RICE UNIVERSITY'S BAKER INSTITUTE FOR PUBLIC POLICY
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MAXINE SAVITZ

PCAST

Transcript of an Interview
Conducted by

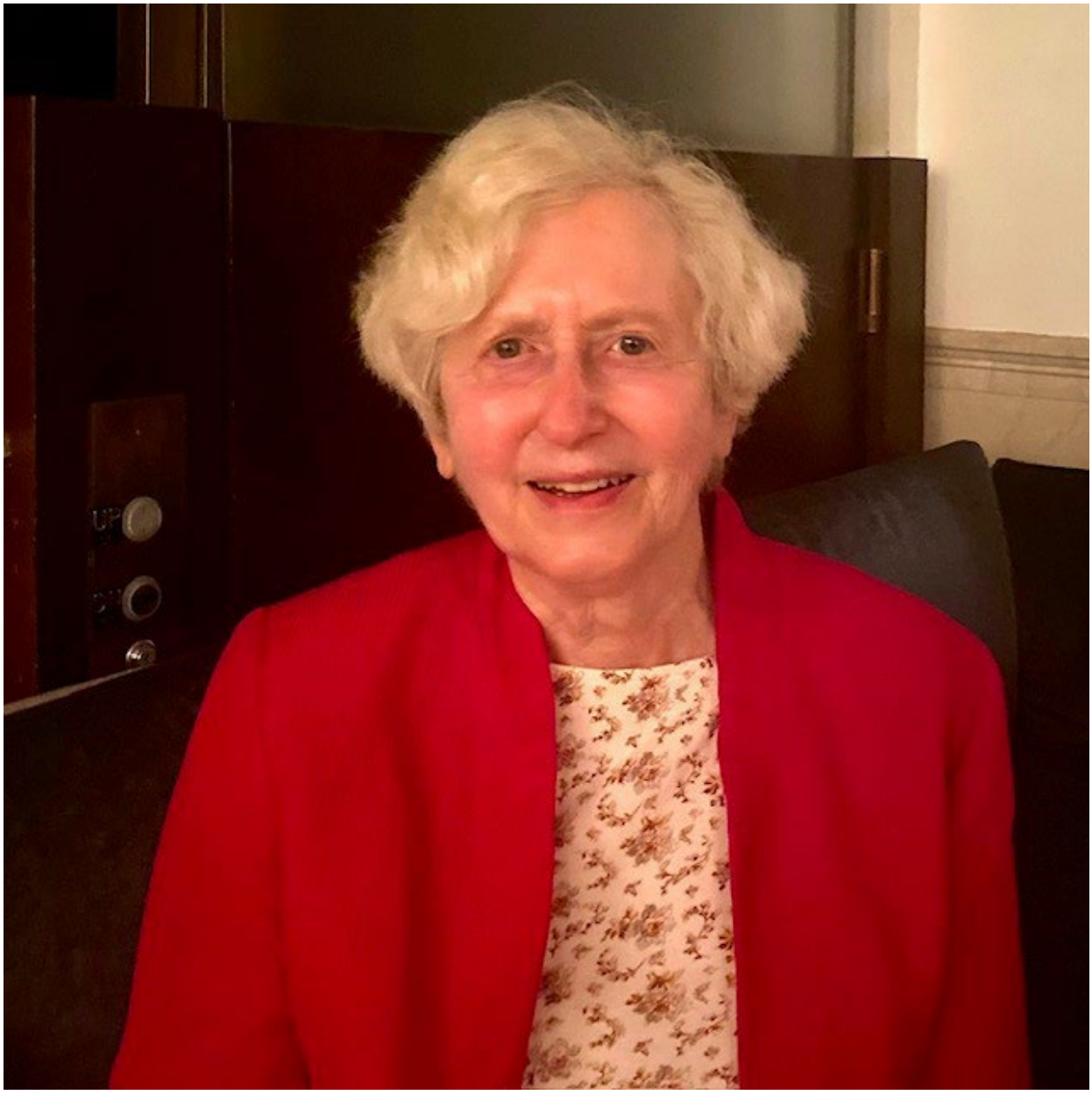
David J. Caruso and Kenneth M. Evans

via Zoom

on

1 and 8 July 2021

(With Subsequent Corrections and Additions)



Courtesy of Maxine Savitz

Maxine Savitz

ACKNOWLEDGMENT

This interview is part of a research project "The President's Scientists: Understanding the Role and Full Impact of the President's Council of Advisors on Science and Technology (PCAST) Through Oral Histories." Funding for the project was provided, in part, by a grant from the National Science Foundation (Grant No. SMA SBE 1854055). Additional support for digital archiving was provided by the Baker Institute Civic Scientist Program, The Richard Lounsbery Foundation, and Humanities Texas, the state affiliate of the National Endowment for the Humanities.

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Maxine Savitz, interview by David J. Caruso and Kenneth M. Evans via Zoom, 1 and 8 July 2021 (Houston and Philadelphia: Rice University's Baker Institute for Public Policy and the Science History Institute, Oral History Transcript # 1123).

RICE UNIVERSITY'S
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Science History Institute
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MAXINE SAVITZ

1937	Born in Baltimore, Maryland, on 13 February

Education

1958	BA, Bryn Mawr College, Chemistry
1961	PhD, Massachusetts Institute of Technology, Organic Chemistry
1992	Executive Program in Management, University of California, Los Angeles

Professional Experience

	University of California Berkeley
1961-1962	Postdoctoral position
	Hunter College
1962-1963	Chemistry Laboratory Instructor
	US Army Laboratory at Fort Belvoir, Virginia
1963-1968	Senior Electrochemist
	Federal City College (now University of the District of Columbia)
1968-1972	Professor of Chemistry
	National Science Foundation
1972-1974	Program Manager, Research Applied to National Needs
	Federal Energy Administration
1974-1975	Director, Building Policy Research Program, Office of Energy Conservation and Environment
	Energy Research and Development Administration
1975-1977	Director of Industrial Conservation
	Department of Energy
1977-1979	Director, Division of Building and Community Systems
1979-1983	Deputy Assistant Secretary for Conservation

	Lighting Research Institute
1983-1985	President
	Garrett Corporation
1985-1987	Assistant to Vice President Engineering
	AlliedSignal Aerospace Corporation (later Honeywell, Inc.)
1987-1999	Director, Garrett Ceramic Components Division
1999-2001	General Manager, Honeywell Technology Partnerships
	National Science Board
1998-2004	Member
	Self-employed
2001-present	Consultant
	National Academy of Engineering
2006-2014	Vice President
	President's Council of Advisors on Science and Technology
2009-2017	Member
2011-2017	Vice Chair
	Obama's President's Council of Advisors on Science and Technology (OPCAST)
2020	Member

Honors

1967	MERDC Commander Award for Scientific Excellence
1975	Engineering News Record for Contribution to the Construction Industry
1979	Engineering News Record for Contribution to the Construction Industry
1980	President's Meritorious Rank Award
1981	DOE Outstanding Service Medal
1992	Elected, National Academy of Engineering
1998	Orton Memorial Lecturer Award, American Ceramic Society
2013	C3E Lifetime Achievement Award
2013	Fellow, American Academy of Arts and Sciences

ABSTRACT

Maxine Savitz was born in 1937 in Baltimore, Maryland. Her parents had both been born in the United States; her father's family was from Ukraine, and her mother's family was from Russia. The oldest of three children, Savitz grew up in Mount Washington and remembers spending lots of time playing outside. She notes that Baltimore was segregated racially and religiously, but Mount Washington was more integrated in terms of religion. The family discussed politics and literature around the dinner table, and there was an expectation that Savitz would go to college. She recalls enjoying math and reading from a young age. In high school, Savitz worked on Adlai E. Stevenson's campaign with her friend, Susan Schwartz. Unlike most of her friends who attended Forest Park High School, Savitz went to Western High School, an all-girls school. She remembers her aunt, Esther Lazarus, serving as a role model for her. When it came time to consider college, Savitz looked at the Seven Sisters and decided on Bryn Mawr College. She knew she wanted to major in math, the sciences, or medicine. As a freshman, she did well in the sciences, though she struggled in composition. Rather than get involved in many formal extracurricular activities, Savitz spent more time interacting with her classmates informally. The gender makeup of the faculty was relatively equally split, and she recalls fondly a husband and wife team in the chemistry department, Ernst and Frances Berliner. She decided on a chemistry major and worked for a Navy lab the summer of her junior year. When Frank Mallory came during Savitz's senior year, he advised her to go to the Massachusetts Institute of Technology (MIT) for graduate school rather than Caltech since the latter had just recently started admitting female students.

Savitz packed up and moved to Boston, Massachusetts. She found an apartment to rent since MIT did not have dorms for women. She had been awarded a TAship, but Arthur C. Cope, the head of the chemistry department, did not want female graduate students TAing so he had them grade papers instead. Savitz discusses the graduate program at MIT, including taking comprehensives and courses. She decided to work in Fred Greene's lab on hypochloride free radical mechanism. Students were guaranteed funding for four years, and Savitz finished in three years. She spent most of her time in the lab, but when she had free time, she played tennis and visited the theater. Shortly after graduating, she moved with her new husband, Alan Savitz, to California where she postdoc'd at the University of California Berkeley for a year. They moved back to the East Coast, and Alan was assigned to Fort Belvoir in Virginia. Savitz got a job in the US Army lab and started working on fuel cell research. There she learned how to become a manager under the guidance of Galen Frysinger. She worked at the lab for five years before taking a position at Federal City College, which she hoped would provide more flexibility when her children were young. After several years, Savitz then took a position at the National Science Foundation and started getting involved in the science policy world. In 1983, she moved to the Federal Energy office and went on loan to the Federal Energy Administration during the embargo time. She then moved to the Energy Research and Development Administration and later the Department of Energy after it was formed in 1977. She talks about interacting with the Environmental Protection Agency and other governmental agencies as well as the states. Savitz left the government in 1983 when she was reassigned to Salt Lake City, a position she chose not to take.

John L. Mason invited her to work for the Garrett Corporation. She would work part-time from the office in DC, but would also visit the office in Los Angeles, California. At the time, Garrett was interested in fuel cells and ceramics. After two years, Savitz and her husband moved to California and settled in Westwood. When Garrett merged with AlliedSignal in 1987, she became head of the ceramics division. She discusses converting some open space in Torrance, California, to a lab and traveling around the country for work. In 1999, AlliedSignal took over Honeywell, including the name, and Savitz became manager of technology partnerships for two years before she retired. Throughout her career, she served on energy studies and government boards. In the late eighties/early nineties, she was appointed to the Secretary of Energy Advisory Board (SEAB). In the mid-nineties, she was appointed to the National Science Board. She talks about developing reports and then being invited to join Barack Obama's PCAST. In 2010, she was appointed co-vice chair, which Savitz notes meant more time on PCAST-related activities. She discusses PCAST's meetings, including their first meeting with Obama when PCAST had a photo op in front of Abraham Lincoln's picture. She details the meeting in March 2010 when she brought some samples for the president. Savitz also mentions reports of interest, including reports on hearing aids and big data technologies. She mentions PCAST's visit to Camp David and reflects on PCAST's focus, noting it did not do anything related to the Department of Defense. She discusses the public perception of some reports, mentions funding for PCAST, and reflects on issues PCAST is uniquely equipped to address. Savitz talks about the importance of diversity on PCAST and believes social science should be better represented. She also thinks younger people should be better represented. She reflects on whether PCAST should be statutory. Savitz concludes the interview by discussing her husband's illness, her role as vice president of the National Academy of Engineering during that time, her service on OPCAST, and the role of women in science.

INTERVIEWERS

David J. Caruso earned a BA in the history of science, medicine, and technology from Johns Hopkins University in 2001 and a PhD in science and technology studies from Cornell University in 2008. Caruso is the director of the Center for Oral History at the Science History Institute, president of Oral History in the Mid-Atlantic Region, and editor for the Oral History Review. In addition to overseeing all oral history research at the Science History Institute, he also holds an annual training institute that focuses on conducting interviews with scientists and engineers, he consults on various oral history projects, like at the San Diego Technology Archives, and is adjunct faculty at the University of Pennsylvania, teaching courses on the history of military medicine and technology and on oral history. His current research interests are the discipline formation of biomedical science in 20th-century America and the organizational structures that have contributed to such formation.

Kenneth M. Evans is a scholar in science and technology policy at Rice University's Baker Institute for Public Policy. He received his B.S. in physics from the University of Virginia and his M.S. and Ph.D. in applied physics from Rice University. His research focuses on the history and organization of the U.S. federal science advisory and policymaking system, with an emphasis on the role of the White House Office of Science and Technology Policy.

ABOUT THIS TRANSCRIPT

This interview was conducted as part of the project, "The President's Scientists" (NSF SMA SBE #1854055). The goal of the project is to improve and expand existing knowledge of the role of the President's Council of Advisors on Science and Technology (PCAST), and its impact on U.S. federal policy. This project examines the working nature and policy impact of the council by compiling and analyzing presidential archives and university collections of former presidential science advisors, including developing a digital archive of this material (https://whitehousescientists.rice.edu/); and conducting oral history interviews of former PCAST members to determine their perspectives on PCAST, as well as their personal histories before and after their tenure on the council.

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INTERVIEWEE: **Maxine Savitz**

INTERVIEWERS: **David J. Caruso**
Kenneth M. Evans

LOCATION: **via Zoom**

DATE: **1 July 2021**

CARUSO: [. . .] I'm just going to do a quick introduction and then get into the questions. I'm David [J.] Caruso. I'm here with Kenny [Kenneth M.] Evans and Dr. Maxine Savitz. We're conducting an oral history interview as part of the PCAST project, an NSF [National Science Foundation] grant between Rice University and the Science History Institute. Today is July 1, 2021, and we're conducting this interview via Zoom. Thank you again for taking the time to speak with us, and, as I mentioned in my email, we, kind of, want to start at the very beginning. So I know you were born in 1937 in Baltimore, Maryland. I want to know a little bit about your family structure. Are you an only child? Do you have siblings? Can you tell me a little bit about your parents?

SAVITZ: I was one of three children and the oldest. I have a brother two years younger and a sister eleven years younger. I lived in Baltimore all my [childhood] from being born [. . .] through high school graduation. My father was in the wholesale grocery business; he had been the only one of his family born in the US [United States of America]. The rest had [. . .] come from Kiev, [Ukraine].[1] It was interesting in that time, he graduated from high school at age sixteen, and you didn't have to go to college to go to law school, so he went to law school at night and finished at nineteen. [He] couldn't take the bar [at nineteen] and ended up going in the family business. [. . .] My mother was also born in the US in Chester, Pennsylvania, but her family had come from Saint Petersburg, [Russia]. She went to Goucher College, and they were married in 1935.

CARUSO: All right. Just as you're speaking, I'm taking some notes, so if I'm a little slow, it's just because I'm typing something on the computer. You were born in '37. One of the major events clearly in the years to come was the start of the Second World War. Were any of your family members drafted, or did they enlist for that war once the US became involved?

SAVITZ: No, no, [. . .] my father was too old to be in and had poor eyesight. My mother had a brother who was in the service, but that was the only closest family member that I know of.

[1] In 1918, the Ukrainian People's Republic declared independence from Soviet Russia. See Andrij Makuch, et. al., "Ukraine," Encyclopedia Britannica, accessed August 9, 2023, https://www.britannica.com/place/Ukraine/World-War-I-and-the-struggle-for-independence.

CARUSO: So you're starting . . . . I assume you started school in 1942, 1943—kindergarten, first grade . . . in that time frame?

SAVITZ: [Yes], I started school at that point and [. . .] in those days, if you were born [. . .] after January 1, you entered in February [as opposed] to starting in September the following year, so you were considered "a mid-year." In the third grade, which was in '45, which was the end of the war, I took a summer program at Hopkins [Johns Hopkins University] and skipped the other half of the third grade to get caught up to be in the fourth grade. [I] went all through [elementary public school]. Then [I] had junior high, which was seventh through ninth, then high school.

CARUSO: What area of Baltimore did you grow up in?

SAVTIZ: I grew up in Northwest area, an area called Mount Washington. We were two blocks from Pimlico Racetrack, and the house is still there. I have a high school friend that I saw three years ago, who lives three houses away, and it's interesting to go by and see the old house. I had wanted to stop in. My parents [. . .] bought the house in 1940, sold it in '67, and my mother and father moved to apartment then my mother to a retirement home. I wanted to stop in and see [the home, but] my children did not think that was a good idea. [laughter]

CARUSO: Can you tell me what life was like in your neighborhood in those early years, your childhood years? Were you, you know, after school out and about on the street playing games? Were you exploring the neighborhood on a bike? What was life like living in . . . ?

SAVITZ: I mean, it was very open and free, and I look at how different it is now for my grandchildren, who have to [have arranged] playdates and can't just go out. You would get home [after school], and you'd get on a bike ride . . . a bike and go ride with friends [. . .] and you just knew you **<T: 05 min>** had to be home in time for dinner. [laughter] People were watched. I [. . .] went away to camp at age nine because of polio; everybody got sent out of the city at that time. [I] started playing tennis, which I then became an avid tennis player, which I did up until about ten or fifteen years ago. I had a very good friend who lived four blocks away named Susan Schwartz and [in the summers we would] go play tennis in the park called Druid Hill Park—which is the northwest section—and ride our bikes down there and play on their clay courts. And [then] come home. [. . .] It was just a very open [and safe]. You could do what you want to do. But Baltimore is very segregated city; it is segregated . . . it was segregated both racially . . . . I mean, we did not have integrated schools till the *Brown* [*Brown v. Board of Education*] decision my senior year in high school, and it was also segregated religion wise. [. . .] East of Charles Street was the Protestant and Catholic community; west was the Jewish

community. There's a book by an ex-*Sun* paper writer called *Not in My Neighborhood*, which goes through three different segments of Baltimore's timeframe and describes very well the period from the forties and the sixties.[2] [. . .] Recently [someone] asked me [if I had] any African American friends growing up? Well, the only African Americans you came in contact with was the household help, and [Baltimore] was just . . . it was a segregated city. [. . .] Mount Washington was a more integrated [area of the] city regarding [. . .] religions. There were [Catholics, Protestants, and Jews living there.] There were all three . . . all religions there, but not [any African Americans].

CARUSO: So is your family religious?

SAVTIZ: [. . .] My father had come from an Orthodox family; they belonged to a Reform synagogue, and I was not a very good student at [religious school] . . . so it was a waste of time. But anyhow that was . . . it was not taught very well.

CARUSO: You mentioned that your father worked for the family business—right?—even though he did the law classes, he didn't get the bar, he worked for the family business. Did your mother work when you were young, or was she staying at home with the children?

SAVTIZ: She stayed at home with the children and did a lot of volunteer work; she actually helped start the Meals on Wheels program in Baltimore during . . . . I guess, the late forties, early fifties and was active in organizations.

CARUSO: You mentioned that she went to Goucher College. I may have missed it—what degree did she receive from there?

SAVTIZ: It was a bachelor's degree. Goucher College at that point was an all-women's school in the city, and now it's . . . became coed I guess [more than] twenty years ago; it's out in Towson, [Maryland].

CARUSO: Was there a discipline that she majored in?

SAVITZ: I'm not sure. She came to Baltimore to be . . . to also study at the Peabody Conservatory because she was interested in [. . .] piano and played piano, but I'm not sure. She did not major in science; that came from my father's family.

[2] Antero Pietila, *Not My Neighborhood: How Bigotry Shaped a Great American City* (Chicago: Ivan R. Dee, 2010).

CARUSO: Okay. So, can you tell me a little bit about what it was like for your family when you were home at mealtimes? Were you—I don't know—chatting about segregation? Were you chatting about the war? Did your parents discuss political issues more broadly, or what was your home life like when you weren't out playing with your friends?

SAVITZ: No, I mean, one of the things that was very important we all had dinner together all the time which I think it is very, very important . . . my sister [Cecile Lupien] was eleven years younger, so it was really my brother [Harrison Lazarus] and my parents. My father, particularly, was always interested in politics and a [Franklin D.] Roosevelt Democrat, liberal. We would discuss that. He also was an [avid] reader and so would, you know, go to the Enoch Pratt Library regularly with books and I [would] often go with him. There was a children's part. And, you know, we would discuss literature and **<T: 10 min>** I'm sure the war was discussed. I just don't remember; I was too young. I mean, I remember rationing and what you could have, and I remember a sticker on the car, but I don't remember how much we discussed [it], and as far as I know, friends of theirs who did go into service all survived so it was . . . . But very much [of the] discussion, you know, was . . . and also, as always, what did we do at school or what did we learn—it was, sort of, a typical family discussion, but there had always been an interest in politics.

CARUSO: And what about your parents' interest in your education. You had two that went to college and graduated from college. Was there an expectation early on that you were going to be doing the same—that you're going to be attending a college, getting a degree in some sort of area of specialization?

SAVITZ: Yeah, I mean, [. . .] education was very important; it was a really a real value, and there was never any question that we would all go to college. We were very fortunate that, you know, my parents also made provisions so that we could afford to go to college and, sort of, the college of our choice. I had . . . . Goucher College offered a dozen full scholarships to people who graduated from Baltimore high schools, and it was just [based on class] ranks and I—again, it's an all-women's school—and I was given [a full scholarship], but when . . . . I had also gotten into Bryn Mawr [College and I] realized it was a better school and going away and they were willing for me to forgo that merit scholarship and you know go to Bryn Mawr. So it was really highly valued.

CARUSO: So as a young child, did you have any specific interests academically? Were you . . . did you have any sort of fascination with Roman history? Did you like botany, or were you just a general interest sort of kid?

SAVITZ: Well, I was a general interest, but I was very good at arithmetic called, you know . . . and math at that point. They learned that I needed to wear glasses when I was in second grade because I copied the numbers wrong and then got the wrong answer as opposed to . . . it was very easy for me, but I was always interested. I was always a reader, but from the typical things that girls read—the Bobbsey Twins—going to Russian literature that we . . . of course, my friend Susan and I were in high school—she went to a different high school than I—we read the Russian authors when one was young as opposed to waiting and not having time. So, you know, it was . . . and then also the other thing which did carry through and does still today is we got at home a morning and evening newspaper—the *Baltimore Sun* and there was an *Evening Sun*—which one read, you know, early on . . . . I mean, read from an early age.

CARUSO: So unless there are other items that you'd like to talk about in terms of early schooling, I think I want to shift to talking a little bit more about your time in high school. Does that sound like an okay way to go?

SAVITZ: Yeah, the only thing that was a difference in . . . . Baltimore had a school called [School #] 49 —public school—where you could do three years of junior high in two. And I don't even know . . . . I don't know if it's still there or not. My father—and you had to be recommended for it—my father had [gone there, and] he had gone all through the public schools, which is why he graduated so early. I was invited to do that, but my parents said no because I had already skipped a half a grade, and I think that was the right decision at a time, but many of my friends were going so that's the only incident. But my junior high school had a very, you know, it was again a segregated school, but the classmates . . . . Philip [M.] Glass, for example, was in my high school—my junior high school—classes, and he left after ninth grade to go to University of Chicago to their program. So . . . we had a priest teach us Latin in ninth grade. He was an ex-priest, and we would communicate in Latin and did a Latin newspaper. I mean, there were sort of these things come to mind . . . there were interesting activities—made school interesting. We also . . . one took the bus to school—public transportation. And I did take piano lessons at Peabody by streetcar. **<T: 15 min>**

CARUSO: I was going to ask given your mother's interest in music, was that something that she wanted her children to undertake as well?

SAVITZ: Yes, yes, and I did through elementary school, and, as I said, you could take the streetcar from where we lived down to where the Peabody was [. . .]—I go to symphony all the time—but I do not have a good ear for remembering or, kind of, telling the difference between G major and B minor. And you had to after four years at the Peabody, you had to take ear training, and that was the end of it. I'm sometimes sorry that I gave it up early just for being able to play it.

CARUSO: Now I know you mentioned that there were some discussions of politics, you don't necessarily remember everything. By the time you were thirteen years old, that's, kind of, the start of McCarthyism in the United States. Do you have any recollections of discussions around, you know, the Communist threat and those sorts of issues at that period of time?

SAVITZ: Yes, I mean, there was discussion about that, and my . . . . I know my father never was interested in joining the party, but he was interested in knowing . . . when [Henry A.] Wallace, before McCarthy, came to talk, he would go. I don't know if any of their friends who were, you know, on the list, they didn't [say] . . . . I mean, [Johns] Hopkins—it was clear there were probably professors there, but they were not friends . . . so we talked about it. My first political remembrance is going with my friend Susan Schwartz in '52 to work on the [Adlai E.] Stevenson campaign. Also, when I was there, [Thomas] D'Alesandro was mayor when I was growing up—D'Alesandro's house and Nancy Pelosi's, they're still there in Little Italy. We didn't hear much; she's a couple years younger and always went to Catholic school.

CARUSO: So why at the age of fifteen, did you decide to work on a political campaign?

SAVITZ: I was just . . . . I was interested in how the country was run, and I liked Stevenson, and my friend [. . .]—a very good friend of mine—and I were energized to do it, and my parents had no [objections]. . . . I mean, I didn't have to ask for permission can I go down and stuff envelopes—things like that. But it was something, you know, as . . . . I can say with my personal involvement, I remember more discussion. My parents also knew our congressman either late forties, early fifties—Sam [Samuel N.] Friedel. So there had always been an [active interest]; my father had always—my father particularly—had always had a real interest in government but not being part of it. That was a different thing.

CARUSO: Okay. Can you tell me a little bit about your high school experiences, what classes were like there? Now, so you know it's a little difficult doing oral history work, you know where people wind up and what they wind up studying in college and so I don't want to assume that you had an interest in science in high school, but I do want to ask if there were . . . if, at that point in your life, you had started to think about what you might want to do when going to college, what you might want to study. So I just want to hear a little bit more about the high school experiences and if there was anything there that was formative for your decision eventually pursue chemistry.

SAVITZ: Yeah, I mean, as I said, I was good in math, and then when starting sciences, you know . . . . Baltimore had two all-male high schools and two—public schools—and two female high schools. Now they [are] co-ed. Just as an aside, the one male high school—Baltimore Polytechnic Institute—which my brother went to was very much science-oriented but did not allow women; it didn't. [. . .] Most of my friends were going to Forest Park [High School]. My

parents thought that Western [High School], which was the all-girls, would be a better environment. Don't ask me why. I mean, you know, you have children at fourteen have these arguments and the family wins. Well, it ended up being fine. It's interesting—the teachers there were predominantly women as you **<T: 20 min>** would expect, and most of them had graduated from Goucher. I mean and again, it was not a . . . it was also much more mixed religious-wise, but not racially at all. My senior year, I was editor of the newspaper was when the *Brown* decision came down, and I wrote an editorial in favor of it, and the advisor to the newspaper was not happy, but that's society . . . . But I started off taking [courses in] math and chemistry and then physics, biology and then the advanced chemistry and the math all the way through and liked it. And I don't know whether—and I was trying to think—was I one point thinking of wanting to be a doctor, but it was very oriented to the sciences. Then when I entered Bryn Mawr, I wasn't sure whether I was going to be a math major or chemistry major. [. . .] I was thinking less about medical school and more about staying in the sciences. [. . .] They were taught very well. I also had four years of Latin; I mean, it was a conditional type of thing. And the history program, it was [. . .] and you were back even in the . . . one difference—even back in elementary school—Baltimore had a track system so if there were an elementary school, there were ninety of us in first grade, there were three sections of first grade all based on ability. In high school, that had changed . . . because they did have advanced placement courses and that, sort of, did it. But the history and all and required English courses were not.

CARUSO: At the time, did you notice any difference in the . . . . I'm trying to think of how to phrase the question.

SAVITZ: In the fifties?

CARUSO: Well, in middle school you were going to . . . you were with both boys and girls, right? It was both genders. You switch to an all-girls school in high school with predominantly female teachers. Given what we know about—historically about—the sexism that usually happened in classes with girls being pushed towards certain tracks of interest and boys—like you mentioned the Polytechnic was a science-oriented school for boys. Did you notice a difference in the way that you were being treated or acknowledged in the classroom once you had moved to an all-female school for high school? Like was there a difference in the education that you were receiving compared to being in a middle school that was both genders?

SAVITZ: No, I mean, I think, and it goes into being the advantage of an all-women's college too which is the thing that you . . . and I didn't . . . and in talking to my friends who went to Forest Park, which was a co-ed school, I don't remember any of us ever thinking about we couldn't speak out and, you know, and couldn't be the leaders in the areas or be discouraged from taking science . . . my junior high school friends—just in thinking back—I was the only one who went into science, but it was, you know, an environment . . . . The other thing is that it was a school—Western—didn't have 95 percent of the people go on to college. There was also

a mix of people who did not go to college right away, who went to, sort of, more the vocational, so as opposed to Forest Park where 90 percent went to college, but that didn't discourage any of us who were on a track to go to college, either by the other students we were with or the faculty, so we were really encouraged, you know, to do things. I mean, we did [. . .] run all the things, but there was a resource issue like we couldn't play hockey—regular hockey—but we could play soccer. [laughter] But that was a resource issue of the times.

CARUSO: And for your high school science education, this is taking up place in, I mean, [the] 1950s, so this is post-war. The United States seemed to be taking greater interest in science and engineering education. Did you notice any differences in how you were being taught or what you were being taught in high school in this **<T: 25 min>** new vision of what American science should be like? I'm thinking of Vannevar Bush's *Science: The Endless Frontier* that he wrote in . . .[3]

SAVITZ: Nineteen fifty.

CARUSO: Yeah, and so like you know this is also the era where we start seeing the rise of the . . . what becomes the NSF, things like that, right? There's an investment in science in the US, and I'm wondering if you noticed anything as a high school student in terms of that new investment in science and science education.

SAVITZ: No, I didn't notice it in high school, but in college, it was very clear because the whole—we're jumping ahead—but it was the class of '58 and '57 with Sputnik, and I mean, this is . . . . I'm sure . . . whether that was a feature that drove me to really do science and not medicine was, you know, you were encouraged to go on, and there [were] lots of resources. But the high school teachers had been [. . .] The nice thing was the chemistry courses were taught by people who had majored in chemistry and physics by people who knew physics and the math so that you [. . .] had well-trained teachers who you could learn from, and we were well- prepared. [When you] had to go take the AP tests, one scored [high] enough, [but that] didn't get advanced placement when you went to these colleges, but the first year of courses—you know, first semester—were not difficult in those areas, more difficult in some others, so I don't remember in the early fifties the push on science. It could be because [. . .] my family's friends were not particularly science people, though my father's youngest sister—he was the youngest—but the one . . . had been a math major and graduating from Goucher in 1920, but the others . . . which just to bring one other thing to get to, which plays upon who were mentors. My father had a sister, Esther Lazarus, who was the first woman to head the Department of Public Welfare in a major city, and so in the forties and fifties, she did that, and she took the train from—before she was a social worker, graduated in the thirties—and she took the train from

[3] Vannevar Bush, *Science: The Endless Frontier: A Report to the President on a Program for Postwar Scientific Research* (Washington, DC: United States Government Printing Office, 1945), accessed September 1, 2023, https://www nsf.gov/od/lpa/nsf50/vbush1945.htm.

Baltimore to Philadelphia [. . .] regularly to get a master's in social work at Penn [University of Pennsylvania]. [. . .] She married, had no children, kept her maiden name. I mean, she was clearly a role model for me. My father's oldest sister who had to leave high school at fourteen then run . . . helped run the family business ended up running the Pabst Beer distributions for the city of . . . for the state of Maryland until she was eighty-five when Pabst Beer was taken over, they said, "Time for you to leave." She had one daughter. Her husband manufactured coats for people. Anyhow, I mean, so there was in my family professional people who, you know, there were clearly . . . particularly Esther was a role model for going on in a field, though it wasn't science per se.

CARUSO: You mentioned Goucher, you mentioned Bryn Mawr. Were there other colleges that you were interested in?

SAVITZ: Well, I mean there was [. . .] Wellesley [College] was another. [. . .] I had [also] looked at Swarthmore [College]—I don't know why—at that point maybe Bryn Mawr was easier to get to as it was in Philadelphia. [. . .] One looked at the women schools; I mean, at least the Seven Sisters and adding in Pembroke, and all really were—in those days before the Ivies and all went co-ed—were the places of choice in a sense for people and there was a different environment than I see having been at a women's college, women's high school. I don't think [there is] much difference versus [in] the women graduating from that are co-ed how well are they doing [professionally] relative to when there were single-sex schools. [I would be interested in a study on how women do now versus those from women's colleges in the fifties and sixties.]

CARUSO: And so it sounds like you wanted to stay in general northeast corridor? **<T: 30 min>**

SAVITZ: Well, my family wanted me to stay in the general northeast corridor. We can get to graduate school later with . . . about the pressure there even though I was fully funded. But so, you know . . . and Bryn Mawr was closer to Baltimore than Boston, [Massachusetts], and one could easily take the train. [. . .] There was a person I knew from [Baltimore], from my high school—at least one person went to Bryn Mawr every year I was there—that they had really good sciences. [. . .] It and Mount Holyoke of the Seven Sisters had the best sciences at the time.

CARUSO: So it sounds like it was a relatively simple decision for you to go to Bryn Mawr?

SAVITZ: Yeah, I mean.

CARUSO: And was there anyone else from your high school that decided to go? You mentioned there was always one person each year.

SAVITZ: Ahead of me, there was a person—not in my class—a person ahead of me, a person who graduated from Bryn Mawr in ’57, one in ’56, and one in ’55. It was like Bryn Mawr took one person. Several people went to Goucher—partly financial. [. . .] My friend Susan went to Vassar [College], another friend went to Smith [College], another did go to Wellesley, so we had a smattering to . . . as I recall—and I was trying to think of this—more of them went to Goucher if they didn’t go to the Seven Sisters than went to University of Maryland. And that has changed now.

CARUSO: So you started at Bryn Mawr in ’54 or ’55?

SAVITZ: September of ’54.

CARUSO: Fifty-four, okay. Was this the first time that you were away from home for a long period of time?

SAVITZ: Aside from going to summer camp for years—various camps—yes, so I mean I had . . . but yes, it was the first time.

CARUSO: Okay, you mentioned that you didn’t necessarily know what you wanted to major in when you were going to college, right? You were thinking mathematics, maybe a science, you weren’t necessarily sure. Did you have a sense, though, of generally what you might want to be doing as a career post-college? Like did you have . . . you know, nowadays students are always expected to apply knowing exactly what it is that like, “Oh, I’m going to be an engineer; I’m going to be this; I’m going to be that.” Did you have a sense of what career it is you wanted to pursue post-college when entering college?

SAVITZ: I knew that I wanted to do something in the sciences or math or medicine. I remember the dean saying to us a third of the people knew what they wanted to do when they enter, a third knew when they had [to choose] a major, and a third finally knew when they left and so, and that was the thing. What was interesting—the difference between coming from a public school at that point versus from a private or boarding school showed a real difference at least in my freshman year—not in the sciences, because I was well-prepared, in fact. There were two students who had gone to Windsor High School, which was all-girls in Boston and one’s father was a well-known surgeon, and the other was a well-known [internal medicine physician]. . . . I would help tutor them in chemistry. [. . .] I just could not write [well], and

everybody had to take a freshmen composition course and even though I had been editor of the paper. [. . .] In freshmen composition—and I'm very much in favor of this—nobody could test out of it, but it was connected with a period of [literature so you could focus on] American literature, British, [etc.] Critical thinking [was expected].

Every Monday morning, you have a [five-hundred-word] paper due the first semester—second semester a thousand word. You learned to write. Well, I really struggled. The dean said to me, "Well, why? You're just off track; you're way high in the sciences and math and here you are struggling." It was a real difference than just the critical thinking. And also, I had never had any exams, except for the college boards. I mean, we had hour tests [in high schools, not] two or three-hour type-tests. [. . .] Though our class was the first one [at Bryn Mawr] to have more than 50 percent from public school. I mean, that was the difference in the college mix at that time, but [. . .] it all works out. **<T: 35 min>** You know, one has learned [. . .] to write scientifically [and to] correct how people write, which I think is a very important skill. MIT [Massachusetts Institute of Technology] finally a couple years . . . about ten years put in a major writing course; engineers have to write proposals; they have to write papers. I didn't check your background, so I . . . [laughter]

CARUSO: That is something students that I teach—I do courses at Penn occasionally—and my major focus is no matter what you're going to do, you need to be able to speak and you need to be able to write, so those are critical things for any type of profession I could go into. For Bryn Mawr, what was the size of your freshman class? How many students did they admit?

SAVITZ: We had the largest freshman class—one hundred and fifty. The school was about six hundred students, and they also—unlike the other schools—Bryn Mawr always had a PhD program, and that was co-ed, actually. That allowed the faculty to do research [at] a different level than just having—they had a senior honors program—but [. . .] they had full-scale masters and PhD programs. Also, at Bryn Mawr, if you wanted and the school didn't have [the course], you could take courses at Penn, at Haverford [College], or Swarthmore.

CARUSO: Okay. So you start your freshman year, sciences and math pretty simple; writing is a new thing that you're learning to become better at. What was campus like for you in that freshman year? Were you just focused on your classes? You'd mentioned tennis—right?—an interest in tennis. Was there a tennis team at Bryn Mawr that you joined? Were their extracurricular activities that you started to become interested in or engaged in when you became a freshman at the university?

SAVITZ: It's interesting. I hadn't even thought of it. [. . .] I was on tennis team in high school, but not at Bryn Mawr but took it for my sport. I also could swim [well. They wanted me to go out for the team, but] I didn't go out for the swimming team. They just took [too much] time because we had to be in a laboratory—less the freshman year than other years but I played

tennis just as a recreational thing. I was in a dorm called Rhodes North and South of a hundred and twenty students, and it's all four classes and you stayed in the same dorm for all four years, which I think had advantages—now they all move around. You really got to know people in the upper classes [in addition to our class]. For whatever reason, [. . .] forty members of our class were in Rhodes North and South and on my corridor, there were sixteen girls—eight of us were freshmen. We drove the three seniors crazy. [. . .] We had quiet hours, but [from] 10:00 to 10:30 [were] noisy hours, but [they] were just overwhelmed in numbers. You would have these philosophical discussion and things like that. [. . .] People from all different backgrounds [. . .] so I was really very fortunate, and I'm still very friendly with seven or eight of these people that my oldest grandson was very impressed that I've known these people over sixty years, and we get together now by Zoom once a month. There are two of us on the West Coast, they would come here, [. . .] and I would see them when I [went] east. [. . .] I don't remember being active in extracurricular activities in the same way that I had been in high school. I didn't write for the newspaper or try to.

I wasn't one—because I couldn't sing—who was going to be in the class plays. They did have a government club—it was not in debating [group]. [. . .] I ended up being in my junior year [being] the treasurer for all undergraduate activities. [. . .] I just don't remember any kind of extracurriculars. [. . .] The labs took a lot of time—and we just spent . . . you spent a lot of time talking [when not in class] and, I mean, just interacting with [other classmates]. **<T: 40 min>** [. . .] I also am very much in favor of [a] liberal arts [undergraduate education] because [. . .] one, your curriculum is [diverse], but you also interact with people with different ideas and different disciplines. [. . .] I didn't ever smoke [and] you couldn't smoke in your rooms, but they had smoker rooms where people could go play bridge and smoke and talk. One of my best friends from freshman year on, until she passed away three years ago, was a smoker and a bridge player, and I played some bridge, and we would go in and [play bridge]. There was more time of interacting with people that I remember than [any] formal [. . .] than undergraduate activities.

CARUSO: Another question about your entering class. Obviously, *Brown v. Board* decision happened in your senior year of high school. Was Bryn Mawr . . . was it . . . was there racial diversity at the college at the time, or were you going into a situation where it was predominantly white women in college attending classes?

SAVITZ: I mean, it was racially diverse from a point of view that African Americans had been at the school since the teens, but there were a handful. We had did have more foreign students than [other colleges. There were] two people from African countries. They weren't all [. . .] from Europe. [There were also] some Asians. And in fact, there have been some recent activities [regarding their past racial history]. There was a president, M. Carey Thomas, and the library was named after her, and she really built up the school in the thirties and forties, [but she] had been known to make racial and anti-Semitic remarks, so the library name came off. [During the fifties], there was very little racial [diversity]. [. . .] It was just a matter of the numbers. I don't know whether they could have [recruited more]. [. . .] I mean, Howard University was a major

draw for very bright women. Shirley Ann Jackson from Washington, [DC], was trying to go to Howard, and somebody said, "No, go to MIT." She was the first African American physics major, undergraduate and graduate. That's the late sixties; [. . .] the school didn't do recruiting for [diversity]. [. . .] I don't know how much recruiting the school did [in the fifties] versus they did much more active recruiting—or at least I became part of it—in the seventies and eighties, and I think [that there was competition] for where women were going to school changed.

CARUSO: And what was the teacher makeup in terms of gender at Bryn Mawr? Were you receiving education from mostly women like you had in high school or was it an equal split between women and men? Was it more men? What was the . . . ?

SAVITZ: No, it was, sort of, equally distributed [in] the sciences [. . .] [and] in the humanities too. I mean, the interesting thing—the head of the chemistry department, which was part of the reason I majored in chemistry, Ernst Berliner had left Germany, got his PhD at Harvard [University], and was head of the department and married [. . .] a woman who got a PhD [in chemistry] at Bryn Mawr, Frances [Jean Berliner]. [Dr. Ernest] Berliner [. . .] taught the first semester of the freshman chemistry course and his wife taught the second. [. . .] He was recruiting [majors]. He would come in the laboratory. We had teaching assistants who were graduate students, and he would say, "Well, you know what are you going to major in, and what are you going to do?" He would [. . .] really [recruit] us. I mean, it was very . . . it was interesting to see that that makeup. Frances taught the second [semester]. He taught organic, but the physical [chemistry professor was a male]. [. . .] Two out of the five [members of the department] were women. And Bryn Mawr had male presidents in addition to women. When I was there, Katharine [Elizabeth] McBride was [president] from the early nineteen forties till the sixties. She made a habit of looking at the freshman class [picture book] and first day on campus she [would know] your **<T: 45 min>** [name if you bumped into her on the path]. [. . .] Education was important, and also the school really encouraged people to go on into careers, which was different than some of the other schools, not just in science, but in general.

CARUSO: So, you mentioned that in terms of having an all-female education in high school that wasn't that critical but that having one in college was, right?

SAVITZ: At that time.

CARUSO: At that time. Can you tell me what it was about have . . . going to an all-female college that was beneficial?

SAVITZ: Well, it was [. . .] One, it was liberal arts and, two, it was small. So there is a [. . .] very low [. . .] faculty-student ratio. [. . .] You weren't in big [lecture] classes. The biggest class

was freshman chemistry that had sixty people because everybody had to take a year of science. And so you had freshman and you had people [taking their required] year of science, people going to medical school, but there weren't [. . .] large classes. And the faculty knew you, and you were taught by faculty, not by graduate students. You had a graduate student in [the laboratory] as a TA, [. . .] but, as I said, the faculty members were there and got to know you. That was true in the humanities too. Even though in the humanities [where there was] less contact because you came three days [one hour of a specific class a day]. You [may] see your professor or not see your professor [outside of the class]. They outreached to students. [. . .] You couldn't goof off. There was [. . .] little attrition because [. . .] people who [were] selected to come knew that it was going to be a rigorous education.

CARUSO: You mentioned that Professor Berliner went through classes, went through the chemistry lab asking people, "What are you going to major in?" An advocate for chemistry. Is that when . . . so is that . . . is your freshman year when you decided that you wanted to become a chemistry major, or is it later in your time at Bryn Mawr?

SAVITZ: [. . .] I mean, I did lean towards that, but my second year I continued on with math and with the chemistry and decided I liked the lab work. It was just [more hands on] as opposed to more of a theoretical type of thing. And it was [. . .] the way biology was taught at that time and botany and skinning cats [in the lab]. I had three friends who were biology majors and [periodically] a cat skin would arrive [in my room]. [Chemistry was not] memorizing [as was] botany [but was] understanding mechanisms. After my second year at Bryn Mawr, I was able to work in the laboratories during the summer so that I got some exposure to what it was like outside of the school environment.

CARUSO: So when you decided to become a chemistry major, did you have a sense of what a career in chemistry . . . what it meant to have a career in chemistry? Like did you . . . were you thinking to yourself, "I'm going to get a degree, I'm going to go teach chemistry"? Did think to yourself, "I'm going to get a degree in chemistry, and I'm going to go work for a company"? Like did you have a sense of what it meant . . . what having that degree would allow you to do in terms of career opportunities?

SAVITZ: The sense that one has [. . .] when you talk to graduate students often as we try to recruit them in industry to be interns, you're going to emulate what you've seen and you want to go on and you're going to get an advanced degree, and then become a professor. I mean, [. . .] industry just wasn't in my line of sight at that point. I knew about industry because I knew about DuPont, which is [in Delaware and close to Bryn Mawr]. And even more so [. . .] after I graduated **<T: 50 min>** and the person I did my honors with was [a man who] had just gotten his PhD at Caltech [California Institute of Technology], had five children. [. . .] My [senior] year was his first year of teaching. Frank Mallory had to earn some money, so he went and worked for DuPont for the summer [after I graduated]. I was able [to stay and] did research in

his lab. So I got to know something more about industry. But industry was not . . . or government was not in my mind; it was, you know, what you knew, and I didn't know anybody [working in industry]. I had family members or family friends or contemporaries of mine who [later] went on to work in industry. [. . .] Baltimore [had some major industries: steel and chemical.] It was really, "I'm going to go get a PhD and then I'm going to teach." And nobody discouraged [. . .] you and [said], "Keep an open mind."

CARUSO: Yeah, I mean, I was also wondering if you were receiving any specific advice from . . . you had an advisor at Bryn Mawr?

SAVITZ: No, it wasn't . . . not really. Once you choose your major, somebody in the chemistry department, it was a pretty set curriculum because of those courses, but then you have your other . . . the non-science courses [which] were your own choice. [. . .] There was a dean that we could go, but most of us it was much more of our thinking about the non-requirement courses [than] what we wanted to do. Or if you had an issue, you could of course talk to [the Dean or Dr. Berliner]. They didn't have what they now have, [such as] summer internships at industry for college students. That didn't exist and—or it didn't exist at a women's school. You know, I have not compared it to MIT—well, MIT would still allow women but very few [and] did they have people after their freshman [. . .] years go intern? [I don't know.] Now they do. I would hire them [. . .] for the summer—[come and do a] real project. Often, we would hire them when they graduated, but it was just not something that was done at the time though you could work. [. . .] I worked for a Navy laboratory [the summer of my junior year]. It was in Annapolis, [Maryland]. So I did find [a job], and the school must have helped me find the job. I just can't remember how I got that job. But that has all changed [now and] much for the better.

CARUSO: So I was wondering, in order to learn about careers when I've spoken to other scientists, they've mentioned having mentors in college—right?—people who . . . and it wasn't necessarily a formal system, but like you, individuals worked in people's labs and so interacting with a professor doing independent research, they started to pick up information about what chemistry was like post-college. So I was just wondering if you had had any of those sorts of experiences where some, sort of, professor was—I don't want to say looking out for you—but like providing advice to you about how to pursue chemistry as a future career while you were an undergraduate?

SAVITZ: Well, Berliner was one who very actively pursued . . . that you are going to continue [to graduate school]. We had ten chemistry majors out of a class of one hundred forty [students]. [. . .] Half went to medical school—he would, sort of, joke with them, "Why do you want to go to medical school? I mean, that's not really being a chemist." He was [helpful]. [. . .] My senior year when Frank Mallory came, he was the one who would really encourage and keep pushing [me] to continue with the sciences, not to stop though some people did stop [. . .] after graduation and took jobs when they got married. Others got masters. [. . .] There [was a large

number of my classmates] to go to medical school. [. . .] Two went to Harvard Medical School, [and there were only] six women there. One was a **<T: 55 min>** chemistry major; one was a philosophy major. [laughter] It was informal, in reality, then. [. . .] Since I was [a student of Mallory's] first year of teaching and I was his first honor student he gave [me a lot of] advice about graduate school, but we didn't discuss what [. . .] you do after graduate school.

CARUSO: What did he tell you about graduate school? Like what . . .

SAVITZ: Well, so . . . pardon?

CARUSO: What advice was he giving about graduate school?

SAVITZ: Well, so I was thinking of the graduate schools; I was thinking, MIT was one that I knew people [from Bryn Mawr] had gone. He had just graduated Caltech and had [. . .] done it in three years. [. . .] I thought, "Well, now's the chance to go to California." They had just started admitting women because they hired from MIT John [D.] Roberts, who said he wouldn't come if he couldn't bring his female graduate students. So they had not had any female graduate students till the fifties and then no undergraduates till the seventies whereas MIT from the beginning forgot to leave women out of the charter . . . that they couldn't come, so they had a few [women]. [. . .] One of the first women students was a chemist. Then [I] applied to Berkeley [University of California Berkeley], and my parents wanted me to apply to Hopkins, but Mallory advised [. . .], "Go to MIT, not to Caltech." You want to get through graduate school and Caltech was still having issues—not issues—but women were still not as accepted as the males and go to MIT, which is what I did, and I think it was good advice. Now the schools are much more integrated; I mean, many more women at Caltech now.

CARUSO: So I know that you received your PhD in organic chemistry. Is . . . did your interest in organic begin while you were in college, or is that something that you develop after going to MIT?

SAVITZ: No, it [. . .] probably goes back [initially to Berliner who] was an organic chemist and [. . .] my senior year, Frank Mallory [who] was an organic chemist and the work that I had done for him for my senior thesis and also for that summer was all in physical organic chemistry. It was something that I knew about and liked it, and it was not just that making new chemicals and synthesis but understanding mechanisms of how they worked. It was of interest. [. . .] There was no real guidance at MIT as to what might be good for you. [. . .] They had a system—at least in the chemistry department—let's say there were ten or however many faculty members there were; each of them could take only three graduate students, so that the younger faculty could get [graduate students]. There were people from Harvard who that summer had

come and signed up with faculty members that they wanted, and so you had to [at the] beginning of [. . .] your first year there [. . .] think about who might you want to work with if you wanted to be sure and they became your advisors.

CARUSO: So is there anything else about your time in college that you think we should discuss?

SAVITZ: No, [I was] really well-prepared [. . .] for going [to graduate school]; I was well prepared [. . .] from a scientific, technical [perspective] to go on to the next level. I had no problem with the entering exam, and you were well-prepared [. . .] sort of all-round and didn't just do science, but you could do literature, and politics, and other things. [. . .] I have a very positive feeling and have been active in Bryn Mawr. [I have been encouraging them] towards getting scientists interested in public policy. In fact, [I] endowed a summer internship for a science major [during the summer before their senior year to be] **<T: 60 min>** an intern in a state, federal area because [I] learned policy on the fly which we'll get to at a later point in time.

CARUSO: I mean, since you're mentioning policy and I just realized that you'd mentioned Sputnik before we started talking about your time at Bryn Mawr. Was what happened, or was Sputnik in any way significant for you or for the professors, the people around you at Bryn Mawr when it happened in 1957? Like what was the general reaction?

SAVITZ: Well, the general reaction was [. . .] the US has to catch up, and we need more scientists and engineers, and money became available [for scientific research and fellowships]. [. . .] I guess most faculty did have research grants [. . .] and they did have money from NSF. [. . .] And that, sort of, [guided] my decision. [. . .] I could go on and get an advanced degree in science and be fully funded and know that there were jobs afterwards. You do think about that. And there was a need for this—for people to go on in science and there was an excitement about it. [. . .] How do you beat the Russians, so to speak? Because we were aware of the Cold War. [. . .]

CARUSO: Yeah, I just realized that you'd mentioned it earlier, and I never followed up with a question about it. I mean, many individuals in the United States were very spooked by that, right? Hearing that that beeping as the satellite passed by overhead, and, you know, the rise of the communist scare, and people started to build bomb shelters and things like that was in part response to that the Russians could launch . . . they could launch something into space and hit us.

SAVITZ: But even before that, you know, with nuclear [bombs]. I mean, we were part of a generation that you had drills where you got under your chairs. I mean, under your desks.

CARUSO: I actually still had that in elementary school when I went. I remember . . . [inaudible]

SAVITZ: That was much later.

CARUSO: Yeah, yeah.

SAVITZ: I think that Sputnik made a real difference in the funding of science and the excitement for engineering, particularly to solve problems and the advances that we made were incredible. [One other thing. I am still close to at least eight of my classmates. Since COVID, we have Zoomed [virtual meeting via a Zoom Video Communications, Inc. call] monthly.]

CARUSO: So your time wraps up at Bryn Mawr, you're off to MIT for your advanced degree—your PhD. What was it like moving to the Boston area on your own?

SAVITZ: Well, that was fine. [. . .] I had never been to Boston, but I'd been to Philadelphia, had been to New York. And I had ended up through I don't know whether it was through MIT's housing—MIT had to had no dorms for women—[undergraduate or graduate]. I had through somewhere found a woman, Barbara Striker, who was also starting as a [first year chemistry graduate student], and we rented an apartment near Central Square so that we could walk to MIT. [. . .] I had [Bryn Mawr] classmates who were in the Boston area that . . . and good friends of mine from the dorm. One—Susan [Band] Horwitz—who was getting her PhD at Brandeis [University]; she subsequently [. . .] did all the biochemical work on Taxol and just retired after fifty years at Einstein [Albert Einstein College of Medicine]. And Martha [Bridge] Denckla had been first in [our] class at [Bryn Mawr and was at] Harvard Medical School. There was a whole network of people there that I knew outside of the people I would meet in my classes. And then I met the person who would end up being my husband, Alan [Savitz], December of my first year.

CARUSO: So just to be clear, you said there were no dormitories undergraduate or graduate for females at MIT?

SAVITZ: Right.

CARUSO: So the men had dorms where they were . . . so they were all located together. You had mentioned, you know, at Bryn Mawr, you were with multiple **<T: 65 min>** years of students—right?—not just freshmen, but sophomores, juniors, seniors—all in one location. What . . . was there a difference in terms of—like I'm not sure how to form this question—but it seems to me that since the men were gathered together in dormitories, there might have been an easier time developing camaraderie among them than the women were able to achieve because they were forced to scatter themselves around the city in apartments and they seem to be more isolated? Is that . . . like am I . . . ?

SAVITZ: I can only talk about the [campus]. . . . I'm mean, many of the people, even the male graduate students, did not live on campus and then many were married and there were few women period, but the camaraderie and the people you got to know where those that were in your lab. . . . In [the] laboratory science where the people with Fred Greene [worked] two large labs [were combining with students from] Herbert [O.] House [and Fred Greene] so [there was] the camaraderie of people from your year up to people who are trying to finish and that's [whom] you learn from. As you may have seen in some of the other things, as I mentioned [or if] I haven't mentioned but have written [about], that [the difference wasn't] coming from [. . .] from an all, predominantly all-female to an all-male school, it was going from a school of six hundred to six thousand total. It could have been the size, but once you were in the chemistry department, which is where you were early and in [your thesis group], it was much smaller. Maybe there were thirty students in chemistry entering with me. [. . .] The undergraduate school had thirty women total, and the graduate school had thirty women total, not in chemistry . . . it was a small amount, and they could tell the graduate students from the secretaries because we were in jeans and looking scrubby and they were dressed like professional women should dress. The head of the [chemistry department], even though [I] had been awarded a teaching assistantship, which I felt was great because I'm going to go teach [and] this will give me some chance to learn what it's like on the other [side], [. . .] [Arthur C.] Cope did not want his female [graduate students]—and there were maybe less than 10 percent [female]—being TAs [teaching assistants] in the lab. We were to grade papers; we still got paid the same amount as if you were TAing a lab, [but] you didn't know this till you [arrived at MIT]. I was given the task of grading thermodynamics papers and exams. Well, it didn't take me the twelve hours for what I was getting paid for—I did get paid for the twelve hours—but six hours, so I just started my thesis early. I interviewed, and I was able in the beginning of the second semester of my first year to start my lab work. [. . .] I [was] actually on NIH [National Institutes of Health] grants. [. . .] It was as an individual [grant]. There were [at that time] NSF and NIH [grants for] individual [graduate students]. . . . I think they still have a fair number of doctoral degree [fellowships], but the number [. . .] hasn't increased relative to how large the graduate schools have gotten.

CARUSO: So, you said . . . is it Cope? Am I getting it . . . was that . . . ?

SAVITZ: Arthur Cope was the head of the chemistry department.

CARUSO: And do you know why he did not women . . . want women as lab TAs? Was he vocal about that discrimination?

SAVITZ: [. . .] It was just those are the rules. [. . .] Just like women couldn't swim in the MIT pool two days a week—Tuesdays and Thursdays—because the men could swim nude those days. When you tell people these things, they, sort of, can't believe this is a [recent] generation. When people say, "Well, why didn't you fight it?" "Well, you know, the main thing is [. . .] I had a thesis supervisor who was determined that [his students] were going to get finished and the rest of the faculty wasn't discriminating against those of us. If we were in a discussion class, they would call on us just as much as they'd called on others." It was policy, and I don't know when the policy changed. The people ahead of me, a woman [who] graduated from Bryn Mawr four or five years before me—ended up working at **<T: 70 min>** DuPont—[. . .] wrote an article and had the same experience.

CARUSO: Yeah, I asked the question in part because I'm always curious to know if anyone is actually explicit about why the policy exists. There's one person that . . . who was interviewed for our collection Mildred Cohn, a chemistry professor at the University of Pennsylvania, and during her oral history, she mentioned the fact that she was working for a company and even though she had a PhD, she was given a lower-grade status than her male colleagues because the company was worried that if she were given equal status to her male colleagues, all the men would divorce their wives and try to marry her. So it would be a social disruption and so that's why women weren't allowed to have this higher ranking is because it would ruin the company. [laughter] And you know those are the things that are always interesting to hear the rationales behind things, and so I was just curious if there was actually a mention of why women were not supposed to be or were not allowed to be TAs in labs.

SAVITZ: But the industry comment [is accurate]. Even when I was finishing MIT, I was thinking of [. . .] still staying in an academic environment. Women who graduated from MIT in chemistry were offered jobs [from industry with 10 percent less pay] than males graduating from the same professor. They were typically given positions of running an analytic lab versus actually doing development. I mean, there was discrimination in industry; they could be hired but [. . .] it's an anecdotal story related to yours. I have a friend who [in a] Harvard law school class in the mid-sixties. There were twenty women, and they were all invited to Dean [Erwin N.] Griswold's for dinner, and the men were very—male students—were very envious. Why were they invited to dinner with the dean? Well, it was he said, "You know each of you are taking a male's place."

CARUSO: Wow.

SAVITZ: [laughter] I mean, it's sort of these stories are real, though; things have changed a lot, which is good. But the number, as I said, when I wrote something for MIT several years ago the number of women ten years ago was 45 percent undergraduate, 30 percent graduate school, women president, women faculty members, women [department] heads. [. . .] That didn't start to change—at least [having] women in [leadership roles] in the MIT chemistry department—until the nineties and Chuck [Charles M.] Vest did that.

CARUSO: Yeah, I was going to ask what the gender makeup of the chemistry department was when you were graduates.

SAVITZ: Oh, they were all men. [. . .] I don't know [if] there were any women faculty members at MIT at that time. Millie [M. S.] Dresselhaus was one of the first women, but she was a physicist, but it may not have been till the mid-sixties. I don't know because [. . .] it was interesting—it didn't enter one's thinking at the time, "Well, there's nothing but men here." I mean, you were there to get a good education and a good preparation from whatever you were going to do as fast as you could.

CARUSO: You mentioned that you had your TAship which was essentially just a grader-ship when you started at MIT. I'm curious to know a little bit more about the nature of graduate education in chemistry at that time. Were you taking courses that first year? Were you just principally working in the lab and doing this grading? What was the curriculum like? What was the structure of the curriculum for a graduate student at that time?

SAVITZ: Well, it was interesting. MIT's chemistry department had . . . you had to take comprehensives after eighteen months—then there were written comprehensives. [. . .] When you entered, you took placement exams in all areas of chemistry and if, for some reason—there was physical, analytic, and organic—you didn't pass one, you had to take the course. The chemistry department had no course requirements in chemistry. Now you had to be able to pass your comprehensives in, you know, eighteen months, but you had to take three courses of a minor. That was a requirement and at that point, they also had a requirement of reading knowledge of two languages, **<T: 75 min>** [written for] the scientific environment. [There] was a graduate student, fourth year, ready to finish, [but] he still hadn't passed one of the languages. They offered courses at eight in the morning, and if you went to it, one of the [two] passages [. . .] would be what you had already translated in class into English. I had German in college; I had no problems with that. [. . .] Latin was my other language which they didn't [offer for the language requirement]. My choice was French or Russian. But there was no [requirement], but everybody took courses. [For my] comprehensives, you took an advanced organic course from [George H.] Büchi and you took [C. Gardner] Swain's physical organic course. [. . .] I do not remember having to take courses in all forms of chemistry for the comprehensives. It was mainly in your field, so mine were all in organic and but, as I said, if you felt you could [. . .] pass your comprehensive [with no course, and] nobody did that; [everyone] took the courses. [.

. .] I thought I would minor in math, and I took MIT's math, [an] advanced math class and decided that was not for me; it was just such a different level of that math than mine, and [I] ended up doing biochemistry.

CARUSO: So you had . . . you were taking some courses. Were you . . . you were also doing lab work in your freshman year? Oh sorry, your first year.

SAVITZ: There was no required lab courses. I started [. . .] doing lab work for my thesis the second semester of my freshman year.

CARUSO: So, how did you . . . so that's what I'm curious to know a bit more about is how did you select a thesis advisor? How did you develop a thesis project? How did that take place?

SAVITZ: Well, as I mentioned to you, you would [go] to interview the [potential chemistry advisor], you [would] see what their background was and I had thought—naively—that when you went [to graduate school], you did your PhD thesis on what you wanted to do. [laughter] The topic was the area that [. . .] whoever you took [as] your advisor [was interested in]. There was an oral exam after your comprehensives where you presented an original topic that you could then do [. . .] research on but actually you didn't; you continued on with the thesis. Gardner Swain was a top physical organic chemist, had a large lab, was already filled and they—as I said—[. . .] purposely, which I thought [was good], had a limit how many new students [a faculty member could take], so the younger faculty [would have students]. I interviewed Fred Greene, [who] was on the tenure track with House and they shared two labs.

It was doing interesting hypochloride free radical mechanism studies. [. . .] He had a female—but I didn't think about that at the time—graduate student a year ahead of me. [. . .] He was in the lab and he had time, and it seemed like an interesting project. He was someone [who] because he was in the laboratory [was] discussing with what you were doing as opposed to having a postdoc do it, which is what the bigger labs had. [. . .] I learned subsequently he had gotten his PhD at Harvard, and his wife was on track to get a PhD at Harvard and after her second year they got married and she dropped out. They had children, and she ended up being editor of *Journal of Organic Chemistry.* He was determined any female graduate students that he had were going to graduate. [. . .] I didn't learn that till later, but, you know, I liked the type of projects he was doing and I started working on them. Some places now have you work for a couple of professors and move on—you know, choose—but it worked out fine.

CARUSO: Yeah, I've heard people talk about the rotation system; you're in someone's lab for a few months and then you go to someone else's lab and after a certain—I think it's usually at the end of the first year—you make a decision about who you want to work with. So how many people were in his lab beyond just you?

SAVITZ: Well, I think he had . . . . I'm trying to remember whether it's ten or twelve people, but **<T: 80 min>** since he and House shared [. . .] two labs, all together across the hall [from each other]. There were probably twenty people [. . .] who were students and a few postdocs and a couple [of international postdocs. One was from India.] You got to know [. . .] the people in your class. It was the people who were two, three, four years ahead of you that were also available [. . .] to help answer questions or mentor or what have you. But everybody was on a different schedule. I was a morning person, and I would get there seven in the morning and leave by seven at night. I had a good friend who was the opposite; he would come six at night and work all night.

CARUSO: And that was going to be my next question was what was laboratory life like for you, and what were the . . . were their official rules to the lab or unofficial rules to the lab? I know some people they run their labs like, "Oh yeah, you know, I expect you to be there at least ten hours each day, six days a week." Some people are like, "Well, you know you need to get your work done so if it takes you fifteen hours in a week to get that work done, that's fine; if it takes you, you know, sixty hours, then that's what you have to do." I was wondering what his laboratory was like in terms of its structure, its functioning. How was . . . ?

SAVITZ: There were no formal rules, but one of the things that [the chemistry department] required [is] you had a thesis committee [that you] selected your freshman . . . when you first started [your thesis research. It had] three other professors and every six months, you had to send to them a update of where your research was and so that encouraged you to do the work and ended up being a very good [requirement]. When it came time to finally write the thesis, because you've been sending these [reports] every six months, you didn't have to think about what you had done earlier. It was a good thing. There were unofficial rules because one of the people who worked for Greene and was in my class was married and had a child. After the freshman year I don't know whether he worked for Monsanto [or] for one of the [other] chemical companies. When he came back, Greene said, "Well, [. . .] you took the summer off then you got to make up for it." But he ended up finishing in a little less than . . . in two-and-a-half years. Walt [Adams] did and went back to Puerto Rico [to teach]. The intent was your time was your own. [There were no requirements to be there. They] didn't come in and check off where you were or anything, but you were expected to be doing your research, not taking other jobs. And that was the only one.

Now if you're thinking on safety issues, I always wore glasses, but I don't remember if we had [. . .] to wear safety glasses. But otherwise, we would haul our own tanks, and I remember a couple of the male graduate students would think it was very funny when I'm moving [them and] asked somebody to open the door so I could move the tank in—not that they were going to help move the tank—I could do that. And there were no rules that you couldn't work alone, which those are rules now that I know exist here at UCLA [University of California Los Angeles] particularly that [they] and other labs [including federal labs have had incidents],

but it was really [. . .] up to you. What the chairman of the department had said when we first met our freshman year, went over [the funding requirement], we were all funded some way or other—some had already NSF doctoral [funding] and some were TAs. He said, "We will all guarantee funding of some sort for four years, and after that you're on your own." And so there was real encouragement that people should finish in four years, which, in my mind, I feel lucky I finished in three—my experiments went really well and I started early [research]. Now [. . .] people average five and six years, they're not learning that [much more]. I don't know [. . .] if you have graduate students [and] how long they [take for a PhD in] the humanities; I know [they] are long. In the sciences there's no reason that [. . .] you can't do it [in] a four-year period. Some people have said to me, "Well, but there's so much more, and there's so much instrumentation." I said, "Yes, but [. . .] how many papers do you need to publish [before your PhD]." **<T: 85 min>** [We had to build a lot of our equipment.] There wasn't a gas chromatograph on the market; [. . .] the equipment was not what it is now.

CARUSO: I mean, that was another question I was going to ask you was what was . . . what were the technologies that were you were using in the lab and if there were new technologies? So I know you came from Bryn Mawr, you had the exposure, you were working labs, they had a doctoral program there, and there was funding for it so there were probably some more advanced technologies that you were able to encounter in lab work at Bryn Mawr than maybe some other people at smaller colleges might have gotten introduced to. But moving to MIT, I wanted to know if there were technologies in the lab that you didn't know how to use, and if you didn't know how to use them, how did you learn how to use those technologies?

SAVITZ: I'll just back up one thing on [Bryn Mawr]. At that point, [spectrometers had just become available]. Bryn Mawr didn't have one, but Haverford did. It was a five-minute bike ride, so I would take my samples and ride to Haverford and run them. Bryn Mawr at that time—MIT at that time—had just developed the mass spectrometer but I didn't need that for my work. As I mentioned, gas chromatograph you needed to separate out [and identify] what compounds are being formed at these reactions, how [to obtain a] footprint. If there [were many organic chemicals], you can't just separate them physically. [We] had a glass blower who would make the tubes, and we would [fill them. There were] drawings [as to] how to [. . .] run [the samples]. You could put your samples in and get a printout out. [. . .] They had [simple equipment] like centrifuges and [pH meters]. Balanced scales weren't as automated as they are now. [. . .] But if people wanted a mass spectrometer, you could do that [at MIT] because of the work that [was developed there]. But [now you have instrumentation to look at reactions and materials at the nanoatomic level or the molecular level].

And you had to think about [what data you needed]. You couldn't just do hundreds of experiments to get your data and then see the data. You had to think about what experiments you were going to do—was it going to provide the data because you didn't have all this automatic equipment?

CARUSO: You mentioned that you were a more of a morning person getting in at seven a.m., leaving at seven p.m. Did you normally have, like, a twelve-hour day while you were doing lab work?

SAVITZ: [Yes].

CARUSO: And was that all year round or only for part of the year?

SAVITZ: After I had finished my comprehensives, it was all year round. When one was taking courses and then comprehensives, which were the first of February [in the second year, it was more limited. One] took December and January off to study [for the comprehensives. One did] get nervous [about] them.

CARUSO: Okay. So when you were in lab full-time, what were you doing when you weren't in lab? Did you have activities like that you are enjoying? You're in another big city— Boston, right?—there's probably a lot of stuff to do. What were you doing when you weren't doing your science?

SAVITZ: Well, I was playing tennis part of the time some with graduate students. We had two [who left Hungary in 1952] and others. [. . .] I think I [mentioned that] I had met [a man who] became my future husband in December of my first year. We both liked the theater [and movies], and there was a lot of theater—both pre-Broadway theater and small theaters and players, so we went to theaters. I went with [. . .] two of my Bryn Mawr friends to concerts. I mean, just a sort of a normal social life of enjoying [Boston and friends]. You could go Durgin-Park for two dollars, [which] was a lot of money then so you didn't [eat out much]. [. . .] **<T: 90 min>** There was a [chemistry] graduate student from Haverford [David Ellis], who was in my class, would end up becoming president of Lafayette College who was a sailor, and MIT had a big sailing [program]. Several of us would go out and try to learn to sail. It was just normal. [. . .] Several years after [I graduated from MIT, I realized that] I socialized more with people who weren't in my lab than people who were in my lab.

CARUSO: Is there a reason for that?

SAVITZ: No, I just think it was probably [that] I had friends from Bryn Mawr. Actually, Alan had gone to MIT as an undergraduate, but then went to medical school when I met him. [One] just went out with their friends—or his friends—so it was just a network of [contacts], and it grew [from 1959 to 1960]. I had [roommates who were women]. The one graduate student [that] I was most friendly with and [you] wouldn't be surprised—was Ellen Bressel, who was a year

ahead of me, worked for Greene and went to Barnard [College]. [Her] husband was a physics graduate student, and we [. . .] would go to their house for dinner. [. . .]

CARUSO: So you finished your degree in three years, right?

SAVITZ: [Yes].

CARUSO: During . . . so you had in mind that you're going to go on to become a professor. Were you receiving any advice during that period of time about what the next steps would be in terms of having a career in chemistry, or were you attending professional conferences to present on your research and learning about what it meant to be a professional chemist during that period of time while you were in graduate school?

SAVITZ: I mean, it [is] interesting; we, unlike now and like the last [four decades, graduate students didn't go] to the American Chemical Society meetings. There was a local chapter and student chapters, which we all were members of. I was a member of [it], but [one didn't go to their conferences]. My thesis work was published a week before my [final] thesis exam in the *Journal of Organic Chemistry* [. . .] because Greene had heard that somebody at Columbia [University] was doing similar work, and [Greene] wanted to get [our work published first]. Part of it was driven; it's like [today's] two-body problem. I had a husband—[I was] married January 1 of '61, which was the middle of my third year; [. . .] Alan was graduating from medical school and wanted to do an internship [in California]. And he had grown up in Boston, gone to undergraduate school in Boston [and] medical school, and wanted to leave [Boston. He] was applying for [. . .] internships in California. And I asked Greene at the [. . .] the beginning of [my] third year [by September 1960 I would be finished, as Alan wanted to go to the West Coast. Greene had met Alan, as he] would invite all his graduate students over [. . .] to his house periodically. [. . .] We wanted to go to the West Coast, but would he . . . . If I would not be finished in my third year, we'd stay on the East Coast. [Greene] said if I wasn't finished by June, I would be finished by September.

And I said to him, "Well, if I finish my experimental work, then I'll go and write my thesis wherever we are." He said, "No, you won't." He said, "You will stay here." I finished by June; we didn't go to Europe in May because I didn't finish [until] June. [. . .] It all worked out. [Greene]—as I said—was determined his female graduate students—[actually,] all his graduate students—should finish, but particularly his [female students]. Alan ended up getting an internship at UCSF [University of California San Francisco], and I applied for an NSF postdoctoral fellowship to go to Berkeley, and [. . .] San Francisco was where [we] wanted to go. [. . .] I postdoc'd for a year [from 1961 to 1962] in biochemistry. [I] really wasn't crazy about it. [The] professor was never there, so it was an interesting time [at] Berkeley, [which] was very conservative at that time. **<T: 95 min>** [John F.] Kennedy came to speak. [. . .] [William F.] Buckley [Jr.] came, and he had just as big a crowd, which was interesting.

[. . .] Alan was going to do a residency in [radiology]. At that point, you [had internships and residences] at different places. [. . .] He had decided he was going to [. . .] Stanford [University] or UCSF. [We] would stay [in the San Francisco area]. I had gotten a job [. . .] at UCSF in a lab. The [radiology] programs on the West Coast were four years of residency and three years on the East Coast, and [Alan] decided [spring of 1962 that he would] rather go to the shorter program. They were just as well-trained. There was a woman at Tufts Medical School—Alice Ettinger—who [was] an incredible, well-known figure for people in the fifties and sixties in the field of radiology. [. . .] Alan contacted her—she has been an advisor for him—and there was an opening at Cornell [University], so [in May 1962], we decide [that] by July 1, we [would] be in New York City. I had to then find—want to find—a job in New York City, so teaching would be the thing [I would] do. I didn't think about commuting [. . .] to New Jersey to Exxon or [other industrial laboratories]. I wrote to all [of the New York] schools. I got a letter from Fordham [University] that I should have saved that wrote back, "We've never hired a distaff member of the lay faculty and don't plan to do so." [. . .] But Hunter College, which was all-women [. . .], was at 68th and Park, and Cornell was [. . .] at 70th and 1st. Cornell's housing for residents was right there, and I could walk. So they hired me.

CARUSO: What year was that?

SAVITZ: That was in 1962. Then after a year of doing a radiology residency, Alan decided he really didn't want to be a radiologist and switched to psychiatry which is just really opposite extremes. He subsequently has said that if he knew of radiology was going to change as it did with all the [technology and] procedures he might have stayed [in radiology] because he did have [an] MIT science background, but [. . .] it is now [the spring of] '63. If you were a physician in the fifties and sixties, you had to go into the service. You were asked to volunteer to go into the service, and you went in as a captain. If you didn't volunteer, you could get drafted as a private. This is how they built up their plan [for physicians]. There was a Berry plan that set aside for a certain number of [physicians in each] specialty and then you went in as radiology or whatever.[4] He was in the Berry Plan for radiology, but when he switched to psychiatry, there were no openings for psychiatry, so he had to go in the service right then. [In July 1963], we were moving from New York. [Alan was] stationed at Fort Belvoir in Virginia [near Washington, DC]. One of the things when we were discussing with the Army [about] where he was going to go [was] the government had sent me to school for all these years and we needed to be [at an Army base] near a city, not be somewhere else [so] that I could also get a

[4] Named for its creator, Frank Berry, the Berry Plan was a draft plan during the Vietnam War era that allowed young physicians several options for military service to make sure that hospitals and the Armed Forces both had the individuals they needed. See Robert G. Petersdorf, "Financing Medical Education—A Universal 'Berry Plan' for Medical Students," *New England Journal of Medicine* (1993): 651-654, https://www.nejm.org/doi/pdf/10.1056/NEJM199303043280911. See also F. B. Berry, "The Story of the 'Berry Plan,'" *Bulletin of the New York Academy of Medicine* 52, no. 3 (1976): 278-282, accessed October 27, 2021, https://www ncbi.nlm.nih.gov/pmc/articles/PMC1808239/.

job. Fort Belvoir is commuting distance from Washington, [DC], so I was thinking, "Well, there's NIH, and there's the universities there."

[. . .] The first time [we] went to Fort Belvoir, I noticed that there were engineering labs [there]. We packed up in July of '63, and [Alan] started his two-year tour of duty. [. . .] They [assigned him to] radiology. Because of the Army's rules, since the regular Army person hadn't arrived and a [second] person [who] just finished training came in July who was fully board-certified, but Alan had started in June—fiscal year then was [July 1 to June 30]—we did them a favor because [he had been on active duty in June]. **<T: 100 min>** He was head of the department for two months. [. . .] I got a job at the lab right there. I saw these labs, and I applied. I had also applied to American University. They didn't have anything and that would have been a commute. [. . .] I started working on the fuel cell research and setting up a lab. This was in '63. When [Alan] was finished with service [in 1965] instead of [his] going back to Cornell to do psychiatry [because] I really was enjoying [my job] and was successful, he decided to do his residency in Washington, DC, and we stayed [in Washington]. So this [. . .] two-body problem, which is more pronounced now, [is important when hiring people]. I [. . .] spent more time when I was working for industry finding a job for the spouse than I did for the person who was [being] hired.

CARUSO: So you were a researcher at the US Army Laboratory at Fort Belvoir. Is that how you pronounce it?

SAVITZ: Correct, Belvoir.

CARUSO: Okay, and so that started in 1963?

SAVITZ: It started in '63.

CARUSO: And . . . sorry go ahead.

SAVITZ: No, so they had a laboratory. Night vision was created there; they were the two major Army facilities [which were] not doing basic research, but [were doing] more applied research. [They] were Fort Monmouth and Fort Belvoir. [. . .] Fort Belvoir had just hired [a person from] Arthur D. Little, [which] was a scientific consulting firm in Boston. [It] no longer exists, but it was a really good consulting firm. They hired a man] named Galen Frysinger, PhD, to build up a lab in fuel cells [at Fort Belvoir]. [Project] Gemini had occurred, [and the idea was that] the Army wanted [fuel cell] power. [It would] be silent power so there weren't the moving parts that there were in diesels or turbine engines. [They had potential for] multi-fuel theoretically capability. The [Army] wanted it for power, potentially for transportation. [They

were] setting up sites to start a fuel cell research program to build fuel cell technology for ground [and transportation] applications based on it. It didn't matter to [Dr. Frysinger]—he was a PhD in chemistry—that I [was not] an electrochemist. The fact I had a PhD could look good for getting the dollars for [the program]. He [had me] spend a month at the University of Pennsylvania with [a professor] who had done a lot of fuel cell work. [He also sent me to] in Tyco Laboratories outside of Boston. I saw the techniques and what could be used and could then set up a research lab [at Fort Belvoir], and [I] could hire technicians and [did research on] the mechanisms on [the] platinum electrodes—we still use platinum electrodes in fuel cells in some fuel cell systems. [The research was to] see how you could reduce [the platinum]. Also, were mechanisms different for hydrogen than it was for natural gas? How much you [did one have] to reform [the fuel]?

[I] did some basic research [as to] what kind of compounds were being formed. At that time, I had gas chromatographs that you could buy from PerkinElmer [in addition to] a mass spec and other [equipment]. But I also had a portfolio of external projects [funded by the Army] to monitor. General Electric, [whose] research labs [worked] on Gemini [fuel cells], was doing research for fuel cells for stationary applications. Pratt & Whitney then United Technologies [Corporation were] in the other [major research group. They provided fuel cells too], but Exxon Mobil was looking at fuel cells with sulfuric acid. [Edward E.] David [Jr.] who became science advisor was running that program. [University of] Pennsylvania was [where] the academic [research was being performed. I was the program monitor.] Frysinger said, "Just think of it as your own money and how you would spend it and monitor it." I learned with help as to what their statements of work [for performing the research. I also learned about milestones that had to be monitored.] When I was [at] Fort Belvoir [. . .] I **<T: 105 min>** would give papers on my own research. [I developed] a network of [. . .] people in the electrochemical society. [. . .] We published some papers and [I] ended up having [technicians. I had] one person for a couple years. She left and then [there was] a woman Ann Hubbard, whose husband had to serve his two years at Fort Belvoir in the nuclear area. [She had been] a biology major. [. . .] After two years of research in my lab, [she] went on to get her PhD in biochemistry at Rockefeller [University] and then was one of the first non-MD people getting tenure at [Johns] Hopkins Medical School. I said that was my contribution—another contribution—to science, and my own children became physicians.

CARUSO: So there are several questions that I have. I'm going to start with how was it transitioning from organic chemistry to electrochemistry? Was that a relatively easy thing for you to accomplish, or did it . . . . I mean, it sounds like it's a fundamentally different area of chemistry that you hadn't just spent three years of research focusing on. So how was it making that transition?

SAVITZ: Well, I think there were two things. One, you spent three years of doing research, but you get the feel for what kind of experiments you need to do to determine what results, and part of it was some organic molecules because they wanted to really be able to work on natural gas and petroleum and fossil fuels. But the fact that [. . .] they sent me to two places that were doing

this research [and] gave me money [. . .] for buying equipment [for] setting up the lab. [. . .] I was able to create it and learn enough electrochemistry. [Also], by monitoring or being the project manager, [I learned a lot.] From the Army's point of view, [this was fine. The contractors and their investigators, such as General Electric], were really supportive. [Research] was being done in their research labs, and so [when] I had questions about interpretation of [results], they were [. . .] very willing to help. [. . .] There was a lot of support. Of course, I'm [also] the money person, but [. . .] they also wanted the field to progress, and I was looking at some nasty compounds. Hydrogen [with] phosphoric acid as the electrolyte [. . .] was under pressure that I had to publish right away. It wasn't an academic situation. What Frysinger wanted was to have a working lab to show the generals that we could do this work. [. . .]

CARUSO: Another question I had was as a graduate student you're reporting to a supervisor but you're also kind of independent—right?—you do your research, you're responsible for your research. I don't think you mentioned having to supervise any undergraduates while a graduate student. Now you're going into a position where not only are you doing research but you're becoming a lab supervisor—right?—so people are reporting to you, you are checking in on projects, I'm assuming you have to write reports about those projects. How did you develop the skills to do all that when you didn't have any clear exposure to it beforehand? Like how was it . . . what was it like becoming a manager, and how did you manage becoming a manager?

SAVITZ: Two things. One is there were some undergraduates in our lab at MIT, but because Greene didn't have twenty, thirty people and postdocs, he supervised the undergraduates. One of them—[John I.] Brauman—[became] head of the department at Stanford. [. . .] I mean, I've never thought about that. **<T: 110 min>** Frysinger was very helpful on managing the external contracts, meaning. [. . .] Also, you, sort of, learn by experience. I'll [give] a process [example]. I thought, "Well, I'm going to renew this contract with GE. I'll just write it up by . . . I've got the forms, and I have from them the input I need." I sent it over to procurement and then comes a month later, I haven't heard anything. Then I walk over to procurement, and they said, "Oh well, it's on the bottom of the pile. We didn't know you were [in] much of a hurry." I subsequently learned from that experience that whatever—and it did me well all through my whole career—that if, you know, something had to be taken care of, you don't just [submit it]; you go on and chat it up. [. . .] It's all done on a personal basis in a sense whether that's right or not but that is how [it is done.] I had seen how Greene managed his students and also just going to the [industrial] labs [and seeing how they managed]—Tyco lab [in Waltham, Massachusetts] was an industrial lab that had the senior managers and [scientists/technicians] who were doing research—was very helpful.

[. . .] Learning [from] what I saw other people doing [was helpful] as far as being a project manager with the companies. Frysinger [. . .] guided me on what kind of [items] you want to track. [The contract also gives milestones on what is supposed to be done.] You want to understand what technologies are [being investigated] to make sure that they're not repeating something [that] somebody else had [done, and it failed. The] nice thing about leading government research programs at that time is you [got to] know what everybody's doing. [The

contractors, such as] the people at GE [didn't] know what the people at Pratt & Whitney [were] doing except [. . .] when they [gave papers at meetings of] professional societies. We had some guidance. [There were] deadlines. [. . .] Whenever [. . .] a certain phrase of a contract was finished, one had to make sure that [the documentation] was there. There was no formal review process [of the report] other than my review and my boss's review. There was not a big hierarchy. On the non-military side, there was a civilian [director]; Frysinger reported to him, and I reported to [Frysinger].

CARUSO: Okay. See . . . were you were in that position for five years?

SAVITZ: [Yes].

CARUSO: Okay. What made you decide to move on from that position? I know that you became a professor of chemistry at Federal City College, and so I'm wondering where that transition came from . . . why . . . yeah.

SAVITZ: Well, and I learned [from the following]. Frysinger left [. . .] in '66, '67, and I was encouraged to apply for the job. I had two young [children]. My first child was born in '65 and second one in '66—they were fifteen months apart. I had incredibly good household help—[Jessie Morry], a Scottish woman—for sixteen years, which made it all possible. Mary [L. Good and I] would talk about [. . .] the help we had. [. . .] We paid their Social [Security], which was an issue in the nineties for some people.[5] [. . .] I wasn't sure [that] I was ready to head a branch or division, [. . .] so I didn't apply for the job. They hired somebody who I just did not [. . .] respect. [. . .] He was [. . .] a micromanager. I decided when the children were younger, I would limit [travel]. I would have to do some travel trips to monitor these [funded] programs—I actually took a course at UCLA of some new technique when Adam [Savitz] was six months old. He wasn't happy when I came back because I'd been gone. Anyhow, [there was the opening position that] I hadn't taken it. I wasn't happy with [the change], and I was thinking, "Well, maybe I should do some academic thing that would give me more time."

We had moved into the District—no, we didn't move in. I'm sorry. We hadn't moved then; we **<T: 115 min>** were both commuting. Alan was commuting to the District; I was commuting to Fort Belvoir. We moved [to DC] in [1971]. They were just creating [the Federal City College]. Washington, DC, had no land grant school, and so they created [. . .] Federal City College—[now University of the District of Columbia]—to be a land grant school. They were hiring [faculty. The] population of student body in the District [. . .] at that time was 60 [percent], 70 percent African Americans [and would be the major student population. Faculty was going to be very diverse. They] hired a full professor of English from Harvard; another

[5] Mary L. Good, interview by James G. Traynham at Little Rock, Arkansas, 2 June 1998 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0171).

chemistry person they had hired was [Jim Preer], who [had] just finished his PhD with Harry [B.] Gray at Caltech. It seemed like an interesting environment. [. . .] They were just starting to do [more things for minority groups, even NSF.] I thought, "Well, this would be interesting, and it would be different, and we'd have more free time, and I could start a lab doing some research." And I didn't even think about the tenure; I don't even remember [. . .] whether they had tenure.

Anyway, [I] went over then as professor, and it was an interesting experience. You were [teaching kids who] really had to learn the basic skills—[. . .] writing and even mathematical concepts. Then some kids [. . .] were working [at full-time jobs]. It was typical of people trying to get a [college] degree. [. . .] The high schools just did terrible preparation in the District except if you were in northwest Washington at Wilson High School. It really was not a good thing. [Jim Preer, the other chemist, and I] got money from NSF to start a program going to the high schools in a bus to do hands-on experiments, which related to their daily life like trying to figure out [. . .] what kind of carbohydrates are in sugar versus in other foods, what kind of nutritional [values and use of a] gas chromatograph. [We also] had a spectrometer that people could come on and [use]. And it was pretty successful. We would spend several weeks doing a science topic and then go to another school and got kids interested there. A couple of our students who graduated [went on to graduate school]. One went to MIT as a graduate student. I mean, it was an interesting [experience. I] decided to leave [because] the politics [of the school] had changed, and the faculty had changed though Jim Preer stayed his whole career. [. . .] When I looked around, [I saw that NSF had a] program—Research Applied to National Needs (RANN), which was, sort of, more applied research than the other [parts of NSF]. [It covered areas that weren't necessarily covered by the Cabinet and other administration positions. In the energy position—[where] I had done work—they hired me essentially to [be program manager for] fuel cells and batteries. I had done [work in] fuel cells.

But [. . .] before I started—so that was in '72—they said [an economics] professor from Stanford was coming on a sabbatical [. . .] and would I consider working with him to look at the demand side [of energy] both in the technologies and how energy was used. This is in [the 1970s], pre-embargo; one year pre-embargo, gas was twenty cents, plenty available, and nobody really knew how much you used for electricity, and electricity was cheap. [. . .] The nuclear [energy] had been handled by [. . .] the AEC [Atomic Energy Commission]. [. . .] They were doing storage [R&D]. The Interior department was looking at coal; [NSF had established] a [solar effort] in the RANN Program—a [geothermal energy and] fossil energy [programs]. We were doing the demand [programs. I] said, yes, I would go and do it. That was when the early times I remember the deputy for that, [Lewis G. "Pete"] Mayfield, asked me a question, and here this is ten years after I've graduated: why did I go to MIT? [laughter]

[. . .] I thought [that] was a very strange question to ask, **<T: 120 min>** but I said, "It was an outstanding chemistry department—the best—and so why not?" Anyhow, I was in NSF for a year. [. . .] [At NSF, we] got proposals [and funded some] MIT people looking at the demand-side modeling, also at Harvard, Cornell, and funding actual [technology] research at Oak Ridge National Laboratory in thermal energy, some work in lighting and then actually some NGOs who were looking at policy. This was again before the embargo. [My problem with

NSF was it] did not encourage [. . .] at that point—or at least in the RANN Program—[the development of] a portfolio. What type of things should you be looking at, what kind of [specific areas] whereas what I had been doing at the Army was very clear. [. . .] We were on a mission to get fuel cells into stationary and mobile transportation. So [at NSF, it] was, sort of, scattered. [You funded the best project you would get. The] embargo came [in 1973], and then one of the people [that] I had been funding was Jack [John H.] Gibbons at Oak Ridge. He came up to head one of the three-letter agencies in their energy conservation program. and [I] went to go work with him. We were very focused on initiatives and [some were related to programs I had led at] NSF for a month or two during the embargo time, which is when I started to get into the policy world, but again, an ad hoc type of thing.

CARUSO: So it was 1973 that you move to Office of Energy Conservation?

SAVITZ: You know, there was no Department of Energy till '77, so I moved to [the] Federal Energy Office in '73. Then the Energy Research and Development Administration [ERDA] was formed in '75 when they split up the Atomic Energy Commission into the NRC [Nuclear Regulatory Commission] to separate the regulatory [from the R&D. ERDA] was to be the energy R&D. And that then Bob [Robert C.] Seamans, who had been deputy for the Apollo program and had been secretary of the Air Force, headed [ERDA], and Bob [Robert W.] Fri who had been deputy to [William D.] Ruckelshaus at EPA [United States Environment Protection Agency] became his deputy. And when we set up [an Office of Conservation and Renewables], the research programs really developed, and I learned a terrific amount of developing a research program from Bob Fri, who was the deputy and worked in the area and we collaborated for years. But I had my first [policy opportunities] when I was on loan to FEA [Federal Energy Administration] or actually there during the embargo time. They were looking for [suggestions as to how to reduce demand].

CARUSO: So how was it transitioning into this policy arena, right? So I mean, if I understand correctly, you're no longer in a lab—right?—you're not managing projects but you're trying to develop policy? Is that . . . ?

SAVITZ: No, at the FEA, you were . . . . At NSF we were developing projects; [at FEA, we were developing policy. At NSF, we] were sponsoring research, and some of it was modeling and some of it was actually R&D for mechanical [products; one was] being able to have basements full [of] water for thermal storage and then ice for cooling. I mean, it was [a] neat demonstration. [Compact fluorescent light R&D started at] ERDA. [. . .] It was also parallel with policy. [. . .] When the first embargo came, they were really looking what do we do to save [electricity and] protect ourselves from [the lack of] oil. The state of California had just—Los Angeles city, rather—just renewed their contract with the Middle East for providing oil for their power—[. . .] 50 percent of the [fuel for] electricity at that time was from oil as opposed to less than a couple percent [now. We] wanted to track [other laws California passed]. **<T: 125 min>**

Los Angeles City Council [passed a law] if you [were a residential, industrial customer, you] had to reduce [your electricity] use 10 percent; commercial 20 percent. If they didn't over a period of time, their rates would double. [. . .] We had funded RAND Corporation to track [what actions were taken by customers]. The policy at the embargo time [I worked on was related to] lighting. [Richard M.] Nixon actually in the summer of '73 had imposed some energy conservation [actions in] the federal government from a policy point of view [to do. This was] pre-embargo—nothing to do with any shortage [of oil. The] government should [reduce energy use] in a way of saving money and reduce the lighting levels to something called fifty-foot candles and thirty and ten [depending on the task].

When the embargo came, I was meeting with Jack [Gibbons]. I was doing buildings-related [research-related activities at] NSF. Another person had come from DOT [Department of Transportation] doing transportation. I said, "Well, why don't we have the private sector do fifty, thirty, ten? The government's been doing it for six months without a problem." So [I] wrote a paper—a one-page paper—and it went up through the channels and two days later, Nixon announces it. I mean, you talk about real-time feedback, not three years of research and then you get your paper. Well, I mean, that was all very nice, but the next day, I get called in by Eric [R.] Zausner, who was the deputy of FEA at the time—or FEO—saying that well, he's [meeting] the next day with the [. . .] heads of the three lighting divisions in the US—GE, Westinghouse, and Sylvania—[who were coming] to protest what I had done. [They said that] I was going to cause [. . .] unemployment; I was going to cause this and that. I was to be at the meeting. At the meeting, we talked about the federal government had done this, it had not caused [any] visual problems. [. . .] If you had to reduce the amount of fluorescent lighting, [you had to [remove bulbs, you could save them and not buy new ones]. Of course, that meant [they were saying you were not looking] for more efficient lighting. They all each invited me to come to their sites, which I did. What I learned was before you go and promulgate something, you do need to talk to the impacted people. I ended up working closely with them and for two years worked part-time for the Lighting Research Institute between my time leaving the government and going to industry. [. . .] FEO became the Federal Energy Administration [FEA] and in '75, ERDA was formed. I went there to head the buildings and industry program. We built [a buildings energy] R&D program. [In 1977], the Department of Energy was formed, and both organizations fed into [it], and so [they were combined]. I was the deputy assistant secretary for the energy conservation, combining the policy and the R&D. It was very bipartisan, and the budgets grew, [. . .] and the buildings area particularly hit some major home runs. At the time, [industry was] changing from mechanical ballasts to solid state ballasts, compact fluorescent lighting to computer programs to design energy efficient houses, thermal windows. It was really an exciting time to work with industry that was [performing R&D and implementing products. The national labs were starting to do energy efficient R&D.]

CARUSO: So when . . . . I know that [. . .] there was the ERDA—you mentioned that, then DOE, and so you continued on your government career at this period of time at the DOE, right?

SAVITZ: Right.

CARUSO: You were in conservation. What were your—I mean—what were your daily responsibilities like? Yeah, I've never worked in government and so I'm curious to know a bit more about what you . . . what was your general functioning on a daily basis. Were you holding meetings? Were you supervising projects? What was the . . . what were your activities in your position there?

SAVITZ: Well, at that point, I had two hundred people working for me, and **<T: 130 min>** they were divided, you know. There was a buildings program, there was an industrial program, there was a transportation program, and there was another [multi-sector program]. The renewables were all handled by another deputy assistant secretary. It was for conservation and renewables—now energy efficiency and renewables—and so it really was [establishing a program similar to what we did at] ERDA. [. . .] What are the goals? Doing a strategic plan. And in ERDA I did it for buildings and industry. You know, what would be the goals and what projects do you need on a five-year basis and thirty-year basis—or not thirty—ten-year basis, what kind of budgets, and things like that. [. . .] At DOE [also], we had to do strategic planning [and] then our budgets had been growing. By the time I left DOE, we had a billion-dollar budget, and part of those were grants programs—weatherization, which is still going, was two hundred million—state grants programs, [another for] schools and hospitals [retrofits. One] had a policy office. You were supervising these [programs]; you were also reviewing the projects, and you were also going out and meeting customers. My responsibility was [also] testifying in front of Congress to defend the budget and also [Gerald R.] Ford—in my mind—had the best process for developing policy. So we had had the one embargo and here he is president in '75, and they asked people [. . .] to develop what might become legislation and so we developed a plan [for legislation]. One was building [. . .] energy performance standards; one was appliance labeling because they didn't want standards at the time. Another was a tax credit [for energy efficiency investments. One was] weatherization for [low-income homes]. Handled separately [were] the automotive standards. This is '75, so it had be when FEA . . . before I went to ERDA, but it mixed between the two. Anyhow, and we wrote [policy options for legislation]; it went through the FEA. Roger [W.] Sant had replaced Jack Gibbons. Then [Sant] had a meeting with the secretary or the administrator and then when there was a meeting out in Colorado [with the president], Sant went to [this and decisions were made on] legislation. It was [called] Project Independence. [. . .] What it [really] was, was to get [independent of imported oil].

[. . .] One of the things I did to keep my sanity [and not just administer] things [. . .] was always [to focus on developing specific policy: one was building] energy performance standards [in addition to] the budget. The budget was very important, and, ultimately, at DOE, [policy and R&D were] together. At the Department of Energy, there were two different appropriations committees. There was the interior appropriations [committee for energy efficiency, which originated from the fossil energy programs at Interior]. Then there was the energy and water for the non-interior [areas, such as renewables]. You had the House and the Senate [authorization committees]. You learn to testify by watching [others]; just answer the question. Don't go [into more details]. [laughter] The building energy performance standards was one of the [legislative

proposals]. The Congress would have hearings where they would have the administration and the outside people that you would recommend [testify]. I remember the building energy performance standards were done jointly with HUD [United States Department of Housing and Urban Development]. Donna [E.] Shalala was at the time the head of policy at HUD; she then went on to greater things, including Congress. [. . .] We had to testify, and [HUD] came under Senator [William] Proxmire, who was known for his golden egg [award]. But his staff was very interested in [the] building energy performance standards. I would walk into the hearing room because it was [an energy-related hearing, and] they'd open the curtain, so they didn't have to keep so [many lights] on.

But you also you learn to work with the staffs; you don't need to work with the principals. I did more training of **<T: 135 min>** chief technology officers from the private sector that they don't need to have a meeting with Congressman [Sidney R.] Yates who headed appropriations for the [Department of] Interior budget up until the [program budgets] got merged [with energy and water] at a later time in the nineties. That you want to talk to Bob Kripowicz, who really knows everything. [. . .] You just learn by doing [. . .] these things. The R&D was [getting] exciting . . . things [were getting] commercialized. [. . .] I remember—there was one . . . Congressman [Mike] McCormack from the state of Washington [who] was a chemist. Otherwise, everybody was lawyers. He made a comment to me when I presented an early budget—he was on the authorization for science—he said, "Well, how risky are these projects?" I would say, "Many of them are high risk; they may not be successful." His comment to me was, "You're not doing the right job if [. . .] all your projects are sure of being a success. You're [not] just too high risk. A balance." So part of it was setting the strategy for what we should do: long-term, high-risk, [low-risk], near-term. [We had] responsibility for implementing some of these programs, which is the hardest part.

CARUSO: So you mentioned working some . . . a little bit with Housing and Urban Development—HUD. Were there other agencies that you needed to interact with—government agencies that you needed to interact with—on a regular basis. I could imagine—and maybe my imagination is just completely wrong—but if you're focusing on conservation and new energy standards, technologies, that the newly formed, or relatively newly formed, EPA might be an important agency to work with if they're concerned about, you know, things—new things—that are going to be entering the environmental stream. Were there other organizations . . . other government agencies that you needed to work with on a regular basis?

SAVITZ: Well, I mean, we worked with [EPA. Before EPA] created their Energy Star Program, which is [now very close coordination] between the two agencies, I worked [on] indoor air quality, [which] was of concern to people. If you were tightening up your house, you were putting weatherization in, you were putting the thermal windows, you were caulking where you going to have less air changes—[what would be] indoor air quality? People at Lawrence Berkeley [National Laboratory] [were one of] several national laboratories that really entered into high gear for looking at conservation [. . .] from their earlier start. There were programs there—Oak Ridge [National Laboratory] had been one. That's why Jack Gibbons had come to

the office to be [the conservation head at FEO where] the conservation part of the first central energy office [existed]. Lawrence Berkeley Lab [. . .] had developed a big [indoor air quality] program. [. . .] They had a program on indoor air quality and how do you measure indoor air quality, so we [determined if you did] have a problem, what kind of technology might you need. We would have conversations [with EPA. In] the buildings area, the largest interaction was with NIST [National Institute of Standards and Technology]. They had [the responsibility] for setting up procedures for how do you test efficiency of appliances—air conditioners—from which [the basis of standards were] developed. They also had a building [R&D] program. [. . .] NIST had built a house that you could put in energy efficient [appliances] and measure in a real time—also put renewables on it. They had the group on fire and safety, and so as you were looking at implementing standards—your fire and safety standards were implemented through the codes—how are you going to implement building standards through the codes? The transportation program interacted [with EPA] a lot [. . .] because of the testing capability for dynamometer testing [that was] done up in Michigan by EPA. Then Department of Transportation had programs [ultimately such on CAFÉ] standards, so those were the main [agencies].

We also [had] interaction with the states. We borrowed from California for building standards [and ultimately] appliance standards because they had had this great [potential energy] **<T: 140 min>** shortage, they formed the California Energy Commission. [They] had this legislation and we could [. . .] see how we could tailor it [on a national basis] and also see how they were implementing it. [. . .] There was that interaction, and there was [with] DOD [United States Department of Defense] because they were worried about getting [fuel] supplies. [. . .] DOD has become much more active in energy efficiency because of the cost and [we had] created—and I can't remember when it was created—but it was there when I was—the Federal Energy Management Program called FEMP, which [runs a program where] each agency had to set a target for how—in their buildings—they would reduce their energy. Government [. . .] is the largest user of energy in buildings and in transportation, and so [FEMP had to] report and track, so all of those agencies . . . . GSA [General Services Administration] became a major player in that because they owned the government facilities. It's interesting: this year's budget of FEMP runs, they'll do a few demonstration programs [. . .] and share best practices. [The budget runs about] twenty, thirty million dollars. The current budget [request] has an increase to add another zero, [. . .] which will allow things like the national labs and the federal government buildings to really retrofit. But GSA had also built [in the seventies] a building in Manchester, New Hampshire around the time of the embargo that was the most efficient building measured in BTUs per square foot. I mean, you didn't have any measurement terms because energy [was cheap and available]. You knew miles per gallon, but you [thought if it was] seven miles per gallon—who cares? [laughter] I'm sorry I'm skipping around, but your questions are making me think of things that I didn't know about ahead of time. [. . .] I hadn't thought about for a while.

CARUSO: No, no. It's great to hear, and it's always . . . so in oral history, it's always nice to see how people make connections to the questions that we ask and so we like when people explore questions to see how the connections come to be. Now I don't want to miss anything. I know that . . . well you'd mentioned that you—after leaving government and I guess this was before joining the Garrett Corporation—you did some consulting, right?

SAVITZ: [. . .] I left the government in eighty . . .

CARUSO: Eighty-three?

SAVITZ: Eighty-three.

CARUSO: So what . . . so the two questions I wanted to ask were, are there other things about your time and government that you think would be important for us to know. I mean, you understand the general nature of our project, and I don't want to miss something, but I'm not an insider in the work that you're doing so I don't know if there are questions that I haven't asked that I should have asked. So that's one thing, but the other question is, you know, I want to know what brought your career in the government to an end.

SAVITZ: Well, that was the one I was going to say: were you going to ask me . . . . I don't know what you know [about my] history.

CARUSO: I don't.

SAVITZ: So I was a career civil servant and deputy [assistant secretary]. I rose to be at the highest [level of civil service and] GS-18. [. . .] When [Jimmy] Carter came in, they created the senior executive service and then got rid of the higher levels of GS. [It was] called the SES. As a result of my position, I was at the highest level of SES. The SES allowed you to do was [. . .] unlimited leave accumulation. But the other thing was that you could be removed for various reasons, which if you were career civil service, you were still career. You know, it wasn't a lifetime thing whereas in the former [GS], it had been [with SES. If you were reassigned outside of the commuting distance and refused to accept position, you could be fired.] I had worked; I was non-political. [I had] started in the sixties with the [Army]. I was [a] much lower level, so starting with Nixon, Ford, Carter, and then [Ronald] Reagan comes in. Well, Reagan wanted to eliminate two things: the Department of Energy and the Department of Education. And if he couldn't get rid of the Department of Energy, at least he could get rid of some of the things that they didn't like, which was efficiency and **<T: 145 min>** renewables. And though when he had been governor, he had allowed these [programs to continue. They appointed] somebody named [Joseph J. Tribble] to be assistant secretary for conservation and renewables. He came from a paper factory in Georgia or something like that. [He had] no knowledge of the government, no knowledge of our [programs]. He was [purely political], whether the paper company had contributed to the Reagan campaign or whatever. One of our first hearings in front of Mr. Yates . . . it was Interior appropriations. Yates asked, "Well, you have something, [Mr.] Tribble. [. . .]

PE. What does PE mean?" And so Tribble says, "Professional Engineers." Yates says, "Aren't all engineers professionals?" Well, it went downhill from [there], and Yates just called on the rest of us. [. . .] When the first budget went through, well, it was very bipartisan. Reagan came in [1981] in the '80 election. In '81 [he] had to live with the '81 budget [proposed by the Carter administration]. In '82, [the administration] really demolished [energy efficiency (EE) programs]. They tried to beef [up EE] with money for a combustion facility that [Department of Energy] Office of Science would interact [with Office of Conservation]. [. . .] I would go testify for the budget, and I would go by the rules and not say [. . .] this doesn't make any [sense] to me. The staff and the congressional people had seen me for years. [The administration] decided to reassign me; you could be reassigned [. . .] to Salt Lake City, [Utah], to the Western Area Power Administration [WAPA].

I had talked to a man named Mr. [William S.] Heffelfinger, who was the head [or] equivalent head of HR [at DOE and] who was just really disliked at [DOT where he came from]. I knew they were planning to do this—I had gotten some inkling—I said, "Just [. . .] give me thirty days, and I'll find another job if they go through this," knowing that my family is here, knowing also [the WAPA position is not comparable to the job] in Washington. [In 1983], my son, [a] senior in high school; daughter, [a] sophomore, and Alan's practice was there. I was concerned that if I turned it down, I would be let go. And so they knew I was going to turn it down and so [they removed me from office]. I brought a case up before the Office of Special Counsel saying this was all politically motivated [because I] had built up the conservation programs, and I was [appointed Deputy Assistant Secretary] under a Democrat. [. . .] The building energy performance standards [were] hated, and they ended up being repealed. The industry didn't [like these]. The Office of Special Counsel was headed by a person who subsequently [appointed and was] a very conservative judge in [district nine]—California. He passed away recently. The person investigating my case said yes, [. . .] it was politically motivated; I should be reinstated. That's just a recommendation; it's not a requirement. [. . .] So instead of having me move to [Utah], I could leave the government, and [whatever benefits I had I wouldn't lose] any of those. And this all took a year. [. . .] I had incredible support by [. . .] my family particularly [but also by] my colleagues. We had had to go through a reduction in force at DOE when Reagan came in. I had fifty people I had to remove, which was just awful. In those days, **<T: 150 min>** it was, [last] in, first out. Some people ended up leaving and doing very well in the private sector. I was fighting for those to be able stay. Anyhow, the department decided not to reinstate [me]. I could have then fought it through the courts. [I could] declare victory [in] the fact that [. . .] the Office of Personnel Management special counsel person, who was conservative, had found the department wrong. That was fine. So that was my leaving of government, which I [discuss very little].

But [the law was later changed by Richard L.] Ottinger and [Pat] Schroeder. Ottinger was the head [the energy] subcommittee [. . .] on the commerce committee, [. . .] and Pat Schroeder was on the government committee. [They] held hearings, and they changed the law that you couldn't reassign an SES without discussing it with them and giving notice. Subsequently, both Tribble had to leave and the secretary of energy, who was [James B.] Edwards, a dentist, had to leave. [laughter] But I was surprised in 2006 the California Air Resources Board was looking . . . it was [Arnold] Schwarzenegger was looking for somebody

new [to head it]; Mary [D.] Nichols had left before, and [. . .] they wanted to know if I were interested. At that point, it was during [George W.] Bush 2; the California Air Resources Board was the best energy group you could have in the country because they were really moving along with the air and the automotive [policies]. So I applied for the job, and I got letters—very good letters—from industry and letters from other people in [NGOs]. I wasn't sure I wanted to do it. And when [. . .] they said, well, it's come down to the final two. Did I want to talk to the governor and want to do it? And they said, he knows about why you left DOE. I ended up not wanting to do the commute, and fortunately, I didn't take the job. I would have had to leave it because my husband developed this very fast-growing, deadly cancer.

Anyway, [. . .] it was just a part [of my career], but I remember a person on [Charles H.] Percy's staff, who was a senator from Illinois, who was at the time had said that he and [Mark O.] Hatfield [had] complained to the undersecretary who then told me that all they wanted [. . .] to know why they were firing me. I had learned from the early days in the seventies of working collaboratively with both the Democrats and Republicans, and energy efficiency is a bipartisan thing. [. . .] Everybody has to live in spaces that are heated and cooled and get back and forth in various transportation [modes to] work in industry. It impacts all of our lives. [. . .] I was able [to create a] social science program at ERDA where I had a psychologist and a social scientist and a financial person to find out why [and] what will motivate consumers. Did a study with Princeton called Twin Rivers, [New Jersey]—Rob [Robert H.] Socolow's program where after the second embargo, they went around, and half of the development [had] posted on their kitchen windows what their electricity use was that day and compared it to the other day. Others they did nothing. And 15 to 20 percent drop in energy use when you saw every day; that was before meters [were available]. The behavioral stuff works. It was interesting in the eighties Reagan people wanted to end that right away. [They] thought we were doing mind [. . .] manipulation.

CARUSO: Mind control.

SAVITZ: So that was that was why I left the government, and I got back into good stead. I have to give Mike [J. Michael] Davis **<T: 155 min>** credit. I was still on [National] Academy committees after that for energy and related things but Mike Davis [who was] in [George] Bush 1 [administration]—the assistant secretary for conservation—had me named to go on the Secretary of Energy's Advisory Board. [The Secretary of Energy Admiral James D. Watkins] remained on it until it got disbanded [under Bush 2].

CARUSO: Oh, that does take us to the end of your time at the DOE.

SAVITZ: And we're all getting tired of sitting.

CARUSO: Well, yes, and I was thinking . . . sometimes when you do oral history interviews, you don't get to a good stopping point, but I think this seems like a good one and a great place to pick up next time hearing about the years between government and joining the Garrett Corporation, and then moving on from that point in your history. So I think we're scheduled for next Thursday?

SAVITZ: Next Thursday, same time.

CARUSO: So if that works for you, I'd love to pick things up then.

SAVITZ: That works for me, yes. You bring up all these memories.

CARUSO: I'm happy to do so.

SAVITZ: People don't have to go into psychiatry. [laughter]

CARUSO: So, Kenny, do you want to turn off the recording?

EVANS: Yeah, can do.

[END OF AUDIO, FILE 1.1]

[END OF INTERVIEW]

INTERVIEWEE: **Maxine Savitz**

INTERVIEWERS: **David J. Caruso**
Kenneth M. Evans

LOCATION: **via Zoom**

DATE: **8 July 2021**

CARUSO: [. . .] So today is July 8, 2021. This is our second interview with Dr. Maxine Savitz as part of the PCAST oral history project with us. I'm David Caruso, and Kenny Evans is here as well. We're going to be picking up where we left off last time, but before we get into your work after government, what I wanted to start with is just asking to see if there's anything that you've thought of since that first session that you'd like to add before we move onto I guess your work post-1983.

SAVITZ: It occurred to me [when] you had asked about when I set up the laboratory who might [have helped] me in setting it up, and I said that wasn't an issue; I had done laboratory work as part of my thesis. [. . .] After being at National Science Foundation and [when I] went to some of the Department of Energy [predecessor agencies], particularly Federal Energy Administration, Energy Research and Development Administration. [. . .] I ended up managing people; [. . .] beginning with five people and then ultimately at DOE over 200. There were people who had given me help. One of them, [. . .] Roger Sant was [. . .] at Federal Energy Administration the assistant administrator for conservation and renewables. He succeeded Jack Gibbons who had been there for about a year. He said, "You hire good people, and your program is growing. But you need to be sure to delegate." So that was something that [was known by managers]. He was an MBA; he was not a scientist or an engineer, but [he had later] founded a very successful company, AES, [a fossil energy company]. He has actually [funded] space at the Phillips Museum in Washington, and the National History Museum—very philanthropic. When I was at ERDA—the Energy Research Development Administration—and Gene [G.] Mannella was the assistant administrator [. . .] for efficiency, and there were six of us who reported to him directly. He said, "You know, you were to work as a team, not in competition to each other and that each of you should be able to discuss the other five programs as well as your own." So that, sort of, started the whole aspect of [teamwork and collaboration]. The other [person] is I mentioned Bob Fri earlier, who was the deputy for ERDA; he had been deputy also at EPA for the first administration. [He was] a Rice graduate, [and] he passed away, unfortunately, [a few years ago. He had] a Harvard MBA, worked for McKinsey [& Company] and then got into government. So these people all knew about [management], and they knew enough about engineering and science. [. . .] Two things I learned from [Bob]—well, many things—he had three special assistants so that if you ever needed a question answered by Bob, how do you respond [or get responses]. You didn't have email and anything like that—this is in the seventies—and you would talk to one of the assistants, and within a day you'd get a

response back. So when I became the deputy for conservation, I made sure I had an assistant who was always available [to staff].

The other thing is that we were getting—because there had been pent-up demand to do research in the industrial and buildings area—[. . .] lots of proposals. We would get several hundred [responses] to an RFP [request for proposal], but how do you choose these? He had given us some guidance on criteria for selecting proposals and the whole process. [That really worked for a long time. The] last thing was the Department of Energy [was formed in '77]. My program was like 10 percent of the budget, but I got over 70 percent of the congressional correspondence. Everybody had an idea about how to reduce energy in their homes and the embargo—second embargo—came, and here's what they were going to do with cars. The Congress wanted responses within a week, and you could spend tens of millions of dollars that had been appropriated, and nobody looked at what [you spent money on]. They trusted you on what you were [funding]. We were tracked **<T: 05 min>** on our congressional correspondence, and every Monday we met with the deputies [first Zausner and then] it was [John F.] Jack O'Leary. I ended up hiring a [person] to answer the letters, and he said, "Well, you're not hiring an engineer." I said, "No, I'm going to hire someone who knows the Hill and [also could talk to the engineers] and get the engineering right." I hired a woman who had been a staffer on the Hill [Susan Heard], and we got off the radar screen and answered our letters [on time]. She ended up moving to California and worked [at] Southern California Edison where her last job there was a secretariat for the [external] board. I see her. She lives in Pasadena, [California], so it's just, sort of, interesting these things you learn. Some you think about intuitively, but others require some help, and in some ways, [I feel if] in graduate school [. . .] I had minored in business, I might have been better prepared. [laughter]

CARUSO: Yeah, I mean management and delegation and figuring out how to communicate ideas I think winds up being central to a lot of the work that people ultimately take on. Writing skills, I think more so than many other things, are extremely important since if you cannot communicate well in writing, people really aren't going to know what's going on, and if you communicate well, you can convince people of what it is you want to happen, and so it sounds like negotiating or just having someone to correspond with members on the Hill probably would be extremely beneficial—right?—because then people are getting answers and they're not constantly pestering you with, "Well, what do you mean by this? What do you mean by that?" It's like, well, no, if you write clearly, then you know these questions will be answered in advance.

SAVITZ: Or why haven't I heard from you? And engineers don't want to sit there and write the letters to Congress. They'll write a report or write up a procurement package, but to go [answer a letter is not] the priority [. . .] even though they know their money comes from the Congress. It's still an issue.

CARUSO: So, at the end of the last session, you told us about your . . . . I'll just say departure . . . from government.

SAVITZ: That's a good way to put it.

CARUSO: This was 1983 I think when your position . . .

SAVITZ: Right.

CARUSO: Right. So what did you decide to do at that point? You had spent so much time in government—like what?—I think it was about over a decade at that point.

SAVITZ: Seventeen years.

CARUSO: Seventeen years in government working in various positions, various programs. What was going to be your next step?

SAVITZ: Well, I wasn't sure. We wanted to stay in Washington because [. . .] in '83 my son was a senior in high school and [our] daughter a sophomore in high school. We had ultimately also thought of moving to California eventually. My husband grew up in Boston, spent all [of] his education in Boston, and still didn't like the cold. We had spent a year [in California when he] interned in San Francisco. We were going to stay in Washington [until 1985]. I was thinking I would do some consulting, which I did, and also right before I left [the government], John [L.] Mason, who was the chief technology officer for Garrett Corporation, which was an aerospace company [. . .] located in Phoenix, [Arizona], and Los Angeles. [. . .] Turbochargers was their product most known to the consumer. [The other small turbine engine they made are the main engineers on] Learjets and [on commercial aircraft]. [They provided] the environmental control [systems and starter systems] for all planes. [. . .] They had been doing a [DOE] program jointly with Ford and [in] a second [DOE] program with GM [General Motors] [and its] Allison Division of GM [were developing] gas turbines for automotive [propulsion] because they could take different fuels and also [had] potential of being more efficient.

[Dr. Mason] came to my office, and [asked] would I like to come and work at Garrett for him, as he was the chief engineer. This was in California. So I said, well, I didn't want to come for two years. [. . .] I went home, talked to Alan about it, and this was perfect—we'd come to California in two years. Anyhow, they had a Washington office, and so I'd work part-time [in their] Washington office a week or so **<T: 10 min>** a month, and then I would be out in [California], come out to LA for a week and spend it there [. . .] learning the company and

[meeting the] people. [Dr. Mason] was somebody who had finished Caltech in the late forties, saw an ad in the [local paper for a] position at Garrett, [joined as] a chemical engineer, and had risen up to be the chief technology officer and knew every product and every person. He was [. . .] a terrific person, though, talk about delegating or doings things at the last minute, this was not John. He had hired at the same time as he hired me [to be on his staff] a person from the turbocharger division. [. . .] Actually, their facility was right [. . .] next to LAX where there's now a parking lot near terminal one. I could fly into LA, walk there, stay at the Hyatt across the street, and not even need a car [during the trips]. The other [consulting part was] I worked with the Lighting Research Institute [LRI], which I mentioned briefly in talking about the lighting areas. [. . .] They—with the Illuminating Engineering Society—wanted to set up an independent R&D program different from their three main [lighting] companies, and even though they were headquartered in New York, I could do that from Washington, so that filled my time.

CARUSO: And so what were your specific responsibilities in each of those roles? Was it organizational management? Was it trying to build something? Were you working in policy areas to make sure that things are meeting with government standards? What were you doing in those two positions?

SAVITZ: Well, LRI was [an organization interested] in setting up an R&D agenda [. . .] which they would ultimately implement. With Garrett, [I] was learning about the company but also [new] areas that they were interested in going into, particularly fuel cells—solid oxide fuel cells [SOFC]—which Garrett is known for heat exchangers, which were shaped plate and fin [structures], and a solid oxide fuel cell has a very similar structure. [. . .] I hadn't really done much fuel cell work since the early seventies, but [. . .] I went [. . .] and talked to the people doing the heat exchanger work [and fuel cell work. What] should Garrett's role—if there should be one [in SOFC. I was] in the Washington office where [. . .] there were a few who were lobbyists [and] worked with Congress, but others were interfacing with the different government agencies. It was a very good education for me for when I got to California permanently because I knew how they worked—you didn't go approach a government agency without telling [the Washington office] first—a few things like that. They were just well-known and well-respected. I worked on the fuel cell effort and some advanced materials effort. [. . .] Through that [I] was learning the company.

CARUSO: And so you know Garrett's pursuit of the fuel cells was just . . . was this purely for alternative energy methods, or was this with a mind towards energy conservation trying to figure out different ways to supply energy to things and not necessarily rely on fossil fuels and stuff like that? Because I mean, being a California-based organization but also being the Reagan years, I'm wondering what is motivating this move towards this fuel cell?

SAVITZ: Well, part of it is a new product line [using technology they knew well]. The turbochargers [business] developed [from] their small turbine engine, so they worked with [a

diesel engine] company—I think it was it was Cummins—that wanted to have their engines [for trucks] turbocharged and that led to [their very good practice] about applying their technologies to different products. [. . .] And then [Garrett] was also [. . .] involved with ceramics and so the idea of getting a solid oxide fuel cell would be a different power system. It would be all related to that. And it's interesting, I found [out that] John [L.] Mason was [. . .] also very much interested in the environment and things like that. He passed away two years ago, and his son sent me a letter that we had both signed to a senator from Colorado, Tim [Timothy E.] Wirth, **<T: 15 min>** about our support for energy conservation R&D, things related to climate change. I [had forgotten that letter]. I knew the energy [issues] because I was still [involved in various national energy studies]. Garrett was very good about [that when it] became AlliedSignal [in 1981. They still let] me to do work on various committees related to energy. I was amazed that we had written this letter, and there we're talking about climate concerns in '87. They were concerned with also potential [energy use in aerospace applications] because of missions; otherwise, [. . .] if you're starting [a jet] engine at an airport, you're [using diesel fuel], you're just adding to pollution in addition to the plane flying off. It was looking to protect their product line—a lot of it.

CARUSO: So you moved out to California in '85?

SAVITZ: Eighty-five, yes.

CARUSO: Your kids were off to college and beyond, so . . .

SAVITZ: [Yes, my] daughter, who went to Stanford, [. . .] said, why did we follow her to California, or was she following us? She wouldn't see her friends in Washington. She spent the summer after [her] freshman year living with family that we were very friendly with and she was friendly with their daughter, and she worked for an NGO, which was fine. And they both ended up going to medical school at UCLA, I think, because we were in California. I mean, as opposed to [stay in the East]. My son was a Yale [University graduate], did an MD/PhD, and he chose UCLA over [Johns Hopkins University for it]. I think partly just to get a feel for a different environment.

CARUSO: Yeah, and maybe avoid the cold weather?

SAVITZ: [Yes, but he] moved back [east] in '94. The weather is a big driver.

CARUSO: So you start in '85 at Garrett. You're settled . . . and you were in the LA area I assume? You weren't farther . . . ?

SAVITZ: [Yes], we lived actually in Westwood near [UCLA], so we rented a condo. My husband had gotten [a position in LA. My husband] was a psychiatrist; he had kept his [California] medical license [since 1962]. But the last couple years in Washington, in addition to having a private practice, he started getting involved with managed care. And he [. . .] decided he didn't want to—this is mid-eighties—set up a new practice, so he got a job as medical director of CIGNA's managed care operation in [California]. That was in Glendale, and I'm by the airport. [. . .] I had an uncle who had lived in Beverly Hills, [California], and we knew that area, so we wanted to live there because it was, sort of, equal distance for our commuting travel.

CARUSO: It was commuting middle ground.

SAVITZ: [. . .] We rented an apartment, and the following year we found one, bought one, and it was [on Wilshire Boulevard], the same street, and [I have] lived here ever since that time.

CARUSO: So in the . . . after the first two years, so I'm saying two years—I know that you were doing some work for Garrett prior to your official full-time start in 1985—but, after two years at Garrett full-time, you became the director of the ceramic components division at AlliedSignal Aerospace. Is that correct?

SAVITZ: Yes.

CARUSO: So what brought about that move?

SAVITZ: Well, one thing . . . we were part of . . . Garrett was part of Signal Corporation as was UOP [Universal Oil Products], which is what Mary [L.] Good headed, and one of the things I had done in two years working with John was—when I first met Mary—was setting up a research program that was more fundamental with UOP and Garrett. Otherwise, Garrett was all applied engineering; we didn't have a corporate research lab per se. Anyway, in '87, Hughes Aircraft Company [was up for bid—who was going to take their aerospace company, and Signal and Allied, which was Allied Chemical, talked about bidding on it. Instead of bidding on it, they decided to merge, so I felt that I was back in the government in such a way as a change in administration. [. . .] There [was] in just aerospace alone [. . .] Bendix Corporation [and Garrett Corporation. There] were two chief technology officers, there was a very little overlap in products, but there [were] the personnel and **<T: 20 min>** the corporate research labs. That's when Mary became the chief technology officer [for all of AlliedSignal]. So John Mason became the chief technology officer [for aerospace] rather than the person from Bendix. There were [efforts] to put together these [. . .] two organizations, which ended up [. . .] working well.

When [Larry] Bossidy came in after [Edward L.] Hennessy, there were twenty-six different units, and Larry Bossidy, who was second at GE but never going to head GE, came in the early nineties, he put it into four major buckets and got rid of converse tennis shoes and things like that. So it was aerospace, chemicals, automotive, and their specialty chemicals. They ran at the Kansas City National Lab, which was responsible for the non-nuclear triggering devices for the [DOE weapons program. I'll] get back to the ceramics—but [Bossidy] really [introduced total quality in production]. We spoke as one organization, which became very important for [proposals].

Anyway, one of the things that Garrett had continued to work on [was] the ceramic gas turbines, which were part of the DOE [automotive] program, and [it] had continued to be funded. It really was clear that it wasn't going to be [successful] for automotive [use, but AlliedSignal was] interested in it for aerospace. The person at DOE who was running the program in the eighties [. . .] was somebody that I knew—but also they had done work [with Garrett. DOE thought they could] switch and look at ceramics for aerospace applications. Because for small engines [. . .] there's not enough airspace to just put lots of coatings and things. Allison was interested in the same thing; they were part of General Motors at the time. So there was an ongoing ceramic program that still continued but for different application. [. . .] There were a couple [ceramic] manufacturers—there was Norton [Abrasives] and there was Carborundum, who were US manufacturers, but the best [. . .] ceramic material and parts [. . .] were Kyocera and NGK in Japan. There was really concern [. . .] by the Garrett people we were 95 percent of the small engine market [. . .] in planes, and Japan had set up, following, tracking the US energy programs had set up a ceramic gas turbine program, so they were afraid that they, in addition to producing parts, would start to back engineer [the gas turbines]. So do we do something? Should we [form our own ceramics group]? There was no US one [equal to the Japanese companies]. And we now had a [corporate] research organization in Morristown, [New Jersey], that was very material-oriented, and they had high [success in] development of metals plus they were working on ceramics. We decided we would form a division—or a branch—to really develop the ceramics and try to and ultimately manufacture and put them into the applications mainly for aerospace applications but turbocharges could also be [one]. You would no longer have the inertia [in turbocharges]; they would be faster. NGK in Japan was making ceramic turbochargers [for AlliedSignal at the time].

So that's why we formed [a ceramic division. Because] I had worked in the government and I knew the technology, [they asked] if I would head it. I thought this sounded [exciting], and the corporation was willing to make the investment. Dan [Daniel P.] Burnham, who was at the time [a new] head of aerospace, [. . .] had come from the chemical [division], actually had been at Carborunbum at one point. And he didn't know aerospace—Bossidy just mixed everybody up, which was fine. So I was under the radar, and they gave me certain things that I wanted from the beginning. We didn't have a [ceramic] material that we would know [would meet requirements]. There was a metal foundry that had made all the metal parts, but the ceramics are quite different. You want a clean—doesn't have to be clean room—but it has to be contaminant-free. **<T: 25 min>** I said, "In addition, I need you to hire—external to the company—engineers who had been in industry working on small parts and some material experts." And, as I mentioned earlier with the heat exchangers, there were some ceramic people in Torrance,

[California], at the division there. They had been at Penn State [Pennsylvania State University], and they found some of their colleagues, a couple working at General Motors and [one at Air Products]. Everybody in their late twenties, early thirties [. . .] who knew about commercialization. I wanted a Garrett business development person who really knew the corporation where we could sell internally but also sell externally. I had gotten permission that I could provide if we got the material, also to Allison, who was a competitor of Garrett, but we were going to have different people working on it. And also a contract administrator [. . .] who could just dedicate herself [to the ceramic program]. We started this [division], and then after six months either [. . .] Kyocera approached us [or we approached them] about a potential joint venture.

So for the summer of '88, we went [. . .] to Japan about potentially doing a joint venture. [. . .] Also, Senator [Robert C.] Byrd at the time [had] said US had to buy [from US companies] in the R&D programs that were under his domain, which the [DOE] conservation and fossil were. [. . .] Kyocera was not happy [about parts having to be made in the US], and the Japanese would not test our materials. [. . .] Even before [we began talks], it was decided [that] this joint venture [would] be in the US. Well, it was decided. The Phoenix division still wasn't happy about it. And so we didn't do it. We just proceeded; [Kyocera] opened a facility up in Oregon. But our Morristown group had developed a very good high temperature, tougher silicon nitride. The problem with ceramics, they drop and they break. [They can have high strength properties], and they [can reach] high temperatures but most of the way to toughen [them] is by making a composite, [insert fibers in the material] that will [prevent a catastrophic failure]. The Morristown people had a developed an *in situ* material where you could internally grow silicon nitride—not quite fibers and not whiskers, they were much longer than [whiskers but] that would give it the added toughness that one needed. We ended up having one of the best materials in the world, and the people I had hired really knew how to [. . .] make parts. [. . .] There was technology that Oak Ridge National Lab had developed under [a] DOE program called gel casting, and I made an arrangement for [ORNL] scientists to spend a year in our laboratories to help transfer the technology.

Ultimately in the early [1990s] after three years or so, we were [making progress and] we really were going to need a facility. [. . .] We were being able to make repeatable parts and they were either various blades or also simple [parts such as] rings or for other parts, not just the hot engine part. [. . .] We needed to have our own facility, and Mary was very helpful in that. In fact, the two of us approached the chief operating officer of AlliedSignal. [He said that] if he has [the] two of us approaching him no way [can he] turn us down. So we ended up going into production [of silicon nitride components]. On the main engine that Garrett sold, the seals were [metal and were rubbing] against metal and [were] warrantied for twenty thousand hours [but] were lasting for [only] five thousand hours. That was a big expense. Whereas the ceramics had much better wear property, and so we and Kyocera ended up being a major supplier for [replacing all of the metal seals in the engine. We were also producing] another part for the starters because [silicon nitride not expanding, the temperature could go] from room temperature to very cold temperatures, [and there would not be expansion or shrinking]. We never **<T: 30 min>** [. . .] really got to certifying [. . .] the ceramic blades for the hot section [of the engines]. So it was a niche market.

CARUSO: So a couple of questions. When this reorganization, restructuring happened with the merger, were you . . . so you mentioned hiring individuals and bringing people on. You mentioned the lab in Morristown. Were you physically in the same location as you had been when you joined Garrett, or were you moving into new facilities in the Los Angeles area for this new venture?

SAVITZ: No, what had happened [was] the facility that I had been hired into, which was corporate headquarters, was at the airport and after the merger, they decided we didn't need [corporate] headquarters [in Torrance. Heat exchangers were being produced at the LAX location. Ed] Hennessy at the time decided to sell that property and [move to] Torrance [where] new facilities [had been built. Torrance] is ten miles south of the airport and off the 405. That was where the [metal] foundry was, that was where the aerospace headquarters were for the corporation. The foundry had [done some of our initial ceramic work and] was a block away from the main campus. [They] had some space that we could use, and our offices were in trailers. [. . .] In '92 when we [. . .] needed a production facility, we went back to the Torrance site. There was empty space there that we could convert into the laboratory [and production facility], and we didn't need clean rooms or anything like that but needed it to be relatively clean.

CARUSO: I know you mentioned needing to travel to Japan when Kyocera was interested in a joint venture. Did you have to travel elsewhere to manage this division? Like did you have to go back to New Jersey occasionally?

SAVITZ: Oh yes, very much so because they had developed it, and [when] you scale up, [. . .] they would send people to us. I would also be traveling to Phoenix, and the engine division in Phoenix had a real schism. There were half of them who really liked the [*in situ*] silicon nitride. [. . .] Others said, only in composite. We just don't trust [toughness. It] was just interesting. They had a really good material scientist there, Jim [James M.] Wimmer, who after two years we were in operation, asked if he could come join our group, and he moved from Phoenix to Torrance. And it was amazing; Jim coming to us just gave us all the credibility we needed to the engine division, and they still had their composite people. But he was a super engineer, material scientist. I also traveled [to] Oak Ridge. Oak Ridge had developed a building—high temperature material lab that could do testing—and we could transfer [similar testing equipment to our facility]. I was also on their advisory committee. And I went to Washington to talk to various customers, went out [to] Allison, the division of General Motors, was in Indianapolis, [Indiana]. They [are] now Rolls Royce. [. . .] I mean, partly [selling] and showing [results], I didn't do [much] international travel. I sent my young engineer John [P. Pollinger] off to Germany [to learn about] some interesting instrumentation [they had]. He ends up coming back, ended up

being on the Concorde.[6] [. . .] He's gone from [driving on] the German superhighways. This is this thirty-year-old brilliant man. And then all of the sudden, he's on the Concorde.

CARUSO: One other question just out of curiosity. The lab in Morristown, was there any association or any affiliation to the—I don't know who owned Bell Labs at that point in time—but was there any connection to Bell Labs in Murray Hill, [New Jersey], or is it a completely separate, different . . . ?

SAVITZ: Completely separate. We were, [. . .] until we merged with Honeywell, [. . .] more into the structural—what's called **<T: 35 min>** structural ceramics—for parts as opposed to the functional electronic ones. I can't remember anybody in Morristown who [. . .] we might have hired from Bell Labs. I just don't know. But just as an aside, talk about back and forth. [. . .] After Mary Good left to join the government in the nineties as undersecretary for commerce, Bossidy really was [not interested in big research labs. He would rather buy the technology than invent it]. Neither was [Jack F.] Welch [at GE. After Welch retired, GE did build back their lab. Bossidy hired someone] from Westinghouse to be chief technology officer; that didn't quite work out, and the labs just lost more and more of their esteem and [reputation and] some of their people and their leadership. Lance [A.] Davis who ran the lab went and joined [DOD]. Mary was concerned about whether Bossidy would keep him. [. . .] He became assistant deputy at Defense under Anita [K.] Jones in the nineties and then became the executive director of the [National] Academy of Engineering [NAE] for almost twenty years. But [. . .] after the Honeywell merger, I ended up being part-time head of the Morristown group, which was doing more aerospace [R&D] and not general chemical [R&D] at that point.

CARUSO: You mentioned in your travels Phoenix, you mentioned Oak Ridge. Were you traveling to DC at all? Were you hitting any of the policy issues? Were you meeting with congressman and individuals at various federal agencies?

SAVITZ: [I met] with the Congress [and testified]. It was not just on legislation. At that point, it was really appropriations to be sure that AlliedSignal got the money we wanted [. . .] because this development was done jointly with our own money and the government's, so it was informing Congressmen [Sidney Richard] Yates, who was the head of [US House Appropriations Subcommittee on] Interior, which was a committee [energy efficiency] and fossil energy [came under] by legacy; ultimately in the last ten years, it moved all to [US House Appropriations Subcommittee on] Energy and Water [Development]. I would [appear at appropriation hearings and] bring parts to show him. I had known him from when I was at DOE. [. . .] Garrett, or now [. . .] AlliedSignal, was very good about when there was [open] testimony

[6] The Concorde was an aircraft that flew passengers at twice the speed of sound beginning in January 1976. The average round-trip price was twelve thousand dollars. See Robert van der Linden, "My Ride on the Concorde," *Air & Space Magazine*, accessed November 10, 2021, https://www.airspacemag.com/flight-today/my-ride-on-the-concorde-6783087/.

we would come and testify to talk about our progress, so it was on [the record]. I would meet with DOE and DARPA and some [other parts of] DOD. Those were the main ones. [. . .] I was on various committees and boards beginning particularly in the nineties that were in Washington, and they paid for my travel expenses, so I didn't have to take it out of my budget. [I would time it to visit customers.]

CARUSO: I have a . . . . I'm curious about something, and I'm not sure how to formulate the question. I'm thinking about your career, especially post-government career, where you are still heavily . . . you're very invested in US policy with regard to science and technology. You left the government during the beginning of the Reagan era, you were in this private company during the rest of the Reagan era, the beginning of Bush, and then moving into Clinton. And so I'm wondering if you have any broad perspectives on the ways in which the various governments that you encountered over your time at Garrett and later Honeywell . . . the way that . . . did you notice any changes in the way that the governments were thinking about science and technology during this portion of your career? Did it tie into . . . ? Was there just a general governmental interest in science and technology so regardless of administration people wanted to talk to you about the things that were going on, or did you see different emphases depending on whose administration it was?

SAVITZ: Well, because Garrett was aerospace- and defense-oriented under the Reagan administration, the DOD budget was growing and the research budget **<T: 40 min>** and that's consequently how DARPA became—for those of us in the more basic [research areas]—a funder. [. . .] Reagan particularly kept dropping the request for the [energy] efficiency programs and renewables to Congress. The Congress kept adding it back so that those programs [continued]. The policies changed. [. . .] We had had appliance standards in the early eighties and under Reagan's administration, they were repealed, but then the states could do their own thing, and when Bush came in, [. . .] the appliance industries, they didn't want eight different standards [from eight different states]. They would rather just have one national standard. [. . .] There was just no real [energy efficiency] policy. Now the [National Research Council (NRC)] was particularly going into the Clinton [years doing studies]. Bush was in 2000 was doing energy studies. [. . .] They were evaluating [the level for] CAFE [Corporate Average Fuel Economy], [which] was the automotive standards [. . .] still going on. [. . .] How well were they progressing? Things really changed, though, in the Clinton administration. [. . .] [George] Bush [41] was more sympathetic to [energy R&D and some of the climate relevant R&D] was going [into the] budgets. I really was less involved with what the NSF budget was until I went on the National Science Board in [1998].

CARUSO: Ninety-eight.

SAVITZ: Ninety-six or ’98. But so [AlliedSignal] spent its own money on things [that were] for future developments. [. . .] They were involved with the space program early on, so they were very used to being partners with the government.

CARUSO: Okay. So let’s see . . . when did the . . . so I know eventually became the general manager of technology partnerships at Honeywell but I’m not sure when you took that position on—what year was that?

SAVITZ: We took over Honeywell in [. . .] 1999, including the name. And it was at that point that . . . interesting . . . at [AlliedSignal] corporate research groups, both UOP and Morristown, did research that was very futuristic. We had a man, Ray [E.] Baughman, [who went to] University of Texas at Dallas, [. . .] after this merger. [He] had started ten years [before the 2001 Nanotechnology Initiative] nanotechnology work that we [encouraged]. They also did very applied work [. . .] like the ceramics work they did for us. [They] were looking at coatings for some of the engines. But Honeywell had very active research groups in both Arizona and the main one was in Minneapolis, [Minnesota], where their headquarters were. They never talked to the business units. I mean, it was like we’re here, and they got Honeywell corporate money and they got some government money, so the idea was to see what technologies they were developing could be applicable to their own products plus the old AlliedSignal’s and also getting the various labs to work together. And then [after two years of being Honeywell], I retired. [. . .] GE tried to take over us within [the first] year. Jack Welch had not been happy about the merger, and, you know, there was rumor UTC [United Technologies Corporation] was going to take it over. The EU anti-trust people stopped that merger, which was a good [for Honeywell]. Honeywell’s so much better than GE in the whole operation.

CARUSO: Now, Kenny, I’m not sure if you want to ask now about . . . so, Dr. Savitz, I know that you served on several energy R&D panels during the Clinton PCAST, the one that John [P.] **<T: 45 min>** Holdren chaired, the federal energy research and development for the challenges of twenty-first century and then the powerful partnerships. Kenny, do you think now is a good time to talk about those?

EVANS: Yeah, I would say so.

SAVITZ: Let me just say here just a few, just a couple things because I was continually involved with energy [studies. There were the National Research Council] committees [and studies]. Also, I felt [. . .] the government rehabilitated me in the last part of the Bush [41] administration. I went on the Secretary of Energy Advisory Board, so I got back into energy policy. The other thing that happened [was] Lance Davis, who I mentioned earlier, and I were both in 1992 inducted into the [National] Academy of Engineering, and that made [a difference, though] it shouldn’t make a difference—just like going formally on PCAST shouldn’t make a

difference—as to how the outside world treats you. That led to more activities related to both government boards and also advisory [boards] for the national laboratories, so anyway, [. . .] we can get to the Holdren study.

EVANS: When did you . . . you said you were rehabilitated in some [sense]. When did you start serving on the Secretary of Energy Advisory Board [SEAB]?

SAVITZ: It was the late part of '89 or '90, something like that, and I was on it until when [George W.] Bush 2 came in and they disbanded [SEAB] in 2001, 2002.

EVANS: I see. Were you . . . like when you were appointed to that board like in the early nineties, were you aware of [D. Allan] Bromley's work at PCAST and that White House operation during that time?

SAVTIZ: Well, because [. . .] Jack Gibbons was a good friend, he had been, as I said, I had come to go work . . . he had been at Oak Ridge, which I had worked with him in the seventies, and then he was the first head of energy conservation [before DOE]. He then went back to Oak Ridge and then became the head of the Office of Technology Assessment [in DC], which was another good advisory group [for Congress] that Newt Gingrich stopped funding the eleven million dollars [in the 1990s]. There's been talk about resurrecting it and should [be]. But that's a different topic. [. . .] I served on several of their assessments, which were related to energy efficiency. Jack and I and actually Mary Ann [and my husband]—the four of us—were very friendly. So I was very aware of it; I was also aware of it in the eighties. [George A.] Keyworth, I guess, was [science advisor. I] knew more about the science advisor [. . .] than I knew about [PCAST]. The PCAST working groups I knew more about when Jack was [Clinton's first science advisor], and then Neal [F. Lane] came on as a second advisor.

EVANS: I see. So it was Jack that recruited for the Clinton years.

SAVITZ: Well, he recruited me for National Science Board. [. . .] The Holdren study I think was ninety [. . .] when Neal was there, '96, '97. [. . .] John [Holdren] was the one who put [me on PCAST energy studies. I] had known John since he was at Berkeley and also having still been involved [and] I was still known to be involved with the energy efficiency programs and having helped develop them and grow them. [. . .] We had a [SEAB] study [. . .] that Dan [Daniel] Yergin chaired: *Where's the 'E' in DOE?* in the mid-nineties.[7] The fact [was] that the Energy budget was like four or five billion dollars, and they had science at about the same

[7] Task Force on Strategic Energy Research and Development, Secretary of Energy Advisory Board, "Energy R&D: Shaping Our Nation's Future in a Competitive World Final Report," June 1995.

[level], but the weapons program was the rest and clean up, and it's still that way.[8] I had been vice chair of [the SEAB study and became an energy policy expert in the 1980s and 1990s. Dan had] done his first work [in the 1970s], but he really didn't [focus much on] energy R&D. That's what this [SEAB study] was focused on. He's a wonderful writer; he could take [. . .] things we talked about [and write coherent reports], just like the catchy title. There were some [SEAB] energy studies I had been participating in. [. . .] Under the Clinton administration [there was a] Laboratory Operations Board [as] part of DOE with four outside people, four inside people, and four lab people reporting to **<T: 50 min>** the undersecretary. Charlie [Charles B.] Curtis was the first one and then he became deputy [secretary], and [. . .] Ernie [Ernest] Moniz came from OSTP and became the undersecretary. [. . .] I think [that] was in the second term of the Clinton administration. [The Academy] had done a study [. . .] in 2000 [. . .] ordered by the Congress, "Twenty-two Years of Federal R&D in Fossil and Conservation—"Was It Worth It?"[9] I had been vice chair of that; Bob Fri had chaired it. [. . .]

EVANS: Was that study with the National Academy, or was that a . . . ?

SAVITZ: [Yes], it was the National Academy [study]. The National Academy was continually doing studies. [. . .] I sat on the Board of Energy and Environmental [Systems] and before that it was [. . .] a board of engineering—energy engineering. [The Academy] had a reorganization in 2000; *2000: Was It Worth It?* came after the John Holdren exercise.

EVANS: I see. You said exercise, so when you were . . . [laughter] Could you maybe expand what you mean by that?

SAVITZ: Well, I mean, it was work. [. . .] I should have said study instead of exercise, but it was very good. What I found fun in it [were the people and depth of the study. It] would be a study that normally [. . .] when John became head of PCAST, one of the things he wanted to make sure was that we did studies that the Academy wouldn't do so that . . . and this was a study—the R&D study that we did ["Federal Energy Research and Development for the Challenges of the Twenty-First Century"]—was very detailed and would have been something more like the National Academy would do but they weren't doing it. DOE wasn't funding it, and we really needed it for the guidance [this going forward from the mid-nineties to look at] the different applied energy programs.[10] It was, sort of, fun to think about an energy efficient

[8] Interviewee note: Under the Biden administration, this has changed with Energy R&D growing.
[9] National Research Council, "Energy Research at DOE: Was It Worth It? Energy Efficiency and Fossil Energy Research 1978 to 2000," accessed April 6, 2022, https://nap nationalacademies.org/catalog/10165/energy-research-at-doe-was-it-worth-it-energy-efficiency.
[10] President's Committee of Advisors on Science and Technology Panel on Energy Research and Development, "Report to the President on Federal Energy Research and Development for the Challenges of the Twenty-First Century," November 1997, accessed April 6, 2022, https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast-nov2007.pdf.

budget; you've had an idea of what you would like and then you have the people who you were discussing it with—fossil and nuclear. And I remember Bill [William] Fulkerson from Oak Ridge going, "Why does energy efficiency always win?" [laughter] Except for Senator Byrd. So it was interesting [and it took time to do. When] I was on PCAST with [Barack] Obama, I was then retired, but these studies are very involved. I did have a staff person on OSTP who worked with me, but just getting information and putting it all together for the chapter [took time]. AlliedSignal was perfectly happy [and] willing for me to work on that [PCAST study. I] wasn't making the ceramic parts. I had good people making the ceramic parts. And it brought me to Washington where I could still go see customers. But [PCAST was] going to brief [Bill] Clinton on the study as PCAST, and we were being invited to that briefing whereas when I was on Obama's [PCAST], [. . .] we met with the president a lot—fourteen times—but it was just PCAST and staff. It wasn't other members of the committee [report], external [committee members]. [. . .] The Washington office [of AlliedSignal] said no because the automotive people who were their customers for turbochargers might be very unhappy that part of it was looking at policies in addition to R&D and was increasing the fuel efficiency standards was one of them.

EVANS: I see. That was . . . this is the Clinton administration?

SAVITZ: [Yes], but that's all right. [The report got published].

EVANS: Well, the report . . . so Clinton was then made aware of this report that was part of what you were briefing him about?

SAVITZ: John was briefing. John was a member of PCAST, and yes, they were [other members of the committee]. I don't know how many [there were. I can't remember] in the report [on PCAST] you [published in] 2018. I can't remember how many—if they said in there—how many **<T: 55 min>** times—I don't think you did—they met with the president.[11] That [Clinton's] PCAST had much more—at least from what I understand from even when Jack began [meetings with Al Gore, who] was really delegated to be the chief receiver of and interface with PCAST.

EVANS: Yeah, that makes sense, and I've heard that before that Gore was, kind of, delegated to dealing with—early on at least in the Clinton administration—dealing with science and technology. Around that time . . . well, you were then around that time you said either '96 or '98 [you] were appointed to the National Science Board. So how did that . . . was this another, kind

[11] Kenneth M. Evans and Kirstin R. W. Matthews, "Science Advice to the President and the Role of the President's Council of Advisors on Science and Technology: Membership, Activities, and Impact in the Last Four Administrations," James A. Baker III Institute for Public Policy of Rice University, August 2018, accessed April 6, 2022, https://www.bakerinstitute.org/research/science-advice-president-and-role-pcast/.

of, consequence of you being somewhat, you know, visible in these circles as well as, like, being inducted in the National Academy of Engineering?

SAVITZ: So Jack had me nominated—Gibbons, I mean—but [. . .] clearly a selling point was, in fact, that I had been elected to the NAE. I mean it's so that in some way, the other [SEAB and Academy] reports could be important, but [they were] less important [if you were] thought to be political if you were pro-something. Being in the NAE for whatever reason has a seal of approval, a housekeeping seal of approval just like going to MIT did. I mean, it was just interesting how the community reacts to these things. And Jack made point . . . there were four people from industry on the [NSB]. You had six-year terms, and it rotated. There was twenty-four people on it, and he had four people from industry: John [A.] Armstrong from IBM, another person from AlliedSignal, [Eve Menger], and the chief technology officer of DuPont who then went to Corning. It was interesting. The Bush National Science Board did not have industry people appointed. And having industry [people provided different insights].

EVANS: Bush 1 or Bush 2?

SAVITZ: Bush 2. I don't know whether the Bush 1 [had industry people], but Bush 2 did not. Now [they had] Julia Phillips who had [been at Sandia as head of] the board, or Maria [T. Zuber] headed the board. They now [have] people who had been in industry—Obama had. I don't know [how many industry people he had], and Obama actually reappointed from . . . . I mean, not Obama—[Donald J.] Trump—actually reappointed some of the people from Obama time. But so we were [. . .] the industry people [in 1988 and were] different from the academics [who] wanted to know why do you keep funding these things forever? Shouldn't 20 percent of the portfolio turn over every five years? What's your criteria for choosing projects and things like that? It was a different perspective.

EVANS: Yeah, yeah, yeah. For sure. I wonder . . . so I'm curious about . . . you'd mentioned earlier that Dr. Holdren, kind of, had this vision for PCAST reports being things that the National Academies weren't doing.

SAVITZ: Or wouldn't be appropriate for PCAST [but] would be more appropriate for the Academy.

EVANS: I see, I see. Some of the reports, or the two reports from the Clinton administration, then, in developing those reports, who was your target audience? Was it the president, or was it a more, kind of, general . . . ? Where did you want the reports to land I guess is what I'm asking?

SAVITZ: Well, I mean, you know at that point, I was not sure. I hadn't seen [and] I don't remember seeing a lot of PCAST reports. [. . .] When John recruited us, it was clearly meant to be for the president or the administration. [. . .] In that case because of [being] related to DOE, it was clearly going to be meant for DOE and because of budget, OMB [Office of Management and Budget]. But also it ended up [that] John used it very successfully briefing Congress on it and even during Bush [2] would use to brief to try to increase [applied energy R&D budget and] to make sure the budgets wouldn't get decreased **<T: 60 min>** but would increase. The numbers were still appropriate; they hadn't been reached.

EVANS: Right, right. Yeah, well, I know in those reports they had pretty ambitious budget targets. It's always good to set the bar high in discussions, I imagine. Was it similar under President Obama? I know John Holdren has these, you know, infamous long and detailed studies? Was that the similar experience in the Obama administration in terms of developing reports and getting them out there?

SAVITZ: Well, the idea was to get reports and have actionable items. That was really a key thing for the audience. Depending who chaired the report [will often] depend upon the length. Ernie and I co-chaired one on energy innovation and that actually got implemented—a lot with quadrennial energy review (QER), quadrennial technical review (QTR), and [reorganization] within DOE. How we change in supporting [R&D had] some budget stuff and also some social science.[12] Well, you know, our report was thirty or forty pages; we wanted short reports. There are other reports that became much longer, but [. . .] the idea was to try to get them done in a reasonable [amount of] time so that the policies could implemented, and those were clearly geared for the president or the cabinet official that would request it. One of the things [is] we had cabinet people come both to our public sessions to talk about their issues, and also we had a dinner—this is in the Obama PCAST—a dinner [Thursday]. Meetings were typically Thursday and Friday. And Thursday night we would have a dinner at the Academy other than when [the Academy building was being renovated and they allowed] us to meet there, [we would have] the dinner and invite a cabinet person, a staff person to come—things they might be interested in. When Secretary [Steven] Chu came to see us, he said he had a good feel for the science programs, but not necessarily for the applied programs and where they were going and so that led us to do that report. Of course, then Ernie became secretary of energy, and my comment was the best way to get your things implemented was to get somebody on the report become the secretary because he implemented all the organizational changes and the QTR, QER. It was very good [progress to produce the] reports, we were not given a page limit—it was really up to the people who were chairing the study.

[12] President's Council of Advisors on Science and Technology, "Report to the President on Accelerating the Pace of Change in Energy Technologies Through an Integrated Federal Energy Policy," November 2010, accessed April 6, 2022, https://digitalcollections rice.edu/Documents/Detail/report-to-the-president-on-accelerating-the-pace-of-change-in-energy-technologies-through-an-integrated-federal-energy-policy/266408.

EVANS: Right. That makes sense. You were also in the Obama PCAST appointed as a vice chair. Did that change, kind of, responsibilities in your role in that committee?

SAVITZ: [Yes], that occurred [in 2010]. Bill [William H.] Press and I were appointed co-vice chairs. When Harold Varmus, who was the second external co-chair, became head of the National Cancer Institute, and so he had to leave. No, I mean, what it became was more time [spent on PCAST activities]. [. . .] John had weekly phone conversations with the four [of us]—he and Eric [S. Lander] and Bill and [me] and then the staff person [PCAST had]. Very limited staff—two people. [. . .] Those weekly calls, they were pretty consistent were really to go over some of the report status, what some issues were coming, planning for the next meeting, and who to invite and what's the [meeting] agenda. And then there was more responsibility [with regards to the reports. We read] the reports before they got issued. I mean, one of the things that impressed me about PCAST at least with the Obama administration—and I don't know how it was [before]—was the review process. I mean, the Academy has a very detailed [review process] and works very well. I've been on the [Academy] report review on various [topics. It always makes] the reports better. They send it out to external reviews, and you make changes. You have to respond to every **<T: 65 min>** comment. PCAST did its own review. I mean, the quality initially with Harold Varmus and Eric and John [was very good. They were all] very good writers and good editors. [We] would do that and we would also—unlike the Academy who doesn't want to interact with the sponsor as you're developing the recommendations—[would] get input from the sponsor from technical things—we could interface with the sponsor and could run things by the sponsor before we did the reports. It didn't necessarily mean we changed them, but they would also get a chance to read. I think the quality of the reports . . . . I mean, it's hard to say—other people would have to judge—have been fairly good, have been fairly high. But we didn't have a formal reviewer. [. . .] Everybody on PCAST was supposed to read [the reports] before we were to approve it.

EVANS: And everyone met . . . was it every other month? Were these Thursdays?

SAVITZ: Every other month, so [yes], when John called me in February of '09, he said, you know, six times a year in Washington and two days a week. It will not be that much; you'll [. . .] do interesting reports with interesting people that will have an audience being receptive—we didn't know how receptive at the time—but it was very receptive. But he didn't mention you're going to be doing thirty-six studies, which, of course, nobody had ever thought of and those were not within the two days. We did a fair amount of in-person meetings, and we [also] had external members [on the report committee]. As it evolved over time, we started getting a lot of internal expertise by phone calls—it was before Zoom—so we could talk to this chief technology officer or this person from HUD, or from NIH without having to physically have a meeting, but you did have at least two [in-person meetings] and then just getting it together and making sense of it. One [member], Rosina [M.] Bierbaum, who had been on OSTP during the Clinton administration, was really good climate [expert] was on our PCAST. She was dean at [University of] Michigan for public policy. She said she was spending 50 percent—50 to 75

percent—of her time on PCAST activities. And mine was closer to 50 percent, yes. There was this with the telephone and doing the reports. But when you look at that you had [no hesitation about spending the time. It was just that] you were addressing interesting topics [with] very experienced people, and Obama really cared about it. That was the thing. After each meeting, John in his weekly report to the president would always summarize what we had done at the meeting [. . .] when we didn't meet with [Obama]. So [he was] very much aware, and we were able to get very good speakers come to speak because PCAST was viewed as an important part of the administration. And John said he was . . . Eric's now a cabinet official, which I think is great knowing that he can get to [be a cabinet officer but John] was able to attend all of those meetings as a non-cabinet member.

EVANS: Right. Wait, you said Dr. Holdren was able to attend cabinet meetings as a non-cabinet member?

SAVITZ: [Yes], and they had [. . .] a green cabinet [. . .] that were all people from the energy and environment areas. [. . .] He was very much a part of the National Security Council meetings, [which] he could attend. He just wasn't a principal but having a real seat at the table makes a difference.

EVANS: Right, right. When you did meet with the president, you said you met fourteen times with President Obama. What were those meetings like? Did they . . . did you meet in the same place? Was there press? Was there . . . ?

SAVITZ: [. . .] I mean, just in general our PCAST meetings [. . .] the first day, Thursday, [were] all closed meeting and the dinner was a closed dinner. The Friday morning meeting was open and all streams [and] webcast and [. . .] were all available. **<T: 70 min>** But we would often have one of the people on the panel [in open session and would] then come to a lunch that would be closed again. It was where a lot of the ideas and things [were discussed. The] meetings with the president [. . .] were in different places. The first meeting with the president was just, sort of, a photo op is when we were all inducted into PCAST. And that occurred during the National Academy of [Sciences] meeting in April 2009.[13] The picture that [was above us was] [Abraham] Lincoln signing the formation of the National Academy in 1863 in the middle of the [American] Civil War just like he did the land grant schools. So that was our first meeting with him, and I can't remember all the meetings. [. . .] Second meeting we had was in I guess in August [2009] where we met [during the regular meeting]. We ourselves met in one of the [government] buildings. [. . .] I guess the CEQ [Council on Environmental Quality] building. [After that we started] meeting at the Academy or hotel. But we met with the president [in August 2009] that time in the state dining room where the Lincoln picture is.

[13] Barack Obama, "President Obama on the Necessity of Science," the Obama White House, April 28, 2009, accessed September 1, 2023, https://www.youtube.com/watch?v=k5-MgZD5IMc.

And that was when we were really starting to put the [PCAST] agenda together and also to brief him on the H1N1 report.[14] That had really gotten started early on because there was real concern that fall [about a pandemic]. Eric and Harold had chaired that. It was before we had really had an organizing meeting, and we had come up with various topics that we thought should be studies at that. I remember we had things that [we tried to group that we thought were] very important, things that might be done. The president [met us] by himself. For the first couple years, the president always came by himself. It was interesting. [. . .] He was very much engaged. I mean would ask questions and give feedback, and John always sent the agenda prior to the meeting with [the president], so he knew what we wanted to talk about. I don't know if before that, but later on the last few years, I know he and Eric met with the president right before [he met with us]. But we met in various rooms the first few years, which was fun. I mean, we met in the old family dining room, which was in March [2010]—and I'll get back to that meeting in a minute—we met in the Map Room, [where] pins are still in there from World War II and [Joseph R.] Biden [Jr.] came to that meeting. But no press ever came . . . and usually for the first few [years], it was just Obama and as it went on, Valerie Jarrett would be there and then sometimes the head of OMB or chief of staff. [. . .] We would meet in the Roosevelt Room. The last two years that's where it always was, which is right across from the Oval Office, but we never got to see the Oval Office, which is what I said to John at our last meeting, "It'd be nice to see the Oval Office."

Anyhow, we . . . . As I said, Valerie Jarrett [started to attend them], and Valerie Jarrett would come ahead of the president. And we knew, she would come on time and then the president [would come on time]. Eric and John would brief the president [right before the meeting. We met in] the State Dining Room [several times], we met in the Family Dining Room [and Map Room one time]. The last meeting was in China Room, which is China from all the presidential [terms]. That's outside of the Diplomatic [Reception] Room, which is where they took our last picture. But the meeting that I remember clearly [was in] March of 2010, we met with him in the old Family Dining Room. There are pictures [of all the meetings] you could get from [Archives] if you want any of the pictures. We [were] not supposed to give them out to anybody [at that time], but [there were place cards for where we were to sit]. The president didn't need one unless Biden was there. **<T: 75 min>** I was seated next to [President Obama], and he had a yellow pad, and he doodled. He took it with him. [. . .] The other—just as a side comment—they provided water for us to drink but there was [. . .] no food, and you had pads of paper—but not whole pads—with the White House emblem on it. Half a dozen pieces of paper and pencil because you could not bring anything into these meetings. I mean, [. . .] all electronics and everything [were] locked up. But the March [2010] we could say we met with the president, but we were not supposed to give what was discussed, but I'll give an anecdote. Whether it can be used or not, I don't know. [. . .] One would have to be sure [that] it could go in the oral history. [. . .]

[14] President's Council of Advisors on Science and Technology, "Report to the President on U.S. Preparations for 2009-H1N1 Influenza," August 7, 2009, accessed April 6, 2022, https://digitalcollections rice.edu/Documents/Detail/report-to-the-president-on-u.s.-preparations-for-2009-h1n1-influenza/266404.

So that one—in March of 2010—we're still in the middle of the recovery from 2008 [recession], but [. . .] Obama made time to meet with us and was on time, and [it was] an hour [or] forty-five [minutes]. Anyhow, we had just finished—Ed [Edward E.] Penhoet and I—had just finished [. . .] our first, but the third [PCAST] assessment of the [National] Nanotechnology Initiative that Clinton had initiated.[15] Congress had passed it as a law and required that the administration—and Bush [2] delegated it to PCAST—do an assessment of every two years of how it was going and the [National] Academy [of Sciences] do it every three years a detailed, technical assessment how it was going. So Ed Penhoet and I were asked to co-chair it, and we had Chad [A.] Mirkin, who was [one of the top] five nanotechnology experts and on PCAST. He could be on our committee, but not chair it. I mean, they were conscious that they didn't want conflict of interest to show, and we had then external people. But the three [of us], Ed and I—Ed [was] from the bio area had material interests and I from doing the work that I had been doing at AlliedSignal. [. . .] Chad was very helpful in getting the right people [to] come be part of the committee. [. . .] So we presented the report to the president because it had just been finished. [. . .] It's not just a free-for-all [presentation]. We were really rehearsed. [We] had six minutes, and Eric was really very good at this [preparation], and so what are you going to say? And you leave time [so] that the president—you didn't limit his time—he could have as much [for discussion. Ed] and I got together as what part he would talk about, what part I would talk about. [. . .] You weren't supposed to have notes [and we did not present PowerPoints]. We had to report [the essence of the topic. I] said, "Well, we're going to talk about material. Why can't I [bring samples to the meeting]?" I'm used to [. . .] having in selling ceramic materials to various people [. . .] bring samples of what you made [or could make].

So I said, "Well, maybe we should bring some samples of nanotechnology products or soon-to-be other than [what is] in his Blackberry." [. . .] You can't open [the Blackberry and see the material. One] of the committee members [. . .] had developed some [material] that they had tested the strengths compared to Kevlar with bullets and shot each. The Kevlar, sort of, did bend some, but the material made out of nano was fine. Then there was a small company that had invented a [flexible] plastic with nano-parts in it that could convert sunlight to electricity, so you could put it on a tent, you could put it on a [window]. Then there was something liquid that showed some [nano reactions]. The White House [security] let the two [solid] samples go through; the liquids you couldn't bring in. In any event, we showed these. [. . .] Obama had just started [sending] his scientific ambassadors to developing countries or to the Middle East, and one of our PCAST members [Ahmed Zerwail] was the one for Egypt, so he wanted to talk to Ahmed about the Egypt [experience].[16] And those were the two **<T: 80 min>** [agenda items]. Then [we] got into a discussion about the economics—what were some potential approaches. Rick [Richard C.] Levin, who was our "token" economist, [. . .] was president of Yale at the time, but not our token member. He [. . .] had some thoughts regarding what approaches, particularly regarding labor and projects that [were ready now Obama] said he would take back

[15] President's Council of Advisors on Science and Technology, "Report to the President and Congress on the Third Assessment of the National Nanotechnology Initiative," March 12, 2010, accessed April 6, 2022, https://digitalcollections rice.edu/Documents/Detail/report-to-the-president-and-congress-on-the-third-assessment-of-the-national-nanotechnology-initative/266410.

[16] See "U.S. Science Envoy Program," U.S. Department of State, accessed April 6, 2022, https://www.state.gov/programs-office-of-science-and-technology-cooperation/u-s-science-envoy-program/.

[to his team], but in the middle of all this [. . .] Obama turns to me and said, "Maxine . . ." This is a half-hour after [our presentation]. "What happens if this stuff gets up your nose?" So he clearly had been thinking because nanoparticles are very small [as is asbestos. One] of the things in our report was [that] more attention had to be [given] to the environmental aspects of nanoparticles, both in the use of them in manufacturing and also the production parts. But it just was showing that he was thinking—because he didn't take notes. He listened. It was just a very interesting type of thing.

And we would discuss future goals. In one of our meetings towards the end [of his administration], he had asked us to look at technologies related to the aging [so] as people [age] more and more [. . .] they [could] remain independent and what was possible.[17] As we started to do the study, we took hearing aids as a separate thing to do a letter report because it was so significant and so much needed to be done and it was key. Over half the population over eighty needs hearing aids and they're very expensive. [. . .] In the meeting we told him [that we were bringing him] an update. We said, "We're going to discuss hearing aids and their costs and what might be done both to bring down the cost and to make [them more effective]." And they're not [covered] under Medicare; they were particularly eliminated when Medicare developed in 1965.[18] So he says, "What? What?" [laughter] But then he said . . . what really hit him was that a set of hearing aids is ten times the cost of an iPad—that it really was. Then the next time we briefed him on the examples [of] our recommendation. One was that the FDA [Food and Drug Administration] change the rules so that you could take a prescription from any audiologist or doctor and have it filled anywhere. You didn't have to have the audiologist [fill it]. It'd be like glasses. And legislation was passed. Elizabeth Warren really carried it through. But the FDA—it was the end of 2016—issued a regulation, but [. . .] they're now finalizing [them]. The Trump administration did not finalize them. But that was one [PCAST report where there was] really good implementation. [. . .] The VA [Veterans Affairs] [is] paying four hundred dollars for sets of hearing aids, the same ones we had to buy for [four] thousand . . . ten times the amount . . . just on [large volume purchases]. We felt that [one] could [. . .] use some of the enhancers that could be [. . .] sold over the counter? So it was a really broad issue, and that was done pretty, fairly quickly.

EVANS: I had always been curious about where the . . . how the hearing aid report got started, so thank you.

SAVITZ: [Yes], I mean, they would just as I said, some of the reports we would initiate on our own, you know, bring up and some would get initiated by the people [who] came to speak to us.

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[17] President's Council of Advisors on Science and Technology, "Aging America & Hearing Loss: Imperative of Improved Hearing Technologies," October 2015, accessed April 6, 2022, https://digitalcollections rice.edu/Documents/Detail/aging-america-hearing-loss-imperative-of-improved-hearing-technologies/266473.

[18] President Lyndon B. Johnson signed the Social Security Act Amendments into law on July 30, 1965, which established Medicare, a program of health insurance for individuals over sixty-five. See Social Security Act Amendments (1965), accessed November 15, 2021, https://www.ourdocuments.gov/doc.php?flash=false&doc=99.

We did one on [big data technologies regarding privacy and security]—not the [non-technology] policies—[John] Podesta was doing that [when] that got started. [He said that PCAST] should look at the technologies regarding [privacy].[19] And you could really see [. . .] how concerned the president was of the need for privacy versus openness and to really getting [the policies] right. It was just very open [to solutions. We] put in **<T: 85 min>** a lot of work [on all] the reports, many of [the recommendations] got implemented. Some [recommendations] may have to get done later, but the fact that there was such a willing audience to accept them [and/or] to initiate them [made all the work worthwhile]. It really would help formulate in [the president's] mind what to do. Just like the education ones, he was [concerned about] K-12. [. . .] He was always interested [. . .] in going to the science fairs [with John] and having science fairs at the White House.[20] It's just nice to see.

And Biden came to two or three meetings, and he actually came to dinner at the Academy. We had hoped maybe he would invite us to dinner when we [invited him], but that's just an aside. But he came, and the Secret Service [. . .] cleared out the Academy that evening. He came at 6:30. Normally, [the dinner guests spent an hour eating and giving a talk. Biden actually spent] two hours there, and everybody got a chance to ask a question or more not just technology related. You just saw the depth of knowledge that he had on these subjects and [his] engagements with [them]. It was really very, very good. Just like when one of the first meetings he came to was when we were in the Map Room. That was right after [. . .] the election where we lost [. . .] the House in 2010. [On the agenda was providing] the energy report where we were [. . .] asking for advanced R&D. [One of Biden's comments was maybe the Congress] will at least agree on R&D.[21] [. . .] And then he came to the last one. I think he came to one other. But the other thing that [PCAST did was providing advice about a potential crisis]. In thinking about the crisis where we didn't do a report, but we were called upon [for suggestion]. When Ebola came up, [John was asked] on PCAST—and we had several physicians and people in the [medical] area, who could meet both with the task force and also meet—it was not a formal PCAST meeting—to really discuss what are the options for Ebola. So [PCAST] was drawn upon [. . .] by the administration [for technical advice].

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[19] Executive Office of the President, "Big Data: Seizing Opportunities, Preserving Values," May 2014, accessed April 6, 2022, https://obamawhitehouse.archives.gov/sites/default/files/docs/big_data_privacy_report_5.1.14_final_print.pdf.

[20] President's Council of Advisors on Science and Technology, "Report to the President: Prepare and Inspire: K-12 Education in Science, Technology, Engineering, and Math (STEM) for America's Future," September 2010, accessed April 6, 2022, https://digitalcollections rice.edu/Documents/Detail/report-to-the-president-prepare-and-inspire-k-12-education-in-science-technology-engineering-and-math-stem-for-americas-future/266407; President's Council of Advisors on Science and Technology, "Report to the President: Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics," February 2012, accessed April 6, 2022, https://digitalcollections.rice.edu/Documents/Detail/report-to-the-president-engage-to-excel-producing-additional-college-graduates-with-degrees-in-science-technology-engineering-and-mathematics/266415.

[21] President's Council of Advisors on Science and Technology, "Report to the President on Accelerating the Pace of Change in Energy Technologies Through an Integrated Federal Energy Policy," November 2010, accessed April 6, 2022, https://digitalcollections rice.edu/Documents/Detail/report-to-the-president-on-accelerating-the-pace-of-change-in-energy-technologies-through-an-integrated-federal-energy-policy/266408.

EVANS: Right, right. Did you . . . I know at the very end last time you had mentioned that you also met at Camp David. When did that happen?

SAVITZ: So that happened in September [2015]. I remember exactly because I [had one meeting with the president I missed. It was my] son's fiftieth birthday and he wanted to have dinner at Chez Panisse in Berkeley, California. [. . .] I had to go [to California on Friday, miss the Friday meeting], but not [Thursday's visit to Camp David]. It was September of 2015. Obama had really opened Camp David to cabinet and sub-cabinet members to bring their advisory groups or people reporting to them. John had arranged that [PCAST come to Camp David] and the staff that supported us for a day, and we would hold a meeting there. We would have our PCAST Thursday meeting [at Camp David] and then Friday, they would have the regular meeting [in DC] and then meet with the president. We had the dinner, I think, [Thursday night in DC]. First of all, you had to sign a nondisclosure agreement that you weren't going to tell anybody you were going to Camp David. They arranged a bus to take us there, and [. . .] we were the only external people there at the time. A naval base of thirty thousand people is adjacent to Camp David, and the commander of that base [. . .] is the only one who lives on-site. No electronics at all except if you have a White House one, so John could have his computer. He could—for our meeting—[. . .] take written notes, but we had to leave everything on the bus essentially. Then you're given golf carts, and they say, "Well, here's a map, and here's where we're going to go **<T: 90 min>** to building X." You're wondering how you're [going to find it], but there was a lead one.

The building we had our meeting in was the same building that had, as I think I mentioned, [Franklin D.] Roosevelt and [Winston] Churchill were on the porch discussing Normandy. [It's] very rustic, but [there is] a lot of history. [. . .] When Carter had [Yitzhak] Rabin and [Yasir] Arafat there, they had to make sure that their cottages were equal distance from the president's house. [. . .] When they would have more [than two international leaders, such as the G7, you couldn't have the same cabin arrangement].[22] Just being with all this history around [was thrilling]. Bush 1 had built a nondenominational chapel that allowed for [meetings. It could accommodate] one hundred people; [. . .] we were twenty-some. Somebody from the Navy briefed us on a lot of the history to tell us what had happened there, [including those anecdotes. I] guess I mentioned before that Obama had had a basketball court built with a climbing wall because the Navy used the facilities there like the swimming pool, the gym, and all were part of their [general] facilities. The president's house had its own pool, and it had water in front because when Roosevelt was president, there was concern if there was a fire to get out and get the water, and everything's built of wood, so it's just a very special place. You look and you see all these rocks and things around. Well, the rocks aren't just rocks. [It is a very] secure area. It was a real treat. You read about Camp David, and there's actually a picture—a formal picture—of all of us in front of the Camp David sign. I don't know for your report if you want any of those, but you could get probably either Kei [Koizoumi] or Eric can

[22] The G7 is short for Group of Seven, an intergovernmental organization that meets occasionally and comprises Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. See *G7 Summit: What is It and Why is It in Cornwall?*, BBC News, June 11, 2021, accessed November 15, 2021, https://www.bbc.com/news/world-49434667.

get you the pictures. Because the White House photographer took pictures of all that, but also every meeting, the White House photographer took pictures of us.

EVANS: Right. Yeah, that'd be great. We have some FOIA [Freedom of Information Act] requests out for pictures to make sure the various presidential libraries have given us all the footage they have that's been declassified.

SAVITZ: [. . .] I mean Obama's library isn't open yet whether you can get it from the OSTP people. [. . .]

EVANS: Yeah, yeah. We hope to. Yeah. So was there during your time on PCAST, were there things you had wished you could have tackled or things that you thought you would have liked to have done while you were on the committee?

SAVITZ: No, I mean, I was particularly interested in the energy and climate, and we did a lot on that, and part of our studies became part of Obama's Climate Action Plan. I'm trying to think . . . in the education areas we covered K-12 and then research universities, community colleges, aging. [. . .] I'm trying to think were there any [health] crisis that we didn't [address]. As I said, the Ebola was handled, and there were [other health-related reports that were part of OPASCT 2020. The PCAST reports varied] from H1N1 and rapid vaccine development to [subjects] like systems engineering of health care to bio. We did only two [classified] reports and then had a public release of a [related letter report. Most of us were cleared, but some members] were not cleared. [. . .] I'm trying to think were there issues that [we did not address] because you could weave into so much of these. We didn't really tackle the R&D—the federal government's R&D initiatives as such. We would look at [the] R&D enterprise [related to support basic] research. What percent of **<T: 95 min>** GDP should be on research, and what should be the balance of applied and basic? I would say that was probably one thing that you think about that we didn't do very much. Workforce development got covered a little bit in the community colleges because they're a training [workers for industry]. Really looking at what should workforce development look like and what should the federal [government do to enhance workforce development education. One] thing we didn't do as much of, that I think the Academy does more of, is briefing the Congress of our reports for things that need [congressional action]. They [were] sent the reports. When we did [the first PCAST on nanotechnology initiatives, we briefed Congress]. I was [used] to briefing them. Ed [Penhoet] and I, [with a meeting], arranged [by OSTP's] congressional affairs, went to brief the authorizing committees in the House and Senate on that report and what our results were both budget-wise and where [we] were really worried about the foreign competition because all of a sudden China was [. . .] starting to get lots of patents and wanted to make sure we were still the leader. But other [nano] reports did not [get briefed to Congress]. We did [do it] when something happened. [For example], we thought every two years to review the nano program was just too much; you didn't need [. . .] to do four assessments [in eight years]. Ed and I, so we went and talked to the [congressional staff. Also],

John talked to the staff when they were reauthorizing the nano legislation to make it not be as [often]. I think there was talk [by] the Trump administration trying to roll [the PCAST technical management review requirement] into the Academy's technical [three-year] review.

[. . .] I know that [it] came out in the report; I don't know if it's actually been done. [. . .] We did nothing DOD-related, and that's because DOD had its own [advisory committees. They were] security agencies that [we] talked to [for issues such as cyber], but because [DOD] had the Defense Science Board and the [Defense] Policy Board [and] we had people [. . .] like Craig Mundie from Microsoft [on PCAST who] were very much involved in DOD. Google was. When [J.] Michael McQuade went on [PCAST in 2013, he had a lot of DOD expertise. We] didn't even talk about DOD projects. And there was never any talk [of doing a project. PCAST] was supposed to be advice to the president. [We] never did combine—and I don't think it was necessary—studies with other cabinet-level committees. Domestic Policy Council and [National] Economic Council would come and talk [to us] with some of their issues were. [. . .] Heather [Zichal, who] was on Domestic Policy Council [and had been on John Kerry's staff when he was a senator], was our liaison for the energy and climate studies. [. . .] The cabinet officials would be at [some of the] pre-briefings. We would meet with [cabinet level and sub-cabinet] officials [before a report was issued]. I remember [that for the] study on university research [. . .] we talked to Francis [S.] Collins [after] we talked to people under him. [. . .] He had a chance to review the report beforehand. [. . .] The forensic one [in 2016] had a lot of back and forth; that was one of our last reports, and Valerie Jarrett had requested that, and Eric took the lead on it and had an outside group of judges [as committee members]. There [were] people from the law areas, [particularly DOJ. There was a lot of back] and forth between what we wrote and what Sally [Quillian] Yates wanted as the deputy [attorney general]. Also, the FBI [Federal Bureau of Investigation] because in some ways, the FBI lab got criticized, but we would [not change our recommendation]. Finally, the report did get [published], and actually, [Valerie Jarrett] came—[. . .] I don't know that this should be public—[. . .] she came to PCAST to thank [us] for the report at [our meeting at the Academy. This] was **<T: 100 min>** very nice.

EVANS: Sally Yates did?

SAVITZ: No, Valerie Jarrett.

EVANS: Oh, Valerie Jarrett. Okay.

SAVITZ: Sally Yates finally accepted what we [recommended. The FBI, Sally Yates, and Eric had the most back and forth that I can remember. We] were all involved in that one, but then we [also] were involved with the one on privacy, but I don't remember there being as much back and forth because again we were doing that one with what technologies and there was a parallel policy one by [John] Podesta, led by him. I think that was the only report that had a parallel one too.

EVANS: Yeah, I understood the forensics report to be somewhat controversial when it was released. So . . .

SAVITZ: I couldn't believe that your state of Texas was still using dog bites. [laughter] [. . .] Even though DNA is the best of them all, if you're [. . .] trained to do them right [. . .] and have the right conditions [or] you could get the wrong answers. It was not 100 percent unless you really start to enforce what the laboratory conditions should be, and, you know, we're continually finding out things.

EVANS: Yeah, I . . . you know, I at one point met someone from the Innocence Project, and they were also very thankful that this report saw the light of day, so it's good. Were there . . . ?

SAVITZ: I mean all the reports were published when we [finished] them, and they went to the relevant agencies, they went to all the domestic staff, the different cabinet groups. [They were all discussed at the public part of the regular PCAST meeting and voted on at that meeting.] They were sent to the Congress, so they [. . .] were put up on the web. [. . .] During the [first] day of the Trump administration, my daughter-in-law went to [the] OSTP website, and they were all gone. You had to go through the archives, but [. . .] Bill Press had set up a separate website that had all [the reports] there in case they disappeared from any kind of website that they'd be available. So I'm a little paranoid.

EVANS: Yeah, I went through the day beforehand and downloaded every single thing on the website, so I've got it archived, just in case. Were there other, you know, reports . . . you mentioned there was some back and forth, were there are other reports that were . . . came out and were controversial, or you received, kind of, public pushback for your recommendations?

SAVITZ: No, well, [there] was something [when] the hearing report [was published. The audiology community] didn't think you needed anything but that's what would be a natural type of thing. [There was reaction to the report that] antibiotics to animals that should be reduced. It was acknowledging [. . .] how much [was given. I'm] not sure.[23] I think one of the things that [was of concern]—and I guess that's part of limited staff, and I have the same problem with the Academy [reporters]—of tracking what got [implemented] of what you recommended. Some of it could come down the road at a future time, but I don't know if the Agriculture Department really did any work on releasing the [report] or adopting any of our recommendations for [antibiotics given to animals]. The spectrum report was another one that got good publicity and

[23] President's Council of Advisors on Science and Technology, "Report to the President on Combating Antibiotic Resistance," September 2014, accessed April 6, 2022, https://digitalcollections rice.edu/Documents/Detail/combating-antibiotic-resistant-bacteria/266500.

having this band for spectrum sharing, it ended up being [well-received]. I'm looking at a sheet that you quote in your other study that Ashley [Predith] had done where the executive order was [issued and] led to [reducing] the antibiotic resistant [animals].[24] **<T: 105 min>** Whether that got reversed or not, I don't know. I know that with the Energy Department, which I tracked the closest, under Trump, [. . .] reversed the organization where we had combined science and energy to one undersecretary, which it had been initially, then it had been split during the [Bush 2 administration]. I guess Ray [Raymond] Orbach was the first [undersecretary for science] in the Bush administration. Then it was put back [together in 2013] after our report along with a policy office reporting directly to the secretary and not being a confirmed position. Trump went back to the old organization that there was a separate undersecretary for science, a separate undersecretary [for energy]. They did not do any quadrennial [reviews] but [. . .] under Obama two quadrennial technology reviews were done and one QER, but [Trump] never repeated the QER. I assume the Defense [Quadrennial reviews] were continued, so we modeled that on it. [Ernie Moniz had been co-chair of the 2010 PCAST energy report. In 2013, when he became Secretary of Energy, he implemented many of the recommendations. OSTP and PCAST were] to review the QER. [. . .] Many of us served on parts to review the QTR because we were involved with them but also the QER before it was issued was supposed to be reviewed by OSTP, which it was. There was something . . . another, I thought of . . . if it comes back to me of another report that was monitored pretty well.

EVANS: I had always been very curious about the, kind of, the reorganizing and then I guess this what you mentioned about the undersecretaries at DOE. What was the . . . do you know what the rationale behind reversing that, kind of, organizational change was?

SAVITZ: I think partly it was [reorganized under Trump] because it [had been] an Obama reorganization. [. . .] But it had been that way for a long time. [. . .] Initially the two [had been] together. Then in Bush [2]—I think we were back with Bush [2]—that there was a real push for science to get [the Office of Science] more elevated [by having an undersecretary for science]. Steve [Steven E.] Koonin [undersecretary in Obama's first term] and [Steven] Chu didn't reorganize it. [Chu] kept it as it was. [Koonin] was the undersecretary for science and [. . .] they [also] had [. . .] the director of the office of science, [how is undersecretary for science and director of the Office of Science different from the other] because it's [covering] the same thing, [the same basic science. Early] on even in the seventies, eighties, [I was] trying to encourage the [Department of Energy] Office of Science to do some understanding of mechanisms and science related to the applied [energy problems]. Let's say [applied programs wanted fundamental] battery research, and [the Office of Science wants] to do high energy physics, so many of us really wanted much more synergy, so it made a lot of sense [for the undersecretary to be responsible for basic science and energy programs]. So they're back together again; we're still awaiting confirmation of the person, Geraldine Richmond, to be the undersecretary.

[24] President's Council of Advisors on Science and Technology, "Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth," July 2012, accessed April 6, 2022, https://digitalcollections rice.edu/Documents/Detail/report-to-the-president-realizing-the-full-potential-of-government-held-spectrum-to-spur-economic-growth/266417.

EVANS: That makes sense. Yeah, that . . . tracking that when I first . . . it was confusing for me why all those pieces were moving and when. Thank you for clearing that up.

SAVITZ: [Yes], it was very clear also. [Ernie had been at DOE] in the second part of the Clinton administration as the undersecretary and he really knew the Department of Energy, and it was interesting when he was named [. . .] some of the people from the [DOE] labs, well, they remembered him from twenty years ago and how much policy he did. Twenty years [later after he] had started and run the MIT [Energy Initiative] Program, [. . .] everyone thinks [he] was the best secretary of energy there's been and with the widest breath of knowledge and also [brought in] good people. [He had] a well-run organization and a lot of credibility. He became an important part [of the issues addressing goals] of the climate. **<T: 110 min>** Also because of his knowledge and his participation in the Iran [nuclear] deal and things like that. [. . .] At one point [we] were thinking of having [Secretary of State] Kerry come forward to talk to us, but the schedule just never allowed that. John worked closely with Kerry and particularly [. . .] when Kerry led the Arctic Five group [the US-Nordic Leaders Summit], John was the head of the R&D contingent from the different countries, so he was involved in that.

EVANS: Well, I have a couple other questions related to PCAST, but we've also been going for two hours. I just wanted to check and see if you're good to keep going, or if you need a break or . . . ?

SAVITZ: Do you all need a break?

EVANS: I'm okay.

SAVITZ: I'm okay, yeah.

EVANS: Okay. Well, I . . . while we're on DOE stuff, I had two questions. One was at some point during the Obama administration funding for PCAST came out of I think the Office of Science budget . . . it's somewhere buried in the DOE budget.

SAVITZ: Well, so PCAST was being funded under the OSTP budget—their [budget of about] six million dollars. [. . .] PCAST cost about a million, so Congressman [Frank R.] Wolf from appropriations for which the White House and PCAST came under wasn't happy that John was still willing to have bilateral talks China. NASA had capitulated, so he removed part of the [OSTP] budget. In looking to see what do you eliminate [that is under both PCAST] and OSTP

had grown under John. So [OSTP] had grown under John, but because of John's relationship at that time [with Steve Chu at DOE. John got] the Office of Science to fund us. [. . .] All our travel was booked through the Office of Science. [. . .] We sent our [travel] vouchers to PCAST, and they sent them over to Office of Science—one way or the other. They paid for travel, and they paid for whatever costs were incurred for our meetings and travel now just not [for PCAST members] but [for] all the people who came to work on our committees. And I guess, so it's buried in this [Office of Science] five-billion-dollar budget, and so after it got reinstated, I think Ernie wanted John [have the OSTP budget fund PCAST], but DOE still did it, and then they had some money left over. We had the opportunity to get all of our reports—if we wanted, at no cost to us—bound, so we had four [volumes] . . . now people don't want paper, but it's nice four bound volumes of the thirty-six reports in sequential order. Also, protection—one could have scanned them if they had all been eliminated. But that was the backstory of that million dollars.

EVANS: I see. Thank you. No, I understand that that arrangement continued in the Trump administration. I was just curious where it started and why.

SAVITZ: Yeah, I mean, they should have been funded what was needed, but . . .

EVANS: Does PCAST need to meet more? I mean there's always been this question, but it seems . . .

SAVITZ: Many people were working; not all of them. A few of us were retired.

EVANS: Well, I wonder, you know, PCAST has this like you said that the agenda is, kind of, set by the membership and what the president wants and other folks, and there's a back and forth. Are there particular issues that you think PCAST is, kind of, uniquely equipped to address?

SAVTIZ: [. . .] When you look at some of the overall [reports], the H1N1 was clear one [for PCAST as is] when we're **<T: 115 min>** looking at [future] technologies for cities. Well, could HUD do that? They don't have very much of an R&D [program] though you can get input from them—many of these [such as] the spectrum—or were they going to be willing to have the FCC [Federal Communications Commission] look at. One could say [that the education area] was interesting [when] one on research universities [. . .] came out, there [were two other studies] on that complemented [it]. There was one by the [National] Academy. [. . .] I think Mary Good was the co-chair of that . . . no, she was one on the small business. One from the Academy, ours, and one from the American Academy for Arts and Sciences, which I think Neal may have chaired, looking at research—they complemented each other. But one could [say] that was it [. . .] useful if you have a [department] working advisory group like making use of SEAB, which is what

Ernie did, [the cabinet department] could do those reports rather than [PCAST. Let's] say something about antibiotic-resistant bacteria and having animals do something about it. The Agriculture Department wouldn't have been willing to undertake that. And, as I said, we're meeting more often when the Ebola came up, there were [meetings when] John assembled [and] telephone conversations. I don't know if it came up at an early meeting, but [. . .] now with Zoom if something like that were to come up, you could easily call for an ad hoc type of meeting. [. . .] I don't know whether the other PCASTs had such a rigorous schedule as we did. [. . .] And they were set [for six meetings a year] two years in advance. We would all try to protect our calendars, and the [two] co-chairs [and two co-vice-chairs], every week [. . .] had a phone call at 2:30 [. . .] West Coast time [with staff]. John said I was always on some plane or getting [to] the airport.

[. . .] I don't know if you got a chance to look at the [2020] OPCAST reports [. . .] that I mentioned last time—how you could get reassembled as a subgroup [so quickly]. This happened to come during [COVID]. One wonders why [the Trump] PCAST wasn't asked to do those activities or didn't take it. Now PCAST did fund Harvey [Fineberg and] the Academy set up a standing committee for infectious disease that Harvey [V.] Fineberg [chaired] that came out with some short reports in response to things Kelvin [Droegemeier] sent and NIH sent. We coordinated very much with Harvey [. . .] with our topics and we did not overlap. They did very quick, short responses; eight to ten pages, which were very good.

EVANS: Yeah, those reports were great. I guess I had been curious why they at some point stopped. Was it . . . or did they stopped being asked, or was it they, kind of, had a set . . . ?

SAVITZ: No, I think they got stopped being asked, and the standing committee still exists, but I don't know . . . it isn't clear, and even as the vaccine [has been made available, what things] they were not asked. They did some report on vaccine approaches, [which] we thought they were very good. We showed actually our first two reports to Harvey before we issued them even so he could make sure we were not overstepping. So I think one of the thing that John really did well was trying to carve out areas PCAST should do and eliminate things that it shouldn't do.

EVANS: I see. What about . . . in the PCAST, you know, charter, it often uses this word "diversity." Do you, kind of . . . . I guess I'm looking to get your thoughts on the balance of the committee. You know, there are people from . . . historically PCAST and its predecessors were largely like from the physical sciences in the post-World War II world. They were all atomic physicists and people from the Rad Lab and other stuff. PCAST now is a larger body with more, kind of, diversity, in its **<T: 120 min>** membership. Do you have a perspective on what that balance should be in terms of diversity of the panel?

SAVITZ: Well, I mean, I think [. . .] we had a lot of biological representation, and Eric is having even more biological. I haven't seen any of the names yet, but he comes from biological

[world], Frances [Hamilton] Arnold's [research is] more biological, Maria [Zuber] comes from a hard science. We had diversity with regard to industry and the advanced manufacturing [initiative has continued as manufacturing USA. We] said the three [agencies] particularly DOE, DARPA, and NIST should have programs. The DOE program is going on and flourishing as is the DOD, which just has gotten a [review by the] Academy issued a report on its approaches and how it was doing—not any metric shift that's going on now—and their budgets have increased . . . and it's gone on to about two hundred [million dollars]. The Trump administration changed the name, but it's stayed, so I thought that was good. We had university people, industry people. We didn't have [social scientists], except for as I mentioned, Rick Levin, our token economist—I think having more social scientists [and] having an economist [is important]. So much of what you want to do depends upon how are people going to adapt [. . .] things and will they implement them and what does it take [for implementation]. Why aren't people getting [COVID] vaccines? You can look at the vaccination now [and conduct] studies that really [try to understand] what makes people behave. The energy report we did said that DOE and NSF should carve out money to start looking at social science and [energy technology innovation ecosystem.

For example, how and why are consumers adapting or rejecting new energy technologies]. Bob Fri and I [started] a program [for the American Academy of Arts and Science], which Steve Koonin funded. [The] Alternative Energy Future Project, which was really looking at social science accelerating implementation in the energy area.[25] So I think having a couple social scientists would be useful, but there's always an argument between the physical sciences: is social science really a science? Economists are important but also having someone with a psychology or social service [background. A] market type of person could be very useful to actually implement things. But [also gender diversity]. The hardest on any of these committees is getting people from industry to [. . .] commit the time. We were very fortunate he came—he wasn't on the initial one—that Michael McQuade was able to [join in 2012]. United Technologies [Corporation] was happy to have him do it. Back in the days of AlliedSignal, [they] let Mary Good [do it]. I think it's important to have [industry representation] and then we had the industry perspective of Craig Mundie from Microsoft and Eric [Schmidt] from Google and I from Honeywell. So it's important to have that perspective.

It's going to be interesting to see what the composition looks like of the new PCAST and how many. Twenty-one, I think, was a good number. [. . .] Bush 2 had thirty-six. I don't know how you run thirty-six people or do anything. There weren't many reports; we just looked at the nano ones. On gender make up, there were five women, and the interesting thing . . . Barbara Schaal, who was vice president of the [National] Academy of Sciences and at the time was professor of biology at Wash U [Washington University] and during PCAST time became the dean. And I was vice president of the NAE and used to kid we covered two boxes because we were both women and covered representing **<T: 125 min>** the science and engineering community as a whole. We had Shirley Ann Jackson from RPI [Rensselaer Polytechnic Institute] and Rosina [Bierbaum] and Chris [Christine K. Cassel], so there were five of us.

[25] See "The Alternative Energy Future," American Academy of Arts & Sciences, accessed April 6, 2022, https://www.amacad.org/project/alternative-energy-future.

Shirley Ann Jackson left the second term because she had an opportunity to be on a security presidential advisory group [the President's Intelligence Advisory Board], and you can only be on one presidential advisory group. You can be on a presidential advisory group and many cabinet groups, but that makes sense. [. . .] We had Wanda [M.] Austin who headed Aerospace Corporation, and so we had two [African Americans], and then we had Mario [J.] Molina, so we had three underrepresented minority groups. [. . .] But the group really worked well together. We didn't have to have [. . .] any formal training or anything. [. . .] I think that [. . .] everybody had [. . .] done lots of work before on various committees. Should PCAST have a couple younger people? Meaning would that [provide a different perspective]? We did have some younger people, but we've now gotten older. [. . .] I think having generational differences could be very useful too. [From the agriculture area], we didn't have anybody. [. . .] We had people like Barbara [Schaal who] was at [Washington University at St.] Louis, [Missouri]—[and they had] very close relationships with ag [industry]. We could . . . we called on them [to participate in studies], but there was nobody from that industry per se.

EVANS: It's interesting you mentioned having the younger folks' perspective. I think that Kelvin [Droegemeier] set up a board for early career scientists PCAST. I haven't . . . . I know that they have met once or they met once, but I haven't seen much more activity from it.

SAVITZ: Who set it up?

EVANS: Dr. Droegemeier.

SAVITZ: Oh, Kelvin. Oh, he did it. Oh. Did they ever meet?

EVANS: I saw a screencap from a Zoom meeting, but I'm not sure how often they met, but it was an idea they got from somewhere to put together like a young, an early career panel.

SAVITZ: I think I would rather see a couple people embedded into PCAST panel [. . .] as opposed to [just] having a separate panel because you're not [necessarily] going to have the same [studies]. What the Academy did interesting along those lines, they set up—from the division that does the social science work—a rapid response group to look at social science issues for the COVID. They issued a couple reports. [They] started later than Harvey [Fineberg], but [. . .] I think that was an interesting approach as a subgroup of the standing committee of social scientists.

EVANS: Do you think . . . this is a rather direct, kind of, targeted question, but do you think of . . . do think PCAST should be statutory? Do you think that there should be . . . and I don't have

a good . . . just curious on your perspective on that. Is there . . . you know, it could disappear tomorrow or not based on its current charter. Do you think it's something that Congress should mandate?

SAVITZ: Well, I mean, you know, if it did get mandated, that would assure it, but that wouldn't assure that the president would use it or that the president would appoint people even. I mean, it can be one of those things. Now the OSTP is set up as a separate unit. I guess, it's legislatively. In my own mind, I think it would be good, [. . .] but you would have to have flexibility so you don't say whether it's twenty members or thirty, but it would be good also to know that the scientist, the head of OSTP **<T: 130 min>** was made, was announced early on, not two years later, and [. . .] being a science advisor is not mandated. Kelvin was never science advisor, [John H.] Marburger was never science advisor, and wearing those two hats, I think [is important now] it's a cabinet position. So I don't know if people can [reverse it. The] fact that it's a cabinet position [. . .] as the head of OSTP, it still means that person will be at the cabinet [and] as an advisor to the president in those ways. But, you know, it could delay in naming cabinet officials. I mean, having the right structure, [. . .] it would be interesting as part of your report drawing a chart. [The question is] what should the ideal PCAST look like in the first third of the—well, we're almost there—the first half of the twenty-first century. It's going to be interesting to see in some ways—Eric was so involved in our PCAST . . . what practices does he use for his PCAST? [. . .] Congress could create it and then they could defund it. I mean, there was the Office of Technology Assessment [OTA]. Many of us felt that it was disappointing to see that independent technical advice disappear. The Congressional [Research] Service is a more short-term type of thing, and, for whatever reason, the Academy has not picked up that role in the same way. They do get funded by Congress [for studies], but they haven't, and many of us over time have encouraged them to [take up some of the OTA types of studies. A joint letter from the head of OMB and OSTP to agencies stating the administration's priorities is issued annually. Would] you put that in statutory language? I think it's something to be discussed and what it might look like. So where's the discussion? You can get all the former PCAST [co-chairs] together and wrangle out appropriate language. [laughter]

EVANS: Right. Yeah, it's . . . well, it's one of our research questions, I guess, so thank you for your perspective on it. And I'm curious that . . . you know that you mentioned the two hats thing, and this is something I've always wondered about, so there was . . . . I know you were involved at one point . . . there was a National Academies' series of studies on presidential appointments.

SAVITZ: Neal [Lane] chaired one I think that I was on.

EVANS: When the 2008 election—or excuse me when [the] 2016 election—happened, I then searched for one. I thought maybe there'd be an updated version. Do you have any sense for

what . . . ? I mean, to me, it was a really helpful document. Is that something that the Academies . . . . I don't know . . . . I guess I'm asking . . .

SAVITZ: [. . .] I felt they were helpful documents, and it showed to the general public you could [. . .] easily see which [scientific positions] were Senate-confirmable, which were not, and what was important at the time. [. . .] I don't know who funded those. I don't know in the past whether NSF funded them, but I remember Debbie [Deborah D.] Stein, who was the director of COSEMPUP [Committee on Science, Engineering, Medicine and Public Policy] at the time, she really . . . she was [at the Academy] doing also the Gathering Storm . . . in my mind was a force behind [the series on presidential appointment]. [. . .] I think if they had done it, Trump would probably have ignored it anyway. Somebody coming in who hasn't been in government and more [people join government who have not worked in government], it can be [useful]. It can also show the private sector and the academic [community] what needs to be filled that can be useful to them. I think [. . .] it was a straightforward study that could be done reasonably inexpensively for an Academy study. [. . .] I remember the one I was on, I think Neal was chair, Christie [Christine Todd] Whitman [was a member of the committee]. You had a lot of people who had had political appointments on it, so they really knew what was required of the government [. . .] positions, and [now] you could almost do the whole thing by Zoom and one in-person meeting. **<T: 135 min>** But I think [. . .] it's not something PCAST should do, or OSTP should do.

EVANS: Right. Yeah, that seems like that would . . . too much overlap there.

SAVITZ: And any administration . . . . I mean, any . . . it has to be an independent group to do it.

EVANS: Well, I've got other questions, but I want to see before I, kind of, move on, and I know we, kind of, jumped a number of . . . maybe a decade or something, so I will see maybe if Dave has any questions.

CARUSO: So, I mean, you mentioned retiring soon after Honeywell so I'm assuming that was around 2001.

SAVITZ: Two thousand three is when I retired.

CARUSO: So, I mean, I didn't have that many questions because it's quite clear that retirement did not mean stopping for you, so you've been quite busy. All I would have asked is

whether or not there's anything you would want to discuss about those years between 2003 and when you started working as a member of the PCAST. That's the only thing I had, Kenny.

SAVITZ: Well, I mean, I guess one of the things and one of it is personal. [In] '92 I was [. . .] elected to the Academy [of Engineering. At] the end of 2005—whether I would want to be considered to be vice president for NAE and be on the ballot. There'd be two people, so I discussed it with my husband. That was going to be a quarter of my time, [. . .] and he thought that was fine. The person's responsibility as vice president is fundraising, working with the development office, and it had typically been, as Lance Davis, [Executive Director of the National Academy of Engineering] would say, as soon as you have a woman on the ballot against a man, the woman wins. They had less than 10 percent women [NAE members], but they had been increasing [in number]. We were 5 percent at the time. Anyway, so I did, and in April, I was told I won the election. In May, my husband was diagnosed with a very rare cancer—mantle cell lymphoma—which [you] had a chance to [live] one year, three years, or five years. And so the question was should I do it, and he said yes. He was starting [his chemotherapy]. He started his treatment in June and followed the MD Anderson [protocols]; it was in LA. [. . .] After the first round, he [. . .] had a terrible reaction and was in intensive care for three weeks and rehab in the hospital five weeks and survived for fourteen months. [He] had to relearn to speak, to swallow. [It was] a very difficult time. And he [had been] in very good health. He was diagnosed on his seventieth birthday. He exercised, he had retired and really retired. He was on one [Robert Wood Johnson's panel. Otherwise], he exercised and did his thing, happy that I was otherwise engaged. Then I debated [with myself], do I let [myself become the NAE VP], and the person I had run against was a good friend. [I] talked to Lance and he said, "Well, if you miss the first four or five months, you'll make up for it later." So I did it, and I could do a lot of meetings [via conference calls. At] that point I was also on the Sandia board and PNNL [Pacific Northwest Laboratory] board, and I was always on [the American Council of Energy-Efficient Economy. The Academy was just starting "The American Energy Future" study. If] you want to talk about one of the hardest times in one's life is seeing somebody that's a very important person [to you] just suffer. Anyhow, he did live to see his granddaughter born, which was very, very nice. That occupied a good part of my time. [I] had help 24/7, but if I had to go to a **<T: 140 min>** meeting, one of the family members would come also to be with Alan. He was well aware of everything; he just had trouble communicating.

The thing that [helped] me personally, [. . .] PCAST came up sixteen months after he died. [. . .] I was [part of the NAE and the Academy energy study prior to PCAST. It] took up time. They [had] six council meetings a year and [also] meeting with [the Academy] and the development people. I [was going to] solicit money and [. . .] still always doing [the energy] studies. [. . .] It was a good thing, [a] transition as a time thing and intellectually, a challenge. But I was fortunate that I could still continue some things by phone [when Alan was sick. Sandia people would say, "Voice coming from the ceiling." Zoom] makes it much easier [. . .], but it really [was possible to work remotely. Everyone was] very supportive of my situation. So [my husband's illness was very] unexpected. I tell people never postpone anything at any age. Don't delay; do it. And [I] had tremendous support from family and colleagues and friends that was very, very good. [I was] elected vice president of the NAE [and] Barbara [Schaal was

elected up] at the NAS. [. . .] If you look at what things make a difference in one's career aside from having a supportive spouse, which is [most] important for the whole thing, is one, the education, and then two, being elected to the Academy and then vice president and then PCAST. I mean, all of the sudden, you're on PCAST, and, you know, Harvard wants you to come give a seminar. The week before I didn't know anything more than the week I was announced. It's [very] interesting how [. . .] people think you're going to be close to the president and [can be helpful for access].

Realistic or unrealistic, these opportunities come one's way just from being on it, and one can only have so much time or do so much. But the OPCAST, which we can talk about after PCAST, that was a terrific thing to have during the whole COVID thing when you really couldn't socialize with people, and you can lose so many connections. We had [. . .] specific topics that we developed just like we had during [PCAST]. Typically, two [. . .] or three of us would be the lead, and we [had] a weekly Zoom where we had to give updates of everything and everybody reviewed the papers and John [Holdren] being the wonderful editor that he is edited them all when they were done. My goal at the beginning [of OPCAST] was to have a short [paper. I] did the PPE [Personal Protective Equipment] with Susan Graham. I think we had eight pages; the update was almost as long, but the other reports were mostly under twenty pages. But just having that intellectual getting together and doing [the work with no staff was stimulating. Fortunately], we had academics, who [. . .] do really good jobs with footnoting and all those things that [are necessary for a well-documented report. In] industry unless you're sending a report in for publication, reports on progress of your division or your strategic plan, you [did not have the same type of documentation].

So [. . .] from '03 to '06, I was doing Academy studies, [which took up 25 percent of my time. I] was still sitting on some advisory boards, **<T: 145 min>** which took a fair [amount of time] and doing some consulting. [. . .] My son's family is in the East Coast, and we would be able to go to the East Coast more often and [visit our] daughter in Berkeley. We would travel. It was [. . .] a mixture of things but having [. . .] at least three or four different things [to do] was, I guess, unconsciously important that I do.

EVANS: Does OPCAST still meet? Was it a . . . ?

SAVITZ: No, no, no. We disbanded it in December after the Biden win, and we had [. . .] our six topics and compendium of the six parts [was published]. And the Biden administration was going to be able to do things in a rational way. [There would be] shots in the arms, and Jeffrey Zients [was in charge. Having] the science be followed [externally] was really unnecessary. I sent your report to Eric and to Frances Arnold and Maria Zuber, and I heard back from Francis Arnold, asking me if I had any sage advice and others' sage advice. [. . .] I told her that Eric knows all the best practices and once they get started on issues, questions, I'm happy to answer them, but it was [and] it's a lot more work than you think it's going to be, and it's a real privilege. [. . .] I'll be curious as to what their agenda looks like and what also the makeup [of PCAST is. What] are the first things they tackle? Does infrastructure become something of

importance? Does broadband implementation [happen? They also will] have all this legislation, [including] wanting to create NSF into a technology institute, which those of us who worry about applied programs wonder why are they going to do this. And then an ARPA [Advanced Research Projects Agency] for climate that's going to be spread across the agencies. The Congress hasn't reacted well to that in the appropriations process.

EVANS: Yeah, I was curious . . . as someone so familiar with ARPA, I was wondering what your perspective was on the ARPA-C [Advanced Research Projects Agency-Climate] and the ARPA-H [Advanced Research Projects Agency-Health] initiatives.

SAVITZ: Well, and there had been an ARPA Homeland Security [HSARPA] that had not been successful. I think [. . .] the ARPA-E [Advanced Research Projects Agency-Energy], which had come out of the Gathering Storm study [was justified by that study]. I think Congress wants to see the justification of [ARPA-C. ARPA-E was] justified because of the Gathering Storm had a [discussion and recommendation in ARPA-E]. There was [only] one dissenter of that in that report. But it took until the ARRA Act [American Recovery and Reinvestment Act of 2009] to get any money and organized, so even though it got passed during Bush, it [didn't get] organized. Steve appointed Arun [Arunava] Majumdar, who ran a group at Berkeley at LBNL [Lawrence Berkeley National Laboratory]—the lab—great mechanical engineer. He did a terrific job in really getting it started and got good people and did the right [portfolio], so it really takes [leadership]. I think the idea of having rotating people for every three or four years [is very good]. NSF has the people out from [academia, and that is] good. Several of the [ARPA-E program managers, such as] Dave [David T.] Danielson, stayed [at DOE] and became the assistant secretary for efficiency and renewables [EERE]. I don't see how you do it across several agencies. That's going to be a hard thing. [. . .] Does every agency give money to DOE to do it in their [portfolio] parallel to how they did ARPA-E? Why not just have DOE do it and get input as a requirement as the agenda [develops]? [. . .] I don't see OSTP running such a thing like that; it would swamp their budget. But the leadership is key. Arun [. . .] did a really good job of it. [When Congress authorized ARPA-E in the 2007 America Competes Act, it requested the Academy do an assessment after six years of operation]. **<T: 150 min>** We said [. . .] they really needed to do [another assessment] after ten years to see what the impact was because it was too early [after six]. They were early stage, and what was [proposed] was interesting even at [the time of the study. Some] of the most successful [projects] were not doing energy-related [technologies] but technologies that were related in other fields, which can be a success on its own. It doesn't solve [energy questions, but] in my mind, [is] not a failure.

EVANS: Yeah, yeah. Well, I will be curious to see what comes of all the legislation you mentioned.

SAVITZ: Much less the budgets. I mean, the DOE budget is just [increasing], which is terrific. [. . .] I was impressed [with] the Pacific Northwest [National] Lab [programs. They] just had its

advisory committee meeting [about] two weeks ago. They've been very active in the grid and microgrids and they're really in a good position to look at that whole area and storage. They've got [an] administration [that] wants regional activities and underrepresented communities throughout and that is very key on everybody's agenda, so it's going to be interesting to see how that works out.

EVANS: Yeah, yeah. The budget. deadline is fast approaching. This summer has been really interesting following everything happening in both chambers . . .

SAVITZ: Are we going to have just a continuing resolution?

EVANS: Yeah, who knows. I guess we'll see. Well, yeah, I think, most of . . . yeah, I think I've covered most of the questions that I had. I guess I can open it up to Dave or just, kind of, general perspectives or . . .

CARUSO: Yeah, I mean I don't have any other questions myself. I always end interviews with is there anything that we haven't asked about that you think we should discuss? So that's always my last question, so I, kind of, turn it back on to the interviewee to see if there are other things that you would like to explore.

SAVITZ: Well, just briefly about the role of women in science and just how it has changed and how it hasn't changed in some ways. I mentioned when I was at [. . .] MIT how few women there were and how that's really [has] changed. But the engineering profession is [. . .] still at 10 [to] 20 percent women and then they drop out. [. . .] Physical sciences, [particularly] physics, is low. [It's still underrepresented. How] do we [improve it]? I mentioned Mary Good and I who could work together, but you could work with John Mason, who hired me [and] was very supportive of us too. [. . .] So many of the agencies didn't have women and this is particularly in the seventies. I was very fortunate that I hired half a dozen women who I'm still friendly with actually that came right out of—almost right out of—graduate school; it was their first [job]. One had [a psychology degree; Linda Schuck] had an MBA. [. . .] I mentioned to her about this oral interview, and she said she didn't feel—she had an MBA from Stanford—she didn't feel uncomfortable coming to work in '78 within the DOE, and she was with a group of two other women and Joe Barrow to look at market penetration issues for efficiency. I always [used some money] to do some social science [R&D. She initiated a program] with finance that was looking at real estate [financing] for buildings area, which is a big [industry]. She would go to meetings with the insurance industry, the banking industry, realtors and be the only woman there, so she went out—I had not heard—went out and got a pair of glasses that were blank so she would look like she was very serious. [. . .] When Reagan came in, [she moved to California] in the mid-eighties and [worked] at PG&E [Pacific Gas and Electric]. **<T: 155 min>** There were several [other women I hired]. Bob Fri's major executive assistant when he was leaving ERDA

and DOE was formed, he knew he would have to leave, but she was not. [He] asked if I would hire her, and I had Ann [Chenaut] working on an energy extension service, along with [Mary Fowler] that we'd created. [. . .] And I mentioned the letter writer ended up being [done by Susan Heard. But] in thinking about it, there were fewer from the physical sciences than there were from the social sciences, but that was a part—an important part—of the program, but things change. [. . .] Rita [R. Colwell] became the head of NSF—Rita Colwell—and she was the same generation as I. [. . .] There were not a lot of women role models. [. . .] All of us had very supportive spouses or supportive families that became the key to doing that.

When I would testify in Congress, which I had to do a lot in the late seventies and eighties for authorization, appropriation and then the bills we were doing. I was largely referred to by my first name, but that was fine, but all the men were referred to as Mr. or Dr. With appliance standards, I remember a senator from Arkansas saying, "Well, when my wife goes to buy an appliance, how is she going to know what's the most efficient?" [But they were respectful, and I got the program money I requested]. Joining [. . .] the government—at least the energy agency—had more woman than let's say DOD, but when I went to the aerospace industry, it had very few women. [When] John had hired [me, there were] a couple young women mechanical engineers, and I hired four ceramicists right out of graduate school. [As] I mentioned in a talk that I gave that there's now something called C3E [The Clean Energy Education & Empowerment (C3E) Initiative], which DOE and MIT [manage] and I gave input to, women in clean energy education and empowerment. They have an annual [meeting], and I gave a talk in 2013—I got an award—and I said, "When we started, there weren't twenty women, and here at this annual meeting were two hundred fifty women who were entrepreneurs . . . in energy efficiency and renewables, they were entrepreneurs, they were working in academia, they were working in [industry, such as] Cummins. John [Wall] after he left us as CTO, [Jennifer Rumsey] became CTO of [Cummins]. She's dwarfed by all these big trucks. That there has been a real change [of] many more [women], which is good.

I think this is really a good thing that it's . . . a large number, but it didn't always happen—in the Trump administration, it didn't happen at the higher ranks. Biden is doing a very good job of appointing a lot of women and also underrepresented minorities—and underrepresented minorities in the physical sciences or in engineering are still more difficult, though Georgia Tech [Georgia Institute of Technology] claimed that when [G.] Wayne Clough [was president] that he graduated more Black engineers than all the HBCUs [Historically Black Colleges and Universities], which is something to be very proud and is very good. It's just you got to build on that, so I think [women have more opportunities and women] have been taken advantage of [them. Role] models become important as to who [you see in executive positions]. [. . .] Sandia, for example, said they needed to have some women in higher positions and Jill Hrubry being head of it, she's now a nominee for NNSA [National Nuclear Security Administration] head. The customer wants to see [more women in higher positions]. The government has been faster than industry in many ways of having women in the positions of [high levels] in the civil service ranks and those who control the money. The customer wants to see people looking like [them] in some ways, [. . .] not a group of all white males. [. . .] I don't know how well integrated Rice **<T: 160 min>** is, but it was all-male at one point.

EVANS: Yeah, yeah. I mean, Rice is now wrestling with a lot of those issues historical, as you know, was founded as a free university—or free institute for white men.

SAVITZ: Anita Jones is one of your graduates, and she's just a terrific person.

EVANS: Yeah, she's great.

SAVITZ: Yeah, yeah. But she's never been on PCAST. I don't know, but partly because she worked for the government for . . . during those . . . the whole years of the Clinton time. And she's been very active on all the Defense boards.

EVANS: Right, right. Yeah, I'd always . . . was curious about that. There's only been one or two instances when somebody who was employed by the federal government was on PCAST at the time of their service. I think it's . . .

SAVITZ: [. . .] Even when she left and went back to UVA [University of Virginia], she [was not on] but that could be because she's been on the Defense Science [Board]. [PCAST does not do] a lot of Defense issues, but she has broader [interests also]. She and I were on the National Science Board together. She did two [six-year] terms. One term was enough, which was good. I think six years is just like [two four-year] PCAST. I'll be interested . . . John [Holdren], who had asked us if any of us wanted to [him] to submit our names to be considered for this PCAST. He asked all of [Obama's PCAST members], so I don't know. I felt that [there should be] new people. Personally [people if they did a study I'd be interested in, I would be on the study but not to be on PCAST. There] were people like Chuck Vest and Norm [Norman R.] Augustine [who] were on both Democrat and Republican PCASTs, which were very good. David [E.] Shaw was an initial member of ours, but he had been on the Clinton PCAST, had not been on the Bush PCAST.

EVANS: Right. Yeah, it's been interesting to talk to folks that have served on two because the style of these leaders changes so much and of course the presidents too, so . . .

SAVITZ: Well, that's why it'll be interesting to follow . . . your study has to go through the Biden administration's PCAST. You've got this . . . . I guess Eric's the first head and he's had so much experience with PCAST.

EVANS: Yeah, yeah, it'll . . . yeah, I'm, kind of, waiting to see who he chooses and how it operates.

SAVITZ: As I said, we'll see what practices he does and doesn't do.

EVANS: Yeah, we will see. We will see.

SAVITZ: So I don't have . . . anything, you know, something else might occur to me later, but I don't . . .

EVANS: Well, thank you for all your stories and your perspectives.

SAVITZ: Well, I'm glad you're doing all this. It's . . .

EVANS: It's really a pleasure speaking with you. I learned so much.

SAVITZ: Well, it, sort of, reawakes my memory, so it was very interesting, and I will hopefully get things back to you in less than sixty days, but it just depends. How many pages of this are there?

EVANS: Yeah, I'm not sure how long a six-hour transcript turns out to be.

SAVITZ: I would have a request that they come in . . .

[crosstalk]

SAVITZ: How much?

CARUSO: About one hundred.

SAVITZ: I would have a request to come in hard copy.

CARUSO: Oh yeah. That's no problem.

SAVITZ: [. . .] It's very interesting. Technical papers—partly because of my eyes probably—more than five pages I have to print out. I can read all my books on Kindle and can read reports and things, but if I have to review a report for the Academy, I've got to print it out. Otherwise, I miss something. Very good. Okay, is there any . . . that's it?

CARUSO: That's it for us, I think.

SAVITZ: I really hope you get John because I think he would really give you a good perspective of the two different ones.

EVANS: Yeah, I hope so too. Yeah, I think we'll keep poking him and see; I know he's very, very, very busy, so **<T: 165 min>** hopefully we can get him on the phone.

SAVITZ: Maybe you can schedule . . . like we had an hour meeting every Friday morning at nine o'clock our time, noon for our Zoom meeting. Maybe you can get him six one-hour Zoom meetings. [laughter] Get his schedule fixed. I assume you're going to cover people in the Trump Administration or Kelvin at least?

EVANS: Yeah, we're hoping to get Dr. Droegemeier at least and then we'll see. At the moment, the scope is, you know, Bush 1 through Obama, but if we can, we'd love to talk to those folks as well and see . . .

SAVITZ: Did they any report? They issued one or two reports. One I guess talking about the five key technologies that had to be done, but I don't know of anything else.

EVANS: Yeah, I think you're right. It was just the Industries of the Future report. I submitted a FOIA really early on, and I'm still waiting to see if I get anything back from that OSTP. So we'll see. Hopefully I'll get some more documents and stuff that we'll then preserve, but . . .

SAVITZ: Are there . . . are you pretty successful in getting things back on the FOIAs?

EVANS: Part of it was it's been . . . the libraries have been so—through COVID—have been really, really understaffed and short-staffed, and I think in some cases, my FOIA requests were a bit too broad. So, for instance, you know, at the G. W. Bush Library, they were . . . at first, they told me, they were like, "Hey, we don't think there will be much," and I was like, "Well, you know, whatever comes up is fine." Six months later, they were like, "We found a hundred thousand documents." They didn't even know.

SAVITZ: Every travel voucher was part of it.

EVANS: Exactly, right? And going through stuff, I've been to the Bush library—the Bush 1 library—a couple times because it's so close. It's the same thing where it will be like I requested a box, and the whole box is travel vouchers. [laughter] Like I don't . . . while I'm glad this exists, I don't know how valuable it is to scan, but yeah, no, it's been mixed so far. It's mostly just getting everything through clearance. I think there's just a . . . they've been short-staffed, so hopefully in the next few months, I'll get some good news.

SAVITZ: Well, I look forward to your report and the other. If I hear anything from Maria or anybody, I'll let you know, but the . . . Francis did get it, so . . .

EVANS: Yeah, thank you so much for sending those along, and of course, I'm happy to talk if they have questions on PCAST history, I'm happy to pass things along.

SAVITZ: [If] I hear back from Maria, I'll send [her] your contact information.

EVANS: Thank you.

SAVITZ: So, David, you do all these oral histories for lots of projects?

CARUSO: Yeah, we have multiple projects going on all at once. The major focus recently . . . so in addition to the work on PCAST, we've also been doing a lot on science and disability. That's been a big push, and so not that it . . . it's not an official project, but when I first came in to work at the Science History Institute, I evaluated the collection, and it became clear that—unintentionally, intentionally, I don't know—the way that we were representing science in our oral history collection was as an endeavor that only men did. And so, for the past fourteen years that I've been at the Science History Institute, one of my major pushes has been, you know, making sure that the collection actually represents those who are doing science, and so, yeah, it's not a project, but I tried to interview more women, more minorities—right?—just to make

sure that we are putting out there is a reflection of science and engineering itself and not some artificial construct that we want to perpetuate about who's actually doing science, right? It's not just men—white men—in some room taking care of all of us. So that's, kind of, been a core component of the work at the Institute for quite some time.

SAVITZ: So as part of your . . . this study, is Shirley Ann Jackson one of the people you would consider interviewing? I mean, just goes back all the way to her . . . she was the first **<T: 170 min>** African American to get a PhD and I think bachelor in physics from MIT and the head of the Nuclear Regulatory Commission. I don't know where she worked in between and then was on PCAST just for the one term and been president of RPI for many years.

EVANS: Yeah. Go ahead, Dave.

CARUSO: I was going to say we were interested in Shirley Ann Jackson well before this project, so she was on our list of we'd like to interview this person for quite some time. But I mean, always quite busy—right?—understandably so. It's like, "Do you have six hours to carve out?" "No, I do not have six hours to carve out."

SAVITZ: Well, so she'd drive whenever she came to PCAST coming from the Albany, [New York], area, she would come by a driver as opposed to a plane or something. I don't know how often she's coming to Washington now, but you could arrange while she's in her car. No, I'm sure she's doing work, which is part of the reason she has a driver to have some time, but I mean, she just has a very interesting history of what she's done—in many . . . some cases quite controversial. My grandson after his junior year in college worked in Washington at an NGO that was doing transcribing of oral histories from the Manhattan Project. That was . . . he found it interesting. I mean, it was, sort of, a niche type of area.

CARUSO: Yeah, but I mean that was a very fascinating group of individuals who were working on that project and not just because of their intelligence and their capabilities in science, but they . . . . I mean, from what I've read, they liked joking around a lot, so it was a serious but also comical kind of atmosphere there.

SAVITZ: But it's a camaraderie. I mean, I think when you're in this emergency situation and you're living together and doing . . . and you've got to solve this problem, and you're fighting this incredible enemy . . . that it does . . . you're working hard, but you're also partying in a sense. He found it interesting. [. . .] He was a global affairs major, not a science major, but he found it very interesting. All right. Well, I thank you all, and if something comes up, I'll get back to you, or if you have questions . . . and I look forward to seeing the transcript and then seeing the final product. I think it's good you're documenting all this.

CARUSO: Yeah, a lot of people don't realize like when I say, "Oh, we want to do an oral history," and a lot of scientists, "Well, why don't you just read my publications?" And it's like, there's a lot that happened that you don't publish on, and so that's what we're trying to figure out, right? There's just a lot that happens in rooms and no one records this information, and the only way to get access to it is by talking to individuals.

SAVITZ: And you're triggered by talking to . . . by talking to them, you trigger memories or things that happened.

CARUSO: Yeah, I remember . . . the first interview I did was with Torsten Wiesel. It was part of a project I was working on related to the Pew Scholars Program for biomedical scientists. And I went to do the interview. He was extremely fascinating, I was talking to him about his early scientific career abroad, and I mentioned a paper that he wrote published in English, and his first response to me was, "To be honest, I don't remember what I did in that paper." As it so happens, I had actually made a copy of that paper and brought it with me, and I just handed it to him, and the moment that he saw the paper . . . like he didn't read through it in detail. He just started skimming it, and the moment he started skimming it, it was like, "Oh, now I remember this. I remember that. Oh, there was this funny thing that happened." I feel like those memories do come flooding back with these little prompts that you can show up with.

SAVITZ: Yeah, you get used to it doing the interviews. All right. Well, you all have a good summer.

CARUSO: You too. Thank you so much for your time.

SAVITZ: Okay, thank you. Bye.

CARUSO: So long. [. . .]

[END OF AUDIO, FILE 2.1]

[END OF INTERVIEW]

PUBLICATION LIST

Christopher F. Chyba et. al. "Create a COVID-19 Commission." *Science* 374, no. 6570 (18 November 2021): 932-935. https://doi.org/10.1126/science.abk0029.

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