Business was [always running against the clock to ship product on time to customers]. I remember putting on a lab coat, getting in line with the operators, and putting the thick film material into jars to load onto the FedEx truck when it arrived, so that we could get it out to the customer on time. Yes. It was a very interesting experience.

I learnt the manufacturing process inside out. I could then talk more knowledgeably about the paste. It was a steep learning curve to learn how to run a business, but it was a very useful learning curve. I learned as much as I could. I had begun to enjoy it. There was a big reorganization, and the person in charge of the global [MCM] business was given the role of running the Americas, because a different person was put in charge of the global business. [. . .] I suddenly found myself with no role. Well now, what am I going to do? But I went back to the gentleman that had suggested I move into [the business manager] role. He explained to me that these [reorganizations] do happen, and since you have the least experience of any one in the business, it's obvious that you would be the one that gets screened out. So, I shouldn't take it personally. He said, "You were doing fine, but right now we don't have a business role that's available [for you]."

[My new] boss suggested that I help with the manufacturing quality issues we'd been having and become the quality manager for the business. I visited Japan, learnt the Toyota way, learned how to solve quality problems. I learned a lot about approaches to quality management in manufacturing, and that was very educational. [. . .] I had nobody reporting to me for that year. It was quite a drastic change. At first I thought, "Wow. This is the end of the road for me. Am I going to have to leave DuPont?" <**T: 15 min**>

But I had enough connections in the chemicals world, outside of electronics as well. Because like I explained to you, I had networked and lots of people knew me by now. At DuPont, we used to have lists of people who are on a promotable list. I happened to be on that list, so people would be watching out for whether there were opportunities they could give me. I learned a lot about manufacturing through that period, and then I got an assignment as Lab Director at Chambers Works, which is a chemical manufacturing site. People said to me, "Gosh, you're being sent to Siberia [Russia]. What did you do so wrong?" I remember being frightened by the [large] manufacturing site. I'd never been in a place like that. The environment was different. But I grew to love the job. [The lab that I was in charge of] was like a family. The whole plant was our family. The people in the laboratory were outstanding. It was a thousand-person laboratory. It was exciting. I had so much to learn.

I'd done a laboratory director job before, except this was different now. It was a manufacturing site, where people were unionized. The technicians and the manufacturing people were unionized. There would be union people at my door frequently with their grievances. [. . .] It was a very different experience, but it was worthwhile.

**DOMUSH:** While you were over there at that plant, did you . . . I mean, the things that they're manufacturing, those were not products that you had ever—

**CHOWDHRY:** Never touched before.

**DOMUSH:** You're learning a whole new set of things. You're learning about the process, you're learning everything, right.

**CHOWDHRY:** [Yes, everything was new for me.] But again, I was given the sector level [R&D responsibility]. The group was working on intermediates for the Lycra—spandex—business. The chemical intermediates that go to make that product, which was [key to the properties of Lycra™]. We were working on a totally new process. The intermediate was called Terathane™. So, when was that? 1993

It was 1993 that I moved to the Lab Director job at [Chambers Works in New Jersey]. In 1995, I was asked to run the Chemical Intermediates business. Again, I was terrified. I'd had about a year and a half of business management experience in electronics and [was now told to run a larger] chemical intermediates business with lots of issues. We were supplying product internally [to the very successful DuPont Lycra™] business. Not only did we have a big captive market, we also had a lucrative merchant market. [Lycra™ was a big business.] It was the crown jewel in the DuPont Company at the time. So, I moved from chemicals R&D into the [Lycra™ business] as business director for its chemical intermediates. We had to now take the technology that we were developing [when I was R&D director and commercialize] it in two new plants, one in Spain <**T: 20 min**>, and one in La Porte [Texas].

The first year went really well, and I met all my business objectives. [During the second] year, Lycra™ took off, growing unexpectedly fast. Great news, but we needed a lot of chemical intermediate, and we were just plain sold out. Our new plants hadn't started up yet. We had trouble starting one of them up. Spain was far away. I made countless trips to Asturias in Spain. Countless trips to Texas. Texas was much easier in that we had people who knew how to solve problems. Everything was new in Spain. The people were new. The process was new. I learnt the hard way. I learnt you don't take totally new technology into a new land, which is difficult to get to. It took two days to get [to the principality of Asturias]. The problem-solvers were over here in the US. How many can you take with you? So, it was a very challenging experience, the most hair-raising business experience in my life. It was an extremely difficult assignment, because I had [many merchant market customers] shouting for product. But I couldn't short

Lycra™ which was DuPont's jewel. [I surrounded myself with lawyers to help.] I had so many people screaming at me, from every direction. It was a tough experience. I don't think I slept much for two years. [laughter]

**DOMUSH:** Now did the plant in Asturias . . . did that plant eventually—

**CHOWDHRY:** Work? Well, there were parts of it that worked, and parts of it that never worked right. [On the other hand the plant startup in] La Porte went really well. Asturias became a very difficult nightmare for the business. [Lycra™] was a large several-hundred-million-dollar business. [Coming close to shorting its product needs was] the worst experience of my life. I had lots of crises to deal with every day, hurricanes in Texas, shipping lines freezing, the French routinely going on strike [preventing German parts for the troubled plant in Asturias from coming across the border]. I'll never forget it.

**DOMUSH:** Things you never thought that you would deal with.

**CHOWDHRY:** I never thought I would have to deal with. I became overwhelmingly convinced this was not the [career path I was] looking for. I wanted to manage technology. [I wanted a new role.] But boy, I learned an awful lot. I had a super team. I don't think we ever shorted [Lycra™, and the business continued to do well].

**DOMUSH:** Well, in some ways . . . I mean, you had been business director in electronics before, but in some ways, this sounds like—

**CHOWDHRY:** Not, no, this was—

**DOMUSH:** —trial by fire.

**CHOWDHRY:** This was trial by fire. This was really throwing me into the deep end. I did not have [the requisite] experiences to deal with [what I was faced with]. But you know, you learn. You get hardened by experience. You learn to find people who can help you. I found the right people to send to Asturias and live there for six months, because we had many problems [there and they were the right people to address them].

**DOMUSH:** When you have an experience like this, where you're starting up two new manufacturing sites . . . and when you started them, you didn't know that one of them was going to go so poorly—

**CHOWDHRY:** So poorly, it was awful.

**DOMUSH:** Even at that time, before things start to go poorly, are you just constantly traveling between Wilmington, and Texas, and Spain.

**CHOWDHRY:** [Yes]. All of the above.

**DOMUSH:** Okay.

**CHOWDHRY:** You know, I had not been in chemicals [management] when they had done the piloting of the process. The major issue was that we didn't allow the pilot plant to run long enough to collect the data from which we could scale up for the design of the plant [we built in Spain. By the time we started up Asturias, the] pilot plant had been shut down . It cost too much money to keep it running. I learnt the hard way and I became an advocate for keeping <**T: 25 min**> pilot plants running [until you get enough quality data to have confidence in scaling up a design of the commercial] plant.

**DOMUSH:** Right, you need the pilot plant.

**CHOWDHRY:** [The trial by fire really was] a huge learning experience, so I wouldn't exchange my experiences for any other, because they were all [valuable growth] experiences.

**DOMUSH:** Well, I think it's just about 11:00 a.m. It's probably a good time to stop for the day.

**CHOWDHRY:** [Yes], good.

[END OF AUDIO, FILE #1.3]

[END OF INTERVIEW]

**INTERVIEWEE:** **Uma Chowdhry**

**INTERVIEWER:** **Hilary Domush**

**LOCATION:** **Experimental Station**
**Wilmington, Delaware**

**DATE:** **25 August 2011**

**DOMUSH:** Okay. Today is August 25. I am Hilary Domush, back again at Experimental Station in Wilmington, Delaware, for the second day of oral history interview with Dr. Uma Chowdhry. Yesterday we had finished up talking about what we described a little bit as kind of a trial by fire . . . .

**CHOWDHRY:** That's right.

**DOMUSH:** That you were in charge of this very large chemical intermediates business unit. You were trying to get plants in Texas, plants in Spain on board, and some of it went well, and some of it didn't. You said you learned a lot.

**CHOWDHRY:** I sure did. [. . .] Actually, a lot of the themes [underlying] what I talked about yesterday were about taking risks, having the courage to take risks, recognizing that some risks are going to result in failure, and some will result in success, but that's what innovation is really all about. It's the will to take informed, prudent risks and expect high rewards for the investments that you make. We had made a large investment in both those [manufacturing] plants. [They operated using different technologies, both of which had never been practiced before.] One of them, as I said, performed superbly well. The other one, we couldn't [achieve success] without spending a lot more capital dollars. The business at the time could not afford to spend that much. We did the best we could to make product by using another intermediate, which we could introduce in the middle of the process, and were able to fulfill the orders that we were receiving. But that was in 1996-1997. Since then, we have divested that business . . . we divested [DuPont's core businesses] nylon, polyester. We also divested Lycra. Commoditization had resulted in incredibly low prices that couldn't justify reinvestment economics. That's the inevitable truth about globalization. It has its pluses. It has some minuses.

But as I said, I learnt a lot about taking risks, managing risks, and managing a business while being on trial. There were lots of [learnings]: staying calm [in a crisis], being reasonable, trying to break the problem down into small steps. Attacking things one step at a time, no matter how long it took, having a lot of patience, and finding the best experts we had in DuPont to attack the problem.

**DOMUSH:** Now, the many trips that you made to Spain to help with this plant, was this the first time that you were managing on a global scale?

**CHOWDHRY:** Yes, that's right. The first time I was managing a business was for the Americas, and largely North America. Now, [Terathane®] was a global business, so it was incredibly valuable, opened my eyes to a lot of things about what it takes to make money. It's hard, believe me.

After that assignment, I went on to become [a Business Planning and Technology Director for Specialty Chemicals,] a large organization. In 1999 I was [asked to lead] DuPont Engineering Technologies [DuET]]. Leading Engineering Technology wasn't something that I had ever thought I would be doing, but when it was offered to me it sounded like an intriguing challenge. I was willing to take on the [challenge even though] I was more a scientist than, an engineer. I know, my degree does say, "Engineering."

**DOMUSH:** Yes.

**CHOWDHRY:** But people who graduate from Caltech and MIT . . . <**T: 05 min**> [have the option of doing either. It] depends on the work they choose to do and on the professor they have, because it can lean towards more science, or towards more engineering. At any rate, I went to DuPont Engineering Technology, an organization that was feeling that it didn't get the respect [within] the corporation at the time. It had gone through severe downsizing, and so morale was very low. I took it upon myself to learn the history of the organization from the early days of DuPont. [I began to understand what] made engineering as proud as it felt about itself. The people were excellent. It was a big organization that primarily helped DuPont's manufacturing plants at the time [and helped them improve operations and solve problems. The DuET engineers] were incredible people. I would listen to them at length to understand their feelings, what they thought about the DuPont Company's processes, how they could help even further, etc.

**DOMUSH:** Was there any . . . backlash is too strong a word. I don't want to say that, but was there any concern that you were going to be in charge of this group of engineers? As you said, even though engineering is in your degree title . . .

**CHOWDHRY:** Right. They didn't identify with me [at first]. They didn't really know me, so they gave me the benefit of the doubt, which was very good. You know, they had gone through a pretty massive downsizing, so I figured what I can do is lift their spirit, and give them hope for the future. They were feeling very insecure. I worked hard to lay out a strategy that involved not only working with the businesses' manufacturing plants, but also working even more closely

with their R&D as well as marketing and tech service organizations, which they had not done before. But [the engineers] had incredible skills and capabilities to offer to the corporation. I think, by the time I left, I would say, to a person, they were very happy with what I had done for them.

I had [helped promote] a new brand name for them. A brand name that they had picked themselves before I got there, but I promoted it to the point where it became [well known at DuPont]. Now everybody knows it as DuET, DuPont Engineering Technology. That's not how they were known before. The brand became important. I promoted them with all the heads of businesses. I promoted [their brand and their skills] with the chairman, with executives in the office of the chairman, and so on, so they got a lot of visibility. I felt confident in promoting them, because I knew they could deliver. They do deliver results. They are very conscientious people. It was fun to watch the organization's morale improve, grow . . . The organization grew while I was there. They started having a lot of fun. They made new connections with R&D and marketing. They started helping customers. Their customers were internal businesses, but also the—

**DOMUSH:** But the outside customers.

**CHOWDHRY:** —external customers, whose eyes were opened by the capability DuPont has. The breadth and depth of that engineering technology organization is very, so I felt really satisfied at the end of that journey with the DuET organization.

Then I was offered the [position of] vice president of CR&D, and that was coming back to my roots. I knew this place. I'd grown up here, but it had changed enormously from a technology-driven organization to, now, very much a market-driven organization. I was glad to see that, because it was appropriate for the time. I had been doing market-driven work in the business units, myself. [In CR&D] I found an organization <**T: 10 min**> that had a hunger to learn about the businesses, had a hunger to connect with marketing, and one that was extremely innovative. I knew about that. [People in CR&D are] extremely capable with regard to their science. But innovation is much more than science. It's about taking it from the lab and into the marketplace. For that, you need to commercialize it with the businesses. You need to have very strong relationships with marketing to get the job done. You have to work seamlessly across these different interfaces, which I feel I helped everybody do.

In 2006, I became the CSTO [Chief Science & Technology Officer], which—

**DOMUSH:** Now, before we get into that, I want to ask a couple of questions about when you were VP of CR&D. One of the things that I'm curious about is you had been in these positions where you were managing, running, kind of, business units. While I'm sure that there was a lot of various types of science and research going on . . . .

**CHOWDHRY:** There was. There was also a lot of firefighting. Absolutely. [laughter]

**DOMUSH:** Once you become VP of all of Central R&D, how do you keep track of everything that's going on? You can't—

**CHOWDHRY:** You can't [because DuPont has such a diverse set of businesses]. What you do is . . . and one of the main jobs is to collect around you a team of outstanding people to whom you can delegate responsibilities and accountabilities. In the end, I am and was accountable for everything that went on in Central Research. But I had excellent directors reporting to me, several of them I had known very well in the past. Excellent team of R&D directors in the business units also. I relied a lot on my council of business unit R&D leaders as well CR&D leaders. The collaborations reached an all-time high between the different organizations, and between R&D and marketing, especially. You have to learn to delegate responsibility. I know there is a tendency for people to want to know everything. You can't know everything. It's just too diverse a portfolio of businesses and too diverse a portfolio of programs and science. I would know enough about the key objectives of the top seventy-five programs. I would know enough about the key milestones that were necessary to get across the finish line.

At first when I came in [as VP of CR&D], I was given the Services part of Central Research, the analytical, computing, toxicology [services that did work for all the businesses as well as for CR&D]. I had to streamline that organization, which was a difficult task, but it was necessary.

**DOMUSH:** Had you ever been involved in something like that before?

**CHOWDHRY:** Yes, unfortunately, all throughout my career, there has been some of that. You know, we had just finished divesting some core businesses, so all of the services that supported those businesses [needed to be pruned]. We needed to do the streamlining, which I did, and did it in as humane and dignified way as I possibly could. A lot of people were older and chose to retire, so the demographics helped in the downsizing. It gave me a chance to get to know the people, get to know the services well, [and learn what the clients for the services really wanted].

[In 2006, I was given responsibility for] the research programs as well. It took a while to get up to speed on all the different areas, because we had started investing a lot in biology, areas I wasn't familiar with at all. But that was the organization that really needed the maximum funds, because it was a new incubator, and we needed to grow it. [. . .]

My luxury was to learn. And the challenge of learning has been lots of fun for me throughout my career. In every role I've had, in every <**T: 15 min**> job I've had, there's been so much new for me to learn that I have constantly grown in every assignment as an R&D leader.

As I was telling you yesterday, having been a business leader, I can really appreciate all the tugs and pulls a general manager has to balance to be able to manage the bottom line. I became a very [empathetic person] for business leaders to [collaborate with. If the business just couldn't afford to commercialize a program we had worked on,] I would be flexible about [putting a program on the shelf or] shutting it down [or if I thought] the program could result in great value, we would license the technology. By building strong] relationships with the businesses, strong relationships with the marketing [function, we built] a very vibrant R&D organization that had a lot of hope for the future, and it allowed me to really enjoy the role.

During my tenure we delivered the highest percentage of DuPont revenue [that] I could find in documented history [from new products that were introduced over the previous five years. DuPont R&D programs] culminated in a lot of exciting work that delivered results to the bottom line, so I'm very, very proud of my tenure as CSTO. I'm very happy with my DuPont career, and what I learned from it. [I retired at the end of] 2010 having had an excellent career and having enjoyed being part of the executives in the [company's highest level] operating team. [I reveled in the ability to impact important decisions regarding the future of R&D,] to promote innovation [and promote future R&D leaders in the company]. I really think investing in innovation is the only way to succeed going forward. Yes, you have to cut costs, but you have to constantly be focused on the R&D pipeline, and having the balance between the short-term, and the long-term. I would tell my colleagues, you have to learn to work with bifocal lenses. Be focused on the short term, deliver results consistently, but create hope for the future by investing in it.

Luckily for me, [I had the opportunity to personally witness DuPont transform] itself several times. This is our third century. Not many companies have survived for over two hundred years, and [maintained their position] in the Fortune 50. It's pretty amazing. [DuPont has through its science and engineering,] created innovations and brand names that have changed people's lives. What DuPont does best is take on really big challenges, go where no man has gone before, and create innovations that [create both societal and economic value]. I'm very proud of DuPont. It has been an amazing two centuries of continuing transformations. And a company that survives this long, has a very strong corporate ideology and purpose. We have very strong core values [that have stood the test of time]. If you asked anyone in DuPont anywhere in the world they would [mention our strong core values, particularly safety]. And with respect to that, its respect for people.

One of the things I was [able to do in my] role as the chief technology officer is globalize R&D. It was necessary. It is not something people should look upon with fear. [For corporations to grow,] I think that the opportunities are just enormous, because the world population is growing so enormously. We're already at seven billion. We will [have more than] nine billion by 2050. The opportunity that creates [to provide safe food, energy and protection] is just enormous. [Creating options for] people to rise out of poverty and into the middle class has always been the American way. For us to support globalization at DuPont has always been a natural, inevitable result of all of the [innovations resulting from continuous investment in R&D]. We <**T: 20 min**> invested in a lab in China. I started up the lab in India. I started up a small operation in South America. I'm sure DuPont will soon invest in Russia and Middle East.

We have historically found that every time we go into a country with technical presence [to support local customers, we become successful]. At first, we go in with marketing presence and establish manufacturing presence, understand supply chains. However, if we don't have the technical service people that can help customers understand and use our products, our market share doesn't grow. However, as soon as we bring in a tech service center, or an R&D center, or both, in our case, we have watched market share really grow. So, we have a lot of faith in the fact [that technical presence is essential in any country. What] we believe is that if we provide innovative, differentiated products to our customers, not only will we grow, we will help our customers grow. The more important thing is making sure that they continue to grow and give us more business.

**DOMUSH:** Right.

**CHOWDHRY:** We've made it a habit now that we will continually transform ourselves. We will constantly look at mega trends [in our world]. And the mega trends we've selected for DuPont are about feeding people, about alternative energy. I mean reducing our dependence on fossil fuels and providing more safety and security for people [and the environment]. In general, I would say, all of the programs in this company—R&D—programs are aimed at sustainability in one way or another, whether it's . . . sustainability of the [business or the] planet. You know, over the years, our environment has deteriorated significantly. When you look at the material standard of living of people around the world, all of whom are very dependent on fossil fuel, you stress the planet's environment. You stress resources. You stress the atmosphere. We feel quite strongly that we must do everything to mitigate environmental [impacts].

For every program that we [initiate] especially in CR&D, we always ask the question about sustainability. What will this do for improving the planet? Will it help improve energy use? Will it help reduce fossil fuel? Will it help create more secure lives, and so on? So not that we won't continue to sell the old products that are sorely needed by the growing population in the world, but every new product that we introduce will by—we sort of put down a rule that we will improve [and reduce] our [environmental] footprint by 40 percent with every new product that we introduce. That was a tall order. We don't always achieve that, but we get pretty close in many cases.

**DOMUSH:** Now does that go for trying to make the existing manufacturing processes . . .

**CHOWDHRY:** [Yes, we work on improving the existing] manufacturing processes as well as improving the way we make new products. [Yes. For example,] we are trying to [make automobiles lighter]. When you create a lighter automobile, it consumes less fuel and therefore reduces the $CO_2$ emissions and therefore the pollution in the air. So, our lightweighting materials may not necessarily be completely different from the old materials—may still use

fossil fuel. But the impact on the environment *from their use* is superior. Somewhere along the value chain, we have reduced our environmental footprint. Our mission in this company is sustainable growth. We will commit to reducing the environmental footprint not only within our own boundaries, but also along the value chains that we [participate in].

You know, <**T: 25 min**> with that kind of a noble goal, people are attracted to [DuPont]. When we recruit young people . . . young people today are incredibly environmentally conscious. They have aspirations of really helping the world. Many of them go and do sojourns in Africa, and India, and China, before they finish their senior year, and before they go to college, even. We hire both people [with bachelor's degrees] as well as PhDs. When I would talk to many of them, I found that they really had very tall societal aspirations in addition to wanting to help impact the business. It's very heartening to see that; it's very encouraging to see that.

**DOMUSH:** Do you think that some of the aspirations that people have today, the new employees who are coming in with that have had experiences or been around the world a little bit . . . do you think that that's different [than earlier]? You had said coming out of your PhD that you made a decision to go into industry as opposed to academia because you felt like you could impact more people.

**CHOWDHRY:** Absolutely. So, what has changed? What has changed is we want to impact more people, but do it in an environmentally sustainable way. I think that is different. We didn't hear all those words as much when I was growing up, but it is so much in the news now, everybody is aware of it. It just takes traveling around the world to see that America [wastes energy] more than any other country. It brings home the fact that our energy use is unacceptably large. We're going to have to help reduce it. I'm really encouraged by the youth that I see coming through [our education system these days]. Those that are educated and those that are good enough to graduate have that kind of aspiration, which is wonderful to see.

**DOMUSH:** I don't know if you interacted enough with the employees who are at Central R&D . . . or R&D sites in the other countries, but do you think that this desire to improve innovation, not just for people around the world, but really with this kind of sustainable purpose . . . ?

**CHOWDHRY:** Yes.

**DOMUSH:** Is that something that's American, or is that something that's just increasingly commonplace among new scientists, and younger scientists?

**CHOWDHRY:** Around the world. It's commonplace around the world. With today's internet traffic, and social networking, everybody's talking to everybody else. [People all over recognize environmental issues such as pollution, climate change, unusual frequency of naturally occurring disasters, and are motivated to help address the issues we face as a planet.]

Our [employees] that we have hired in [various] countries for DuPont, all have the same understanding of what mega trends we are going after. [People understand DuPont's] safety ethic, core values, [and passion for environmental stewardship]. Everybody understands that. Everybody is very excited about innovation. When we establish our R&D presence in a country, not only are our people excited, but the country governments get really excited and give us incentives to be there. I [really enjoyed the global interactions with our people and with governments], and I hope to continue those interactions <**T: 30 min**>.

**DOMUSH:** Do you bring people . . . you had mentioned yesterday that when you were trying to get the plant in Asturias and get it really going that, at a certain point you have to have people from here—

**CHOWDHRY:** Oh, absolutely.

**DOMUSH:** —go there the first six months or a year or something like that. Was that something that regularly happens, when you open an R&D site in Brazil or India, are you sending people from here?

**CHOWDHRY:** We did do that in China. We do more of it in India now. We're doing it in Brazil, as well. We have to get it going. You have to have experienced management to be able to bring people up to speed. [Once we feel they can function well on their own, we] select people who have the potential to be local leaders and then bring the expats home. But it does take a lot of time. We have to be patient with the process, because [the employees] are so new. They just haven't had the kind of training that we've been through. [However, schools] are increasingly excellent in these countries, so the undergraduate training that they get is pretty good. We've been very pleased with the new hires in China, India, as well, as in Brazil, very pleased.

**DOMUSH:** Do you see a lot of the people who you are sending over to China, or India, are a lot of them people who were originally from China or India that are then kind of going back?

**CHOWDHRY:** We have done some of that, but not exclusively that. In the R&D labs, I did send people of Chinese origin and Indian origins, Spanish origins, yes. But it wasn't [exclusively so]. I also sent some management that was American or Swiss, because we have a

lab in Geneva [Switzerland] [and our Swiss employees are well seasoned in the process of starting up a new lab]. So in fact, we are now going to send an English gentleman who is working in Switzerland, to our India lab. It's cross-fertilization of a lot of different cultures, ideas, capabilities. To get [new labs in different countries] off the ground, I feel quite strongly that we have to spend the money to send expats. It's just necessary to be successful. In marketing and sales, we've always had Americans from different countries do that. Now, we're trying to grow local leaders much more.

[My] successor here [Douglas Muzyka] is a Canadian gentleman, actually, who spent six years in China building the organization in Shanghai. He grew a successor for himself who is of Chinese origin, and has worked here in America and knows our system. It really helps to know the people here. In particular, R&D leaders in other countries have to be talking to our technology directors in this country [regarding] resources and programs. Our R&D programs tend to be global in nature, so we have to be [communicating with each other] constantly. It's been an interesting learning experience for everybody.

**DOMUSH:** Now, as you're starting to increase the number of R&D sites around the world, as Chief Science & Technology Officer, is this the type of thing where you are just constantly on the phone with different countries at different times of the day? [laughter] Or are you traveling all the time to all of these different sites?

**CHOWDHRY:** Well, I travel at least once a year to all these sites, but sometimes twice a year. We have set up a video conferencing capability [to facilitate communication]. We would send our R&D Directors also, because they're closer to the programs. [. . .] People do like to see the CTO, to [understand R&D priorities, and be able to show what their achievements have been].

I enjoyed it thoroughly, the travel through all these different laboratories <**T: 35 min**>. It's amazing how much innovation is going on, how enthusiastic people are about what they're talking about, and telling you about. It would just energize me enormously every time I [visited our various R&D locations]. In Wilmington you're in meetings a lot. Sometimes you wonder whether all those meetings are necessary! [. . .]

**DOMUSH:** Now, we're sitting here in Experimental Station, and I have no idea what your labs or anything like that looks like. I'm sure they're incredibly state of the art. But this site has been here—

**CHOWDHRY:** Forever.

**DOMUSH:** —forever, exactly.

**CHOWDHRY:** More than a hundred years.

**DOMUSH:** So when you go to these new research sites in India or China or wherever, is there part of you that's maybe a little bit jealous that sometimes you think, wow, they get to work in this *brand* new place. I worked in Experimental Station and that was great. But this is *brand* new.

**CHOWDHRY:** I wouldn't say jealousy as much as I felt grateful for the opportunity to have built these brand new labs and capabilities. They are beautiful. They have state-of-the-art equipment. Oftentimes, we'll have more state-of-the-art equipment here, and we have critical mass here that they lack. The level of expertise, the breadth, and the depth of expertise at the Experimental Station is unparalleled.

So, there's pluses and minuses. Yes, we have antiquated labs here. Many of them are not modern at all. But the quality of the work doesn't have to suffer. Chemicals and materials are available to all. What you do with them is really up to how innovative you can be. So much has changed over the years. We had a beautiful library here. Everybody does their work on line now, so nobody goes to the library. It breaks my heart to see a library of the quality we had change so drastically, but it isn't affordable anymore to keep adding to the library collection, when you can get it on line. [People tend to stay in their offices at their computers and occasionally speak to people who work near their offices or labs.]

**DOMUSH:** That's it.

**CHOWDHRY:** That's it. Unless you call . . . or you set up [meetings or reasons] for interaction [such as poster sessions], seminars, and things like that. The Terrace on the Mall, where people got to eat lunch, [helps create a venue for] informal [interactions that are so important].

**DOMUSH:** One of the things I read about, when I was trying to read up for your research file, a little bit about how DuPont's global presence is—I hope I get the name correct—the DuPont Knowledge Center in Hyderabad [India].

**CHOWDHRY:** That's correct.

**DOMUSH:** I was just wondering if you could tell me a little bit about that. Is that the research site just with a fancier name? [laughter]

**CHOWDHRY:** Well, sort of. It's a beautiful site. It has R&D [for each of the businesses]. It also has [engineering, as well as a pilot plant operation. The Indian employees, who have a lot of pride of ownership in the lab], wanted to name it themselves and wanted to be different from the other labs. [. . .] They feel that they are unique in that they have everything under one roof, biology, <**T: 40 min**> chemistry, polymers, electronics as well as engineering. [The India lab has] more breadth of capability, more diversity of programs than China does. [They called it the DuPont Knowledge Center (DKC). That was their idea. I think it's kind of nice. China calls themselves the China Technical Center, CTC.]

**DOMUSH:** Now that you are Chief Science & Technology Officer Emeritus, you stepped back a little bit . . . .

**CHOWDHRY:** Yes. A lot.

**DOMUSH:** A lot. Okay.

**CHOWDHRY:** No, I have. Now, it's Doug Muzyka who runs the place. It's only appropriate that I step back. I'm mostly involved in external things. I'm on the advisory board of the National Institute of Standards or the nominating committee of the National Academy of Engineering [. . .]. I was up [at Harvard's Kennedy School of Government] for an energy workshop and . . . you know, I just get invitations to go to different venues to talk about my experiences about the different views that I have, and subjects that are important to me and to DuPont. So, I have enjoyed the role, and will continue this for as long as I enjoy it. I am on the board of a company [LORD Corporation, which I really enjoy. I just have a smorgasbord of stuff I do and it's fun.

**DOMUSH:** So, is the traveling that you do now, maybe more . . .

**CHOWDHRY:** More domestic, [yes]. Much more confined, and I'm happy . . .

**DOMUSH:** A little less tiring?

**CHOWDHRY:** [Yes], and much less tiring. I am happy with [places I visit] . . . . I have always enjoyed being there. I do not enjoy the process of getting there. Nobody does. But, you know, these long flights and long, long journeys really got to me after a while.

**DOMUSH:** Well especially, as you said yesterday, flying to Asturias is practically an entire day. Flying to India, flying to Brazil, flying to China; none of these are close.

**CHOWDHRY:** Lack of sleep. [After a while the travel] wears on you. If you don't get enough sleep, it's really hard on the body. [Yes], I don't miss that part of it.

**DOMUSH:** Well, since you are doing less international traveling . . . can maybe reflect on those experiences a little bit more. [. . .] Obviously, the world has moved towards being a global industry and a global site. Clearly, as you said, there are many, many reasons why DuPont and other industries need to think globally. In terms of students and young scientists, should students and young scientists be considering not just working in the United States? I mean, if you're a young American science student, should you be assuming that you'll be going to India or China or one of these other places? Or should that be an aspiration in the way it was your aspiration to go from India to the United States?

**CHOWDHRY:** You know, that's a good question. I think that, if I look at where would I go to university today, I would say without any hesitation it would still be the US—the [US has the topmost] graduate schools in the world. When it comes to K-12, [the US is unfortunately below par] as you well know. Parents do think about sending their children abroad for K-12. Now the people who go as expats to various countries have the luxury of sending their children to the American School. The American School in these countries is excellent and [offers very high] standards, like a private school here. They get the benefit of that kind of school.

[You asked if] people today are already thinking about jobs outside the US . . . you know, more and more we have such a melting pot here that we have Indians and Chinese that are second generation, third generation here. They are thinking about going to their parents' homelands <**T: 45 min**> to work. So yes, I haven't found many American youth wanting to do that yet. But more and more I do hear that it's so expensive to go to graduate school here that people are considering going to other countries for graduate school. Then they find it just as rewarding to work [abroad], because frankly, the multinationals are everywhere now.

**DOMUSH:** Yes.

**CHOWDHRY:** So, you can find yourself working for an American company sitting in Singapore, Hong Kong, Shanghai, and it's like being in the US. The lifestyle is not dissimilar.

**DOMUSH:** As the research goes more and more around the world, do you worry at all . . . I mean, you spent so much of your career at Central Research here in Wilmington, do you worry that the caliber of research here might decline?

**CHOWDHRY:** Might decline?

**DOMUSH:** Because people who maybe would have come and been recruited to DuPont Central R&D are instead going to the Knowledge Center in Hyderabad.

**CHOWDHRY:** I confess that I do not see the day that that could happen [any time soon]. Not yet, not for decades to come. I think that the best and the brightest, whether they're in China, or India, or Korea, want to still come to the US. This is the largest economy in the world. It is still the country with the most freedom to explore. I think the American spirit of innovation and entrepreneurialism is encouraged, fostered, [and] nurtured in this country. If we stop investing in R&D, then all those fears do surface very quickly. But as long as we keep investing in R&D and innovation in this country, I think we are far enough ahead that we need to keep that lead, which means we have to stay at the leading edge of innovation. The [US leads in biotechnology, nanotechnology, information technology, and in general the] game-changing [social networking] technologies, and paradigm shifts have originated in this country.

When will that phenomenon begin to globalize and change? It may happen in the next couple of decades. It might happen. The population growth is . . . the demographics are on their side. The next two billion people that will come into the world will largely come from the developing countries. Their growth rates are high, because they're starting from a smaller base. Our growth rate is stalled, and hopefully we won't go into a recession, but hopefully we can get our [political system working]. The [US] national laboratory system, the investment in science and technology, [. . .] has historically been very large. Although it is declining, it's still large. In absolute dollars, it's still a very large number. I would wager to say that in biotechnology and nanotechnology we are very far ahead of the rest of the world. So, in leading-edge technologies my view is that we need to keep investing in [emerging] areas of R&D to stay at the leading edge.

I feel we've lost the manufacturing of most materials to other countries. We've watched that happen with electronics in Japan as Japan was growing. Now we see it in China as China [grows] to be the manufacturing hub of the world. As long as we accept that we can keep transitioning commoditized innovations to China and India, and stay at the leading edge [of new technology areas, we can maintain our lead but China, India, and other growing economies] won't be satisfied with that. They will want to be at the leading edge themselves. They will emulate everything that America does. When that crossover occurs is anybody's guess. It just depends on how much we keep investing <**T: 50 min**> in R&D. That's why it's so critical for government and our public leaders to have a passion for innovation and keep investing in it.

That's what differentiates us. That's what differentiates our standard of living. We cannot maintain our standard of living without [investing in R&D] . . . excuse me. [phone ringing]

[END OF AUDIO, FILE #2.1]

**DOMUSH:** You were just talking about the importance of the government and industry leaders consistently reinvesting in the commitment to innovation.

**CHOWDHRY:** [Yes]. Innovation requires [R&D and] manufacturing. Unless the R&D people are co-located or close to the manufacturing people, [the rate of innovation can be adversely affected. When groups are] working at the leading edge [of technology], they have to interact closely. The dialogue and the experimentation has to be done speedily and cycle time [must be reduced] to be the first to move to market. I really feel very strongly that we need to co-locate [R&D and] manufacturing [in the US]. We're not going to bring back all that is lost, but we can stay at the leading edge of new technologies. For biotechnology and nanotechnology and the new areas of medical technology, we need to manufacture [products] here in this country.

**DOMUSH:** Would you say . . . I've heard you say a couple of times, in a couple of different ways, when you were in charge of various business units, when you were VP of Central R&D, when you worked with the engineering group, and now when you're talking about co-locating manufacturing—

**CHOWDHRY:** And R&D.

**DOMUSH:** —and R&D. It sounds like that there should be this commitment to integrating all of those parts of the business. That it's not necessarily the same people, but they have to be able to talk to each other. They have to know each other. Am I understanding that correctly?

**CHOWDHRY:** Yes. Absolutely, it really helps. It helps to reduce cycle time. It helps to gain market share. It helps in so many ways. It helps create more opportunities for people to grow. Unless you grow, there aren't enough opportunities for the young ones to keep coming up through the system. A lot of women feel that there aren't enough opportunities because the men are occupying all the key positions in corporate America. Everybody's working longer, staying [at their job] longer, [and this is] not creating the opportunity for the [younger employees] to rise. So if business kept growing, more opportunities would get created. The way to grow is through innovation, or occasionally through acquisition, but largely through innovation. Unless you invest in it, you're not going to get it. I was a very strong proponent of continuing to invest in R&D, until they got tired of hearing it from me. [laughter]

**DOMUSH:** I'm sure they didn't get tired of it. Someone has to be a proponent of that.

**CHOWDHRY:** Absolutely.

**DOMUSH:** In thinking about the globalization of science and chemical industry and also thinking about where women in industry are, I spoke with someone a couple of months ago who was from China originally and did her early education in China before moving to the United States. She said that questions about women in science are so interesting to her, because growing up in China it didn't matter if you were a man or a woman. You either could do something or you couldn't do something. It just didn't matter.

**CHOWDHRY:** That's fantastic.

**DOMUSH:** She said none of these things . . . she wasn't aware of any of these things until she got to the United States and started to see some of it. But she had many experiences similar to yours, where people were friendly. People were nice. People were not discriminatory. I'm curious if you see the globalization of science and the globalization of industry as a way for more women around the world to become involved in science?

**CHOWDHRY:** Oh, absolutely. I do think [globalization] enables more women around the world to get involved in science. I would say most societies that I have encountered outside the American system are very male chauvinistic. I'm surprised by what you say of the young Chinese lady [you mentioned]. You know, I've been to Chinese customers, and Japanese customers, Indian customers and no, I would not feel that they are equally respectful of women. <**T: 05 min**> [There is a] chauvinistic, condescending attitude—in Europe, as well. I think this country is far ahead of the others in many ways. Now, at the top of some governments it is true that there are women in China, Germany, and several countries. But the exception doesn't make the rule. Most of the middle strata of society still believes that the male gender is more capable, and we will need larger numbers [of women in the workplace] to demonstrate what women can do to change that paradigm, to change that thinking. It will take a generation. The next generation is doing a whole lot better than my generation.

**DOMUSH:** We can look at the chemical industry in the United States, and of chemical companies, there are two CEOs that are women. Of course, one is here at DuPont, and one is at Dow Corning. Do you foresee that changing in the next generation? The next generation of CEOs, that it might be more evenly split?

**CHOWDHRY:** I do think that. I've been to a few meetings of the Fortune Most Powerful Women [Summits]. They gather a summit and five hundred to a thousand women attend that summit. You see the most incredible talent. The talent coming up is very, very impressive. I don't see how they won't become CEOs. Absolutely they will. The talent pool is enormous and it is growing. So, how long it will take is the issue.

You know, some industries like the chemical industry are very old. They resist change. It's taken a long time for the DuPont executives to have a few women among them. We have one woman who is a president, out of the fifteen presidents that we have. [Diane H. Gulyas, President of DuPont Performance Polymers] It's going to take time. It's a slow process.

**DOMUSH:** For the women who are in industry . . . and this can just be your impression of it, not your experience because as you said, your experience was that you've been very lucky, you haven't felt discrimination, which is of course wonderful. We should all be able to say that.

**CHOWDHRY:** Oh, yes, absolutely.

**DOMUSH:** Do you have any sense that maybe women in industry are asked to prove themselves more before they move into some of these managerial positions?

**CHOWDHRY:** Oh, I would say that's true of myself, as well. [In] every new role I took on, I had to prove myself. You aren't immediately accepted in your new role. With male members it's different. They don't get the scrutiny women get . . . is my view. Maybe it's a biased view, but that is my view, that every assignment that a woman takes on, she really starts from scratch to establish her credentials, to establish her credibility, whereas, for a male coming in, his credibility is taken for granted. He's innocent until proven guilty.

**DOMUSH:** What is there to do fix that?

**CHOWDHRY:** What does it take to fix that? It will take a generation of repeated results. I think as long as women continue to [provide a] track record of [excellent] results . . . as I went along in my career, one can point to a track record of results and a series of successes, and some failures as well. But every failure was an opportunity to learn and improve. So, I think that during my day, there were many women who were beginning to establish a track record of results. But, if people become too interested in moving from one assignment to another rapidly through a corporation, they don't have the time to see the impact of their decisions and some real results. I feel that . . . in all the people I mentored, I always tell them to build a strong track record <**T: 10 min**> of results. Show what you can do, [. . .] and then communicate those

accomplishments to people, your peers, your mentors, your seniors. Unless people know what you've done, they're not going to automatically [consider you for bigger roles]. So, communicate—

**DOMUSH:** Right, so you can't expect someone—

**CHOWDHRY:** — can't expect everybody to know what you have accomplished. Some people have the notion that, "if I've done such a great job, everybody should know that. My bosses should know it." But, in the hurly-burly of everyday existence when [managers] have a lot of direct reports, it's difficult for them to keep track of everybody. I think communication skills, interpersonal skills, and a strong track record of results are good ingredients for success.

**DOMUSH:** Now is that something that you did in terms of going to your superiors and reminding them about the things that you were doing well along the way?

**CHOWDHRY:** I would network, yes. Yes, I would say that one of my strengths were my networking capability internally as well as externally. I have a lot of connections externally. I have connections internally with [various managers and directors]. I found ways to catch up with them at some meeting or the other and tell them what I was working on and what I had done. You just find ways without being [aggressive] about it to communicate results, and, hopefully, your own management is promoting you. That would be ideal, but that doesn't always happen.

I remember when I found myself out of a job in the electronics department, I took it upon myself to go meet with the other sector group vice presidents to tell them that I was available, if there were any opportunities that came up in their organizations and [told them] what I had accomplished in electronics. So, I think it's important. People here, at least in the DuPont Company, are more than willing to see you and to listen to your story as long, as you don't make a pain of yourself. I think there's opportunity [to be heard]. People are willing to listen.

**DOMUSH:** Now, you mentioned a couple of times yesterday that as you were kind of moving up into some of these businesses and things, that there was one person in particular that kept saying you really should take this position, because I'm not going to ask again. If you do want to move forward . . .

**CHOWDHRY:** That's correct.

**DOMUSH:** Was that someone that you would have considered a mentor, or someone that helped you along your way?

**CHOWDHRY:** [Yes], I would. I would. He was a mentor. He noticed me when I was in Central Research. I had spoken at a research review and done a review for all the sector VPs. He noticed that I had capability and potential, and so he took it upon himself to help me along the way. So while I was in electronics, he was certainly a mentor. Then I moved on, and he retired. Oftentimes, what happens in large corporations is when your mentor retires then you have to start all over again and establish your credibility. That certainly happens. I have felt it . . . definitely felt it. If your mentor disappears or the people who spoke up for you in your earlier career [retire, you are left without advocates].

**DOMUSH:** Without an advocate.

**CHOWDHRY:** Yes, you have to create new advocates.

**DOMUSH:** You mentioned just very briefly a couple of minutes ago about telling people that you mentor to make sure that they promote themselves, and that they network appropriately. How do people pick you as—

**CHOWDHRY:** Take the initiative?

**DOMUSH:** —a mentor, or do you go out and find people to mentor?

**CHOWDHRY:** No. People have to find me. No, I didn't go out and advertise. I am an approachable person, and people <**T: 15 min**> who wanted to talk to me found ways to talk to me. They can catch me anywhere, in the cafeteria, or [at a meeting,] or even schedule an appointment. People who wanted to get some advice came, and saw me. I was always happy to talk to people. I think if people can learn from my experiences, and if I can share experiences that would help people, I [am more than happy to do it]. I would go and give talks at the Terrace on the Mall, so that people would listen to my story and see what they could learn from it. They would ask questions. Anything I could do to help them, [I considered worth my time]. I would always tell them that there isn't a recipe that works for everybody. Times change, and today's times are different than when I joined the company. Different things are important at different points in time. You have to understand your environment and the culture you're in and figure out for yourself how best to wind your way through it.

I think the cultural fit with the environment and the ability to figure out what works [in your particular environment] are key in large corporations. Then of course, it depends on how good you are and how well you can speak about your work, and other people will notice. You know, to be noticed among sixty thousand people, it's not easy. It's not at all easy. You have to make that extra effort and build relationships. That's so critical. In the end, it's people making things happen, right. In today's world, with social networking there are different ways of keeping in touch with people, so there are different ways of getting noticed. For people who take the initiative and have a strong desire to move up in management, they have to befriend a senior manager, one way or the other. Then through that person, and with other managers, that's how you get known. Some women do that successfully, very successfully.

But really, it's very dependent on the culture you come from. There are really [diplomatic and yet] aggressive types from every side of the ocean. There are. It just depends on how you grew up and what [shaped] your personality. [laughter]

**DOMUSH:** Well and certainly, the ability to network, and the ability to have confidence to go out and talk with people. People can do that aggressively, before they can do it not aggressively.

**CHOWDHRY:** To talk to people . . . right, exactly.

**DOMUSH:** But it is true. Everyone is different in how they interact with people.

**CHOWDHRY:** I was fortunate in that I started getting awards—external awards and external recognition—early in my career, and got elected into the National Academy of Engineering and to the American Academy of Arts and Sciences. In fact, the year I retired, 2011, I got two really significant awards. In these awards addresses I get to promote DuPont , so it's good for DuPont, it's good for me. People can see that it's possible [for a woman and a minority] to rise and become a CTO. I think I am the first woman to be a CTO in the chemical industry. Now that [there are female corporate CEOs, CTOs, business vice] presidents . . . the doors are open for really good, talented, motivated to walk through. The doors are now open.

**DOMUSH:** You said yesterday at one point that, earlier in your career when you were still very much a researcher or when you were kind of starting to move into research management a little bit, that you never imagined that you would be Chief Science and Technology Officer.

**CHOWDHRY:** No, never. Never.

**DOMUSH:** Was there some point in your career as you did start to move on, move into these various management fields that you did start to think maybe I could do that one day, or maybe I'll be the one to fill that slot one day?

**CHOWDHRY:** I did think at one point that maybe I'll get that role. Then, I didn't get it <**T: 20 min**> for many years, and so I thought, no, [it's unlikely now]. I am past the age when I will get that job, so I was very surprised, actually, when I got the VP job [in CR&D] and then the CTO job. It was a big surprise for me. I wasn't quite expecting it. I was enjoying the DuET job.

**DOMUSH:** It sounded like it.

**CHOWDHRY:** Oh, [yes]. I was really having a great time. I wasn't expecting this at all. You know, there are different personalities that are in charge who may like you or may prefer somebody else. I noticed at one point in my career that, I wasn't "in" with the senior leadership of technology. So I didn't think I would get this job. As I mentioned, when your mentors retire, [you feel abandoned. Only] one person can get to the CTO role and the pyramid is very narrow at the top.

**DOMUSH:** When things like the VP position or the science and technology officer position became available, were those positions that were offered to you or were those positions that you had to apply for?

**CHOWDHRY:** No, no . . . offered. No, in this company you don't apply for those positions, unfortunately. That's not an open process. [laughter]

**DOMUSH:** I didn't think so.

**CHOWDHRY:** No. I think people would like it to be an open process, but it isn't that way. No. Just the stars got aligned, I guess. I did a very good job in DuET. I came [into CR&D] and did a very [good] job with the services organization. So, maybe that's . . . it also depends on being at the right place [at the right time].

**DOMUSH:** [Yes.] It certainly sounds like when you were working with chemical intermediates that you did a very good job at just . . .

**CHOWDHRY:** It was a difficult situation.

**DOMUSH:** It was a very difficult situation . . .

**CHOWDHRY:** Very difficult situation. After that I wasn't asked to do another business assignment. I was perfectly happy about that decision. You know there are some things you really kind of gravitate to and have an affinity for, others you have to force yourself to want to do it. If you don't enjoy [certain types of roles as much, you shouldn't force yourself to do it]. I made my aspiration pretty clear to the people that make these decisions. I really wanted to be in technology [management and not in business management]. They weren't used to hearing that, because people regard business management as the most desirable career in DuPont. I really feel that the DuPont company is founded on innovation, and growth through innovation is the lifeblood of this company. Being responsible for that is an amazing honor, and I aspired to have it at later stages in my life.

**DOMUSH:** You mentioned that now that you are emeritus, you get to go and do things. You give a lot of talks. You're on various advisory committees. Do you have more time for some things like hobbies . . . ?

**CHOWDHRY:** [Yes]. I like travel. Yes. I like meeting people, like doing some cooking from time to time. I just haven't had the time to read books [I have always wanted to]. Once I get through the phase in which I have to do a lot of clearing up, because you collect stuff over thirty years of a DuPont career that, unless you're an amazing organizer, and have the will to throw stuff away each year . . . I didn't, so I have a lot of stuff to clear. As I clear all that paperwork and manage all these external assignments, it still doesn't leave a lot of time, but I'm trying to get physically fit, so I joined a gym. I'm trying to eat right and do all the things that I aspired to do that I didn't do [when I worked full time].

**DOMUSH:** Well, now you have a little bit more time.

**CHOWDHRY:** I have a little bit more time, so really it's time for soul-searching on exactly what I'll [enjoy most and how I can contribute most]. Right now, there are many exciting things to do. I get invited all over the place, but that won't be forever. So, I have to pause and [reflect on how best to manage my life going forward]. <**T: 25 min**>. As you grow up in management you often have a little knowledge about a lot of things, but you don't go deep into one subject. So I have to decide what it is that I want to focus on. But there are many things I want to know, and so I bought a lot of [DVDs on subjects] that I will one day start to absorb . . . in biology for instance, languages, yoga. There's plenty of time for the hobbies that I didn't cultivate through my career and now wish I had.

**DOMUSH:** You said you get to do some traveling now.

**CHOWDHRY:** [Yes]. We went to Europe for a couple weeks, and then we go to India for four weeks, so plenty of traveling for a while. We will travel for six weeks a year. We didn't take our six weeks of vacation through my career. So, I would bank it, then you can cash it in when you retire. But we never had the time to go off on summer vacations. Wish we could live our lives the other way around. When you have the money, and can go on vacation, you don't have the time to do it. When you're young, you don't have the money. [. . .]

**DOMUSH:** Yes.

**CHOWDHRY:** But there's so much to see in this country we haven't seen and so many friends to see across this country as well as other countries that there's enough to fill a lifetime, actually. Exciting to look forward to.

**DOMUSH:** When you and your husband go out to India is his family also in Mumbai?

**CHOWDHRY:** In Mumbai, yes. We have a wedding coming up soon in the family. So, [my husband's] sister's children are marriageable age and my brother's grandchildren are school age. There's so much mentoring we can do internally in the family. It's great fun.

**DOMUSH:** It sounds very exciting.

**CHOWDHRY:** [Yes]. Do you have children?

**DOMUSH:** Not yet, in October . . . hopefully, October.

**CHOWDHRY:** Exciting.

**DOMUSH:** Yes. Was there ever a time in your career where you guys considered going back to India?

**CHOWDHRY:** No. We didn't see the opportunity in our day. But today's youth wants to go back, because there's a lot of opportunity. So, times have changed, and we didn't dream that this day would come so soon. It has been remarkable how things have changed. You know, when we

came abroad, it just wasn't feasible for us to get the kinds of opportunities [in India that] we were seeking, first in research [universities] and then in industry.

Indian industry didn't invest in R&D at all. It still doesn't. They [mostly copy] the products that the US makes. There will come a time when industry starts to invest in R&D, but not yet. The people who want to go back are people who are either joining a multinational or there are sectors that are more mature within the Indian industry, like agriculture, financial services, computing services, things like that, where [job opportunities] are many-fold. But not for the kind of research we were doing. I wouldn't have gone to Europe either, actually. I felt like there was no other country where I wanted to go.

**DOMUSH:** Well, I think we've come to the end of the questions that I wanted to make sure . . . .

**CHOWDHRY:** Good. I hope you get a few excerpts that you can use.

**DOMUSH:** I'm sure that I will. Is there anything that I didn't ask about that I should have or anything else that you want to mention?

**CHOWDHRY:** No. I think the quote from Churchill, which says, "You must never, never, never, never, never give up," you've seen that one . . . .

**DOMUSH:** I have.

**CHOWDHRY:** I used to have a big poster of that on my wall. I really liked it. There were many times when I felt <**T: 30 min**> I can't do this. I'm not sure I can do this. Then, I'd look up and it would inspire me, give me hope, and just muster the will to go forth and do it. But there are times when you go, gee, this is not a solvable problem. I'm not sure I can handle this. But somewhere, somehow light comes through the tunnel.

**DOMUSH:** You have to muster the confidence from somewhere.

**CHOWDHRY:** Somewhere, exactly. Then, help the next generation. That's the most fun now, watching the next generation grow. That's really been—both for my husband, and for myself—we really enjoy the mentoring of young people, which we do a lot of, actually. He likes to do that for young entrepreneurs, and I like to do so for women.

**DOMUSH:** Well, that's great. I think that sounds like a wonderful place to stop, unless there's anything else at all that you want to say.

**CHOWDHRY:** No, not at all.

**DOMUSH:** Great. Well, thank you so much for all of your time.

**CHOWDHRY:** Thank you. Thank you very much.

[END OF AUDIO, FILE #2.2]

[END OF INTERVIEW]

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