Dr. Larry Mayer Interview

Sept. 18, 2020

JF: Today is September 18th, 2020, and this is an oral history interview with Doctor Larry Mayer. It is being conducted via Zoom due to the COVID-19 public health situation. Doctor Mayer is in Lee, New Hampshire, which is a suburb of Durham. And I, Joanne Flanders, am in Bethesda, Maryland, which is a suburb of Washington, DC. So, good morning, Doctor Mayer.

LM: Good morning to you.

JF: Where we like to start with these oral histories is, tell me where and when you were born.

LM: I was born on the 17th of May, 1952 in the Bronx, New York City.

JF: I see, and in your family history, I see that your father came from Mainz, Germany.

LM: A suburb of Mainz, a little tiny town called Ober-Olm.

JF: [00:01:00] Ober-Olm, and that's on the Rhine, and he emigrated in '38 with his parents, when he was around age 12, to the US. Now, World War II was declared in '39, but in '38, German troops were marching into Austria and Sudetenland. What kind of stories has your father shared with you about his experiences coming over to the US?

LM: This is a very sad story, actually, because my parents are Jewish. And so by 1938, the Nazis were quite well-ensconced in Germany, and so they did not have a very pleasant time there, which led to their emigration. But at the same time, it also led to the fact that not too much was ever discussed about it in terms of personal history, and I think the experiences were too traumatic and too difficult that they really didn't want their children to know too much about what happened to them -- we knew generalities, but not details. [00:02:00] of what their experiences were. It turns out that my wife, when she was my fiancée and my grandmother actually had many long discussions and I probably have learned more through that path. And then towards the end of his life my father actually left a tape that discussed some of his experiences growing up in Germany in that period of time. Not too much about the actual immigration. There was actually some confusion and I've done some research to track down the vessel they came on and where they came into the country. And it was the SS *Amsterdam.* I finally found the immigration record for them. But it was not a part of my father's past that he really wanted to talk about. I actually once did a sabbatical in Germany and we had just had our [00:03:00] second child and so my parents had two

young grandchildren, two and four years old, and they really missed them and they wanted to come see them while we were in Europe. But my father wouldn't go back into Germany and so we were in Northern Germany, in Kiel, and the plan was for us to just take the ferry over and meet them in Denmark, very close by. And the night before we were supposed to go there, my mom called and said my dad said he would come over and meet them, and it was a very very strange situation. I thought this would be very good for him but he refused to speak German, he is a fluent speaker of German and also perfectly fluent in accentless English, but he refused to speak German there. And we were nowhere near where he had grown up but again, at the last minute we decided to [00:04:00] take a drive, and he agreed to that, to this tiny town Ober-Olm, again thinking this would be a very cathartic experience for him since we had been treated so well while I was a visiting professor in Germany. It turned out, in retrospect, it was not a good idea, and it really was quite traumatic for him and so again, that kind of stopped discussion of the subject.

JF: When his family emigrated in '38, how is it that they had the means to emigrate?

LM: That's also an unusually interesting story, and this all kind of falls back on my grandmother. Before the First

World War, in 1914, my grandmother came over to the U.S. -- she had relatives who had immigrated much earlier and were in New York City and it was the Stern family, actually, which if you saw the *Titanic* movie, that old couple, [00:05:00] that was the family. And my grandmother came over at about age 14 to basically be a nanny for them, to spend a year abroad kind of thing. And did. And World War I broke out, and she was not able to return, so she ended up spending four-five years, till she was about 18, 19 years old, with her relatives here at the time, before she was able to go back. And in that time, she became absolutely fluent and accentless in English. My grandmother spoke perfect accentless English, and my grandfather never spoke a word of English. And it was interesting because when she was able to go back, she was summoned back and told that a marriage had been arranged for her with the Mayer boy, and she was actually quite excited because she knew the Mayer boy. But it turned out it was a different one. (laughs) [00:06:00] It was not the one she was thinking of. But it worked out quite well. They stayed happily married for many years. But her ability to speak English and the contacts that she had, allowed her, through a big letter-writing campaign, to find the needed sponsors to get out. You needed a US sponsor to

bring somebody out, but also her ability to go into the US Embassy and the Consulate in Germany with her accentless, perfect, English, I think really helped the situation for both her and the small subset of our family that escaped. And I've seen many letters written to her from our relatives thanking her for her efforts in doing that. So it was that kind of twist I think that allowed them to get out that very late, as you recognized, 1938 was very late to get out of Germany at that time.

JF: And at that time in this country, reportedly, the German population was the least [00:07:00] population in the US, so it must have been a very unusual experience.

LM: That part I don't know about because I grew up in, as I said, the Bronx, in New York City, and by that time, the early 1950s, when I was born, there was quite a German population in New York City. In places like Washington Heights, you could walk around and only hear German being spoken. So I don't know what it was like in the 1930s. I assume there was also some huge anti-German sentiment too because of what was going on in Europe.

JF: So you mentioned that your father's faith was -- Jewish faith. Has religion played a role in your life?

LM: It's something I've always been proud of. I don't call myself terribly religious but I certainly identify with the

faith and I'm very proud of our heritage. [00:08:00]

JF: So the traumatic experience, it sounds, that he had, didn't disrupt the faith being carried through.

LM: No, I think just the opposite. (laughs) I think one of the reasons that I've kept the association is kind of, to put it crudely, I don't want Hitler to have won.

JF: So I would like to learn more about your childhood growing up in the Bronx, but quickly, tell me a little bit more about your mother. I know that her parents emigrated from Germany and Russia before World War I, and she also grew up in the Bronx. How did she meet your father?

LM: My mother's mother, my grandmother was Russian. My grandfather, whose name was Schulz, so clearly of German descent, I think he was born in the States and his parents were immigrants. [00:09:00] But the way they met is that my -- I think I've got this right -- my mother's father had a laundry, a little laundry in the Bronx, and I think my father got a job there working for him. We lived in big apartment buildings and so those stores were on the first floor and my father's mother and father had a little bakery and my dad worked there too. He was trying to get as many jobs as he could. And so I think he worked at the laundry for my mother's father and met my mom when she was probably about 14 -- maybe even younger, actually. And they all

lived in the neighborhood across the street from each other [00:10:00] in different apartment buildings. And so my Dad met my Mom then, and then he went off to the war, to the Second World War, and served in the Pacific. And they got married in 1950, so he came back I guess probably about '46-'47. I know he was on Saipan and Okinawa and then served with the occupation forces in Japan. I've got letters that they wrote to each other when he was away, and when he got back - they started going out and got married. (laughs) So they met basically through their parents, I would say. But not arranged.

JF: I see, and so you were born in the Bronx. Tell me about your memories. That would have been in the '50s and '60s, your childhood years. What are your memories from those years? What stands out to you?

LM: Lots of interesting memories. We lived on the sixth floor [00:11:00] of an apartment building, fortunately it had an elevator although sometimes the elevator wouldn't work so sometimes it was walking up six flights of stairs. Some of the early memories are things like -- they're very New York memories. They're the fact that the elevated subway went right by the building, so every few minutes there would be the noise of the train and the sparks, and to this day I can't sleep in silence, I have to have some kind of noise

going on all night to let me sleep. It was the experience of old buildings with radiators and the clanging of the pipes and when there was no heat, banging on the pipes to get the janitor to fix the heat. (laughs) Of us little kids, when it was cold, we'd always hang around the radiators, these standup steam radiators, and there'd often be a cover on top and if it was the right temperature you could sit on it. And we'd play there and I remember coloring and every once in a while, I had a brother and a sister, we'd drop a crayon into it [00:12:00] and the terrible smell of the melted wax and the radiator. But real memories of building the Cross Bronx Expressway. When we first lived in this apartment building, the Cross Bronx Expressway wasn't there and they built it while we lived there, and we literally looked down on it. And they had to blast it, so I remember the blasting, which actually cracked our bathtub on the sixth floor, so that's a pretty scary (laughs) experience. But then watching them build it, and then once it was built, it was really interesting to watch cars break down, and in those days it was like watching something in the desert in Africa, where an animal carcass gets stripped in minutes by the vultures and things like that. I'd watch cars get stuck, the owners would walk away, and then within an hour this would be just a frame

(laughs), as the car was stripped. So lots of experiences like that. [00:13:00] I remember -- it was a very different world at the time. Kind of, at age seven, I could ride on the subway myself and go visit my grandfather who -- his laundry was then in Manhattan by that time. It was a very safe-feeling place. It was a very mixed neighborhood in terms of ethnicities, and I'd walk to my public school, PS 119, I remember. Actually I just, a few days ago, looked at Google Earth and saw it was still there. It looked much nicer now than it did when I was there. So not unpleasant memories at all. I remember walking, again, very far to Little League games and things like that. So it was just a very different kind of upbringing, I think, than people growing up in rural America. I remember when I first got out of New York and one of my first girlfriends lived in this house with a white picket fence just like I'd seen on TV, it was so shocking to me. I said, oh, I thought this was only on TV but it really existed.

JF: [00:14:00] So it was quite an urban environment.

LM: Oh, yes. Very much an urban environment. I mean, the only trees we had had a cast iron grate around them for some reason. On the sidewalk, every once and while there'd be a tree but it would have this grate. There was one empty lot

between the buildings, and this was the wilderness. It was very rocky. It had rock outcrops and lots of garbage. Brush and shrubs and things like that growing there. And I remember one day looking -- out the window and seeing hundreds of people there and police cars and everything so -- you know, as a little kid, I had to go down to see what's going on and push my way to the front. And what it was was a garter snake. (laughs) Somebody had seen a garter snake in this lot and this attracted a crowd of hundreds -- and the police were called. It was such an event.

JF: Wildlife. [00:15:00] So how is it that -- you earned a scuba license as a teen, is that right?

LM: Yes. So as I said, my grandfather had a laundry and by that time it had moved to Manhattan, and I would go visit him quite a bit and next to his laundry was a sporting goods store. Again this is in the late 1950s, early 1960s. And this sporting store was probably one of the first around to start carrying scuba gear. And I remember going in there and just was absolutely intrigued by this. And I don't know if *Sea Hunt* might have been on TV at that time already with Lloyd Bridges, and that intrigued me. And my grandfather and I walked in there one day and he saw me looking, and there was a book, and it was a children's

book, and it was called *Boy Beneath the Sea*. I remember it. It had two authors. One of the authors was actually Arthur C. Clarke. I actually looked it up because [00:16:00] I thought it had been Jacques Cousteau but it wasn't, it was Arthur C. Clarke and somebody else, and it was about a boy in the Caribbean. There were lots of beautiful underwater pictures of this boy with the old Aqua Lung -- and that was it. I was absolutely hooked, hooked on doing this. I wanted to be an oceanographer, which is a very strange thing to aspire to in the Bronx. All my friends wanted to be doctors and lawyers and things like that, or their parents wanted them to be that, but I wanted to be an oceanographer. So I just stayed laser-focused. I remember the next time we went to the sporting goods store, my grandfather bought me a mask and a snorkel. Not a useful thing to have in the Bronx, but I spent hours in the bathtub just staring down at the drain with the snorkel and the mask at seven, eight years old, and eventually had the opportunity to take scuba diving lessons, and then pursued that academically too. (background noise) [00:17:00] I'm just trying to keep the doors closed because there's noise outside.

JF: Do you recall where you were certified?

LM: Yes. So I think my very first certification probably was

-- let's see if I got this right. It was a training program. I was certified many times over, but I think the very first one was probably something called Viking Dive Shop or something like that. I can't remember. It was some place in the Bronx. It was all in a pool, there was not an open water dive or anything, but then I eventually went to University of Rhode Island, got certified there, and then certified again at Scripps, so kind of kept moving up the ranks of certifications. Although scuba diving has virtually nothing to do with my career. (laughs)

JF: Well that path, then, to URI -- University of Rhode Island. [00:18:00] You were in the honors program for geology, you graduated magna cum laude with an honors degree in geology. So your interest peaked obviously in your teen years, was the path to URI pretty straightforward for you? How did you decide to go there?

LM: This is even stranger, actually. As I was growing up, 10, 11, 12, 13 years old, and knowing I wanted to be an oceanographer, I would just kind of -- anywhere I saw the word "oceanography" I would pursue it. And I found out about that time that there were several very special high schools -- they were called specialized high schools in New York City. Most of the schools were just standard, general admission schools, but there were three or four schools,

Bronx High School of Science, Stuyvesant High School, Brooklyn Tech at the time, that you had to take an entrance exam for and they were very selective about entrance. [00:19:00] And so Stuyvesant High School, which was in Manhattan, had, for whatever reason back then, a Saturday morning lecture series on oceanography. And so I would travel -- it was about an hour and a half from where we lived to get there by subway and bus, and I would travel there each Saturday, and I would listen to the lectures and they were interesting and some I understood and some I didn't. But after each lecture, as a little obnoxious kid would go up to the speaker and thank them and then say, well, you know, if I want to be an oceanographer where should I go to college? And I just kept a little list and people would start saying, Scripps, Woods Hole, Lamont, the three big oceanographic institutions, and then Hawaii, Rhode Island, the next level of places. So I had this list of about four, five places and when I was approaching [00:20:00] graduation from high school, and it was time to apply to college. Nobody in my family had gone to college before so we were very naive about all of these things. I had no idea of the concept of graduate school versus undergraduate. And so I just applied to all the schools on that list. And I got very nice letters back from Scripps,

Lamont, Woods Hole saying, well thank you very much but we're not an undergraduate university, we're a graduate school. But Rhode Island and Hawaii said, oh, we are undergraduate schools but nobody really got an undergraduate degree in oceanography at the time. Because I was a very good high school student and had very good grades -- they were very happy to see my interest. Rhode Island invited me to come up and it was one of my first real ventures outside of New York City, and I saw the beautiful countryside of New England and I just kind of fell in love with New England and the woods and stuff like that. And so I said, well, Rhode Island's the right place [00:21:00] to go for me. And so I was working that summer, the summer before university, in the Catskill Mountains as a busboy. I don't know if you ever saw the movie *Dirty Dancing*, I was living that crazy, crazy, crazy life there. You made a phenomenal amount of money in those days in a very short period of time, but you had to work very hard and you had to work every day of the week for the entire summer. You never got time off. They could replace all 50 people, busboys and waiters, in about 10 minutes because it was such a difficult job to get, such a well-paying job. And so Rhode Island wanted incoming freshmen to come for summer orientation, before university started, and so they

sent this letter that said sign up. And the first thing they ask you is what your major is going to be, and I had no idea. I said, well, you know, I want to be an oceanographer, by that time I'd been watching every Jacques Cousteau show there was. And so I said, Jacques Cousteau, oceanography, Jacques Cousteau, marine biology. So I said I'll be a biology major. [00:22:00] So I put biology down. They had about eight or nine different weekends to come for the orientation and I had badgered and badgered and badgered and pleaded with the maître d' at the hotel to give me one weekend off. And he finally agreed for the slowest week of the season and he said, okay, you can have that weekend off, that's it. And so when it said first choice, second choice, third choice, for the weekend orientations, I put the same dates down. And I get a letter back saying sorry, it's all full. And so I called them up this time and I said, look, I don't have a choice, I have to go that weekend, I really do. And the person on the other end of the phone says, well, it's not that it's really all full, they said, it's just all full for biology majors. And I said, well, I don't care what my major is. Just give me any major that would get me into oceanography. And they said, well we don't have many geology majors. I had never taken a geology course. I barely knew what

geology was. But I said, that's fine. [00:23:00] And so it was again, this absolutely random suggestion by somebody that led me off into geology and I think that was a great decision because by the time I graduated from graduate school as a marine geologist/geophysicist, there were plenty of jobs for marine geologists and marine geophysicists. But the field was actually already saturated, probably because of Jacques Cousteau, with marine biologists. So many of my cohort who were graduating as marine biologists were getting stuck in perpetual postdocs and things like that. There weren't many faculty positions available for biologists. So I'm very thankful to whoever that person was who suggested (laughs) that other path.

JF: Very fortuitous then. So your expectations at that point, when you finished, you went straight into graduate school, is that right? You went to the West Coast?

LM: Yes. I finished up as an undergraduate. I started relatively young, [00:24:00] I think I was just 17 when I started university. And so I was just 20 -- I think I arrived in California actually too young still to drink legally as a graduate student. So I went right from undergraduate to graduate school. And the way it worked at Scripps is that you went right from undergraduate, from a

bachelor's degree, to a PhD program. Scripps was almost exclusively PhD -- or at that time was almost exclusively a PhD program.

JF: And while there, you worked on the lab's Deep-Tow Geophysical package applying it to the problems of deep-sea mapping and the history of climate.

LM: Yes, well two very different things. The way it worked at Scripps is when you got there, the first [00:25:00] couple of weeks you're there, they have -- well, it's actually the whole first semester -- they have each one of the faculty members come, in a course called "Seminar in Marine Geology" or something like that. And they have each one of the faculty members come in and discuss what they are doing, their research and things like that. And there were two of them that just absolutely interested me, and they were really quite separate and different. One of them was a fellow named Wolf Berger [00:25:30] who was a younger faculty member at the time, and he was what we call a paleoceanographer. He was a person who studied the history of climate and the history of the ocean, looking at the history of the ocean to understand the history of climate. It was a brand-new field that really had just started, he was one of the founders of the field. And so that really intrigued me. And the other thing that intrigued me was

the work of a fellow named Doctor Spiess, Fred Spiess, who was the director of a [00:26:00] separate lab at Scripps called the Marine Physical Lab. And this was a Navy-funded lab, and this was a lab that focused on really leading-edge technology for deep-sea exploration. And the group that he headed up that worked with the students was something called the Deep Tow group. The Deep Tow was an instrument that had been built in the late ’60s or mid-’60s, when the *Thresher*, the USS submarine *Thresher*, was lost. And the Navy realized that they didn’t really have the tools available to find something as large as a submarine on the seafloor. And so they came to Doctor Spiess, who was an acoustician, ex-submarine captain but also an expert with a PhD in underwater acoustics, and said, can you help us build something that would be able to find things that were lost on the bottom of the ocean. [00:27:00] And in those days, these were the days of analog electronics without fancy computers, they put together this tube,full of electronics. They started with a section of an Atlas Missile Silo pneumatic tube, just a cylinder, very very thick that could withstand the pressure with end caps on it, and started building electronics and building something called the sidescan sonar, something that would allow them to look out sideways and see shadows if there was something

standing proud on the bottom. And a magnetometer to detect metal. And one by one they added cameras, and started developing systems that would transmit the signals up the cable and power down the cable, and so this was really the first instrument that was able to explore the deep sea. And that just absolutely thrilled me too. And so I tried to figure out a way to combine those two disparate areas into a thesis, and I did. [00:28:00] I actually used an acoustic system, what we called a sub-bottom profiling system specially built on that Deep Tow to give a very very high-resolution look at the subsurface of the seafloor, the layers in the subsurface of the seafloor. I used that in areas of the equatorial Pacific that are very sensitive to changes in climate. The sediment that accumulates on the seafloor there is made up of little skeletons of microfossils, of small plants and animals, just their skeletons. And as the climate changes, the animals and the plants that live in the surface waters change. And those changes in the animals and the plants create changes in the sediment on the seafloor, and if you have enough resolution you can actually see those layers acoustically. And so my thesis was about trying to [00:29:00] look at glacial, interglacial changes in the seafloor remotely using the acoustics. The only other way we had to do it at the time

was to take an actual sample and count things. But the idea here was to use the acoustics to try to see those layers remotely. So I got to combine the best of these two worlds, the world of paleoclimate and the world of technology and acoustics. And so it is a mapping exercise, without question. The Deep Tow made spectacular, detailed maps of the area it surveyed. But it also had this other component to it.

JF: And the climate component, really a few decades ago, although people were talking about climate then, a few decades before it was such a loud conversation.

LM: Yes. This was long before it was on the forefront of global interest. And before I think we recognized it, certainly. This was in the 1970s, before we really recognized just how critical things were. [00:30:00] But these are some of the tools that built the foundation for what we are now studying with such intensity -- these are the tools that built the foundation for what we're looking at now.

JF: Very interesting. When you left there, you went back to the East Coast. URI graduate school.

LM: Yes, I went back to New England as a Post-Doc at the University of Rhode Island. In a totally different field again. (laughs) In physical oceanography, actually, for a

fellow named Mark Wimbush. But he really brought me there because he had lost an instrument, a very important instrument that had been making measurements at the bottom of the ocean for seven months or so. And so in part he brought me there because of my experience in building instruments and trying to find things on the bottom of the ocean. But he was, and I was, part of a physical oceanography group at that time. That was just for a year or two. Then I went back to doing (laughs) what I normally do.

JF: [00:31:00] And at that point, around ’82, you began a period of quite a bit of working overseas and abroad and with international communities. You were in Nova Scotia, went back to Germany. Visiting professor, Paris, New Brunswick, then in ’99, University of Stockholm awarded you a Doctor of Philosophy honoris causa. Tell me what spurred you into the international.

LM: It’s not as jumbled as it sounds. Basically, at Rhode Island, I came as a Post-Doc, but my training at Scripps had been to write proposals. At Scripps, we were trained from day one to write proposals. And as graduate students even, we supported our own research through proposals we wrote. And so as soon as I got to Rhode Island, even though I was a Post-Doc being supported by Mark Wimbush, I

started to write [00:32:00] proposals to do other work that I was interested in, which was more of this high-resolution acoustic work. So I wrote a proposal with a colleague there to build something called the CHIRP sonar, a new type of sub-bottom profiler that would get us even higher resolution. And then I wrote another proposal with another colleague to work on a deep-sea drilling project. I started getting involved with the Deep Sea Drilling Program even when I was at Scripps, because the key to paleoclimate work is to take long cores. The proposals were actually successful. I got them funded and it turned out, I remember John Knauss came to me and said, he doesn't know how this happened but as a Post-Doc I'm wasn't really allowed to write proposals. They shouldn't have been able to get through the system but they got through and I got them funded, and so I became what we called a soft-money researcher at Rhode Island supporting myself, [00:33:00] which at that time was very unusual. There were not very many soft-money people at Rhode Island at the time. It was mostly all hard-money faculty positions. And at the same time, my first child was born and I got really really nervous about soft money. And I'd done very well, but the idea of not knowing from year to year whether you're going to get paid was okay when it was just me, and just me and

my wife, but when I had a child to support, I really -- I felt I wanted some more security. And so I started to look for a tenure track position, a faculty position that would have a guaranteed salary but still let me do research, because research is what I really love to do. And at that time, Dalhousie University, which was Canada's preeminent oceanographic university, was advertising a job for a marine geologist, geophysicist, just what I was. [00:34:00] And it was one of the great deals of the world. It was just a graduate program, so your teaching responsibilities were maybe one course a year, something like that. But 12 months of hard-money salary and a lot of time to do research. And so I jumped at it and fortunately got the job, and I was there for 10 years -- it was during that time that I had two sabbaticals (inaudible), a sabbatical in Kiel, in Germany, that I mentioned earlier, and then a few years later a sabbatical in France. I spent the year in Paris at Paris XI University. And the international collaboration, really all of it revolved around the Deep Sea Drilling Program, now called the International Ocean Drilling Program -- it changes its name every few years but it's still that same program that's been going on over 50 years, it's really remarkable. It's an amazingly international collaborative project.

[00:35:00] The people I worked with in Germany, the people I worked with in France, were all people I had worked with on ships, on the *Glomar Challenger* or on the JOIDES *Resolution*, the drill ship. And so we were just continuing what we do naturally. Oceanography is a remarkably international collaboration and a small community at the same time. So it's just natural, moving from one place to another. I was 10 years at Dalhousie, and then the Government of Canada decided it wanted to get into the ocean mapping business. Not head over heels, but the Government of Canada wanted to establish what they call an industrial research chair and put a lot of support into the concept of ocean mapping. And it was going to happen at the University of New Brunswick, a place I had not even heard of before. It was still in the Maritime Provinces, not far from Nova Scotia. [00:36:00] But this was a place where there was tremendous expertise in what we call geomatics. These are people who really study the details of measuring the earth, mostly land-based, not ocean-based. Many of the early developers of GPS systems were at the University of New Brunswick. They were a really powerful department in geomatics or survey engineering as they called it at the time. And they called me at Dalhousie and said, could I come help them write a proposal to extend

that expertise into the ocean, into this ocean mapping program for the government. So I helped them write the proposal, and then helped them look for somebody who would become the chair in ocean mapping, and for whatever reason they couldn't find anybody. And they finally came back and said, well, would you want to do it? Which I had not considered. I was very happy at Dalhousie but we were growing out of our house in Halifax and we decided to move houses. And once you decide to move a house it doesn't matter if you're going to move five miles, [00:37:00] or 500 miles. And so it was time, and we decided to move and I then spent another nine years at New Brunswick before coming here to New Hampshire.

JF: So the international work, as you said, in some ways it's just a natural progression. I know that, looking over your CV, you've been on at least 19 international committees and had a number of very significant experiences there. I would like to talk with you more about that when we get to the Seabed 2030 effort. But right now quickly, right around the end of this academic period we're talking about and the role that you had as the chair, you then, in '99, became founding director of the Center for Coastal and Ocean Mapping at the University of New Hampshire. You were also co-director of the UNH Joint Hydrographic Center.

Tell me, when did that concept begin for you?

LM: [00:39:00] That's interesting. It began with others, really. And this comes back to the chair in ocean mapping in New Brunswick. The way the chair worked there was -- remember I described it as an industrial research chair. The concept was that the government would match money from partners that you would bring in. Industrial partners or they extended it to government agencies too. When the chair started in Canada, there were three partners -- there was the Canadian Hydrographic Service, and there were a couple of Canadian companies that were the contributors, and the government matched that funding. And then as our reputation grew internationally, as a center of ocean mapping expertise, other people approached us, many of them US agencies. The US Geological Survey came to us for mapping help, [00:39:00] NOAA, different parts of the Navy, the Naval Research Lab, and so on. And some US companies too. And we started to build up to 12, 13 different sponsors, many of them US entities. It's not so easy for a US entity to send money to Canada, particularly a federal entity, but they managed to do that. And the Canadian government would match that and so everything was good. Also because of the interactions with our NOAA colleagues in particular, I would sometimes be called in on meetings

for the future of ocean mapping and things like that. These were actually some very difficult times for NOAA back then. There were pressures to end the NOAA Corps. These pressures were coming from the commercial community who basically said they could do all that [00:40:00] mapping themselves, and NOAA, I think quite correctly, said, well, this is an issue of public safety. The government is the one that holds the liability at the end of the day for a chart. And the government needs to maintain that expertise. We can share the efforts, but they need to maintain the oversight and the expertise. And there were very bitter battles going on and I was called in for some discussion in Washington, and in the course of that discussion, I remember commenting about how things worked in Canada, where the university acted as the interface between the industry and the federal agencies -- we were the research arm for both of them and everybody was all kumbaya and we all worked together nicely. I don't know who was there but somehow, through the efforts of folks at NOAA, the concept of an ocean mapping center [00:41:00] in the States came up. At that time, Senator Gregg was the chair of the Commerce Appropriations Committee that funds NOAA, and so as Senators often do, he had a university that had an ocean engineering department, a very rational place

to house such a center, and -- again, I knew nothing about these discussions going on within NOAA, – there was a proposal, although I guess it was an earmark, really, from Senator Gregg to create a center for ocean mapping at the University of New Hampshire to try to play this role of bringing industry and the federal government together, and helping NOAA in their research efforts. And I was approached after that. I actually didn't know what [00:42:00] was going on, at all, until I got invited by an ex-colleague from Rhode Island who was then at UNH, to come give a seminar at UNH. And it was very strange, I remember it was very cold, it was in the winter and I came in my flannel shirt and jeans, and at that time there was a hotel on the campus called the New England Center, and so they put me up there the first night, and I was supposed to have breakfast with my colleague at the New England Center at seven AM in the morning. And I get to breakfast and the President of the University is there and the Vice President and the Dean. Seven AM, what's going on here -- why are all these people here just to have breakfast with their seminar speaker? And nobody explained any of it, it was just a breakfast, and we were just chit-chatting. And then I gave my seminar and after that -- the Vice President of Research called me into his office and explains that the University

had gotten this earmark from the Senator and they'd asked around and [00:43:00] people had suggested that I might be interested in leading up the new center. The timing couldn't have been better because at that point my father was getting very ill and it was a real schlep from New Brunswick down to New York. And this would have been a lot, lot closer, and a lot easier in many ways. And so I agreed to come to UNH and brought some of the group from New Brunswick down here, but -- the Center at New Brunswick is still active -- first led by a student of mine, and now by a student of my student. The first student, John Hughes Clarke, is now at New Hampshire. So it's all a small family.

JF: Looking back now, because it's been [00:44:00] almost 20 years since that originated, when you think of what your expectations were then and where things are today, what are your thoughts on that, on what has evolved there in the past 20 years?

LM: That's a great question. I guess in some ways, I'll start by saying I'm thrilled with what has evolved. I don't think I could have imagined back then that it would have grown to as large an entity as it is now, we're over a hundred people. We started with 12 or so people and now we're over a hundred. I don't think I ever imagined --

although I knew in my heart, of course, that ocean mapping was such a critical component to almost everything we do, and I'll say even beyond the ocean, because the ocean controls so much of what goes on in the rest of the world. [00:45:00] And this is the fundamental framework, we know so little about the ocean. So I've always, in my heart, known how important it was. But I guess probably the most rewarding thing is seeing now how this is being broadly, in this country and globally, recognized. We just had a White House Summit and Presidential memorandum that have led to a National Ocean Mapping Exploration and Characterization Strategy. In this country and globally, the Decade of Ocean Science, the UN Decade of Ocean Science for Sustainable Development has recognized the need for a complete map of the ocean, and the Nippon Foundation/GEBCO Seabed 2030 project is working towards the complete mapping of the ocean by 2030. So there's just so much going on that says, maybe I didn't choose a bad path.

JF: Formed up very nicely. So in 2000, that same year, President Clinton directed the Secretary of Commerce to convene a panel of America's finest ocean explorers, scientists, and marine educators, to develop [00:46:00] a national strategy for ocean exploration, and you were asked to be a member of that panel. So the report, "Discovering

Earth's Final Frontier: A US Strategy for Ocean Exploration" laid out objectives and challenges for a national program -- the first objective to map the physical, geological, biological, chemical, and archaeological aspects of the ocean. And the first challenge within that objective, mapping in new scales, emphasizing regions not previously observed. Similar question, what were your expectations then for that Panel and how far have we come?

LM: So when that Panel first started, I was truly excited because in my heart, I am an explorer. What so excites me is the fact that so little of the ocean is known and trying to make that unknown known. It's pure exploration, but with tremendous benefits, as most exploration -- well-thought-out exploration – has. [00:47:00] And I was just thrilled that at literally the highest level of the government, there was recognition of the fact that ocean science had evolved very quickly. It's a very new field, oceanography in general, and so dependent on modern technology. But yet in the traditional funding paths that we had, which was typically the National Science Foundation, the approach to funding science was very constrained in terms of hypothesis testing. And that's wonderful for an evolved science where you really can put

together great hypotheses. It's very difficult, in my opinion, and I think in the minds of the other members of that panel, to apply that same sort of approach [00:48:00] to a young field where the hypotheses are not as clear. If we think back about some of the great discoveries in ocean science over the last years, many of them were made accidentally. And that's because we had no idea -- we had no idea there were hydrothermal vents down there. We had no idea about certain mechanisms going on until we stumbled across them. And so I think the hope of the President's Ocean Exploration Committee was to define something that, on paper, is remarkably boring -- systematic exploration. Start in the corner of the ocean and systematically map and characterize as much as you possibly can, continuously, and then find the exciting things and then focus on them more. Now that's a real hard sell. It's a shame it's a hard sell but the cost of doing that is large, although I always contend it's no larger than a mission to Mars. [00:49:00] And we choose to fund missions to Mars, which is fantastic, but I think we also owe it to our own planet to fund that kind of exploration. And so the reality at the end of the day, at least for these high hopes of complete exploration of the ocean, the Panel's report was really a compromise, but at least evolving out of that effort was NOAA's Ocean

Exploration Program. When the committee wrote the report, it did not recommend, as committees often do, where in the government an Office of Ocean Exploration should sit. It was an invitation to many agencies to buy into ocean exploration with the hope of new money. This was not going to be taxed out of existing budgets. The idea was that there would be new money for it. And to NOAA's credit, but, in my mind, to the discredit of other agencies like NSF and ONR, only NOAA stepped up and said we will do this. And so it's been a NOAA program only. [00:50:00] I think the Navy, and NSF particularly, has a lot to gain from this kind of exploration … But NOAA did and so, thank goodness they did. But it has been a long struggle. The committee report was in 2000, as you said, and the recommendations back then were budgets of 75 million a year or so for the program, plus capital investments and things like that. And we're not there yet at all. We're slowly creeping up there. So I'm thrilled it happened. I wish it would have been more universally accepted and more rapidly accelerated, but we'll get there. Again, I think in the last year or so we've seen a real direct recognition.

JF: Similarly, [00:51:00] I want to jump ahead to a time period when you were co-chair of the NOAA Ocean Exploration Advisory Working Group. [Break in recording] So jumping

ahead just quickly to the time period when you were co-chair -- The NOAA program, as you said, stepped up, began to evolve. I remember when the budget was only four million in an office of about four people, and it was beginning to grow. And then around the mid-2000s, you and Doctor Robert Ballard were co-chairs of [00:52:00] the Ocean Exploration Advisory Working Group, the predecessor to what we call today the OEAB, the Advisory Board. What do you recall about that experience and the role that that working group played in the evolution of this very new program?

LM: Right, well, that working group was a direct product, I think, of NOAA stepping up to the President's commission's report. And so again, I was thrilled that that happened. It was a working group that had, at that time, not much clout, really. It was a working group of the SAB, the NOAA Science Advisory Board, but back then there was very little representation of ocean science on the Science Advisory Board. The Science Advisory Board was really dominated by atmospheric sciences, [00:53:00] that part of NOAA, and again, very important. And so in all honesty, it was a very frustrating time, I think, for both Bob Ballard and myself, in terms of getting the highest level of leadership at NOAA to really buy into the concept of ocean

exploration. It was funded as you said at a relatively low-budget level, but I think that the gosh-honest truth was almost every year in the President's budget, that program was zeroed, and it had to be put back in. And so to me, that's not the kind of enthusiastic support that we are seeing now. So it was a frustrating time, I think, but we soldiered on and good things still happened.

JF: Well when you think about advisory boards and the role that they [00:54:00] can play with programs such as the federal Ocean Exploration Program, what are your thoughts on if and how the process could be improved upon?

LM: That's an interesting one. I've served on a number of advisory boards, some that I felt have been effective and others not, and I think a lot of it has to do with whether the federal representatives will listen and that's the luck of the draw, perhaps, in terms of who the federal representatives are. There are certainly constraints in terms of FACA regulations, and I understand those constraints and respect them, but they can be frustrating too. But I think the key to [00:55:00] a federal advisory board, or any kind of advisory board, is to have a willingness on the part of those being advised to listen, to have a mechanism to implement, if possible, what the advice is, to certainly dismiss advice that they don't

think is good, but to start with an open mind and say, even though these people -- which is often the excuse, don't understand the constraints we have, or don't understand this or that, they may have reasonable ideas. And to do it early enough in the process that it can make a difference. I see a lot of efforts at federal advice where the government has produced a document, they put it out for public comment for a couple of weeks, and they then feel they've covered their obligation to get feedback and sometimes it's too late at that point. And so I think we're seeing, with the national ocean mapping strategy, [00:56:00] some real attempts to get input earlier in the process, which is a very good thing.

JF: Thank you. So that was around the mid-2000s, and I know at that point, you, I think in '04 you had been an adjunct scientist at WHOI --

LM: In '04, '06, somewhere around that time. Again, it's a small community and I've collaborated with people there all the time and so when they asked me to collaborate, they said it's easier if you become an adjunct there. Woods Hole was always one of these places that I looked up at like Scripps, so I wanted to have both notches in my belt. A Woods Hole notch and a Scripps notch -- there's a great battle between Woods Hole and Scripps. Actually Bob

Ballard and I play this all the time, because he's more of a Woods Hole pedigree and I have the Scripps pedigree and so we always argue about which [00:57:00] place is better. (laughs) They're both great.

JF: In the last, I would say, 10 years, at least on paper, it looks as if your momentum has continued to increase, and the number of things that you're involved with, very substantial. I wanted to talk with you about some of those, but quickly, I'd like to return to the President's Panel for a moment. The Panel said that a national program in ocean exploration must be innovative and bold. From your vantage point today, where do you see some of the ripest opportunities for innovation and boldness?

LM: Those are good words. Whether that comes to fruition or not is another issue. I think the innovation is clearly in technology, and I think the program is really [00:58:00] embracing the concept quite nicely. But I think the real question is, how does it embrace it? Does it promote it? Does it fund it? Those are internal battles on the federal side, but I think without question, given the magnitude of the task of ocean exploration, it ain't gonna happen, simple as that, with current technology. We need to find better ways, more efficient ways. And I think without question, the Ocean Exploration Program is promoting and

embracing that through funding, and through spiritual support, and so on. If you want to get really bold, then I say you take this step back to what sounds horribly boring. [00:59:00] It's so funny that probably the boldest thing would be, hire a fleet of vessels and have them start mapping in one corner, and map the entire global ocean. Just do that. And again, we can bring technology to make it cheaper, more efficient, and so on, autonomous vehicles, whatever. But that would be a hugely bold step and I don't think we're quite there yet.

JF: During partisan times, which we've experienced more so lately, there's been even more of an opportunity for the philanthropic community to get involved, including with technology development. What are your experiences in terms what they can and should --

LM: This again is a wonderful thing that we have a growing philanthropic community, [01:00:00] Schmidt, Dalio, and folks like that who really have focused their efforts and their money on ocean exploration issues, and that's fantastic, and it's really been helpful and, as you say, promoting both the technology side, providing platforms and access and things like that, way beyond what the federal agencies have been doing. But at the same time I'm always concerned about that because I don't want the government to

use it as an excuse to remove their responsibility, their mission responsibility in terms of monitoring, measurements -- it's hard to get a philanthropic organization to fund a 50 or 100 year monitoring program that is often needed to get critical background information, like the baseline information to understand change. The philanthropic folks will rightfully focus on the more exciting aspects. [01:01:00] And so, I think we can find a balance but I worry sometimes that the government says, oh, the philanthropic organizations are going to take care of all of that. We don't have to. And I think there are some fundamental responsibilities of the government that can't be neglected.

JF: You had an appointment in 2016. Former President Obama appointed you to the Arctic Research Commission. We've been seeing rapid changes in the environment around the planet, and particularly in the higher latitudes. People have concerns. They also have hopes for, for instance, the Arctic Region. When we think of the Arctic, you've been on at least I think nine mapping expeditions in ice-covered regions of the High Arctic, including as Chief Scientist and co-Chief Scientist. You were appointed to the Arctic Research Commission. You are [01:02:00] co-head of a center related to Seabed 2030 where the Arctic and North

Pacific is the purpose there. When you think of the Arctic, where might you still see the promise and also some of your perhaps greater concerns?

LM: The Arctic takes everything we've said about ocean exploration and just puts it on steroids, basically, in terms of how little is known about it -- the seafloor, the water column, the processes. Mostly because it's so difficult to get to and hard to work in. But the importance of it is in the global system, this is the canary in the coal mine with respect to climate change. Things are happening so much more rapidly up there, and we've seen it. We started working up there 2003 and you go up there each year and you can visibly see the changes each year. [01:03:00] There are fluctuations, but boy, there's no question about the trends. So to me it's critically important to work there but we need to understand that it is much more difficult to work there. Much more of a technological challenge. But all the more reason to not leave that out in our efforts to explore the ocean and explore the world. And really, I think by looking at things happening in this accelerated mode, we may get some really good hints about how to handle things at lower latitudes, where the same things will happen, maybe at a slower rate. But we have this sped-up experiment going

that we can study up there.

JF: This leads me to Seabed 2030. It was launched in 2017 at the UN Ocean Conference. As you mentioned earlier, it's aligned with the UN Sustainable Development Goal. [01:04:00] You're playing an important role in that. You're co-head of the Arctic and North Pacific Ocean Regional Center with someone who I think is a colleague, a long-term colleague of yours, Martin Jakobsson, perhaps from both University of Stockholm and at UNH.

LM: I first met Martin when I was still at New Brunswick, and he came and spent a year with us at New Brunswick. He was working on his thesis, and he was using some of the tools we had developed for visualizing the seafloor. So it has been a very very long collaboration. A wonderful collaboration.

JF: Tell me about your role in what is perhaps one of the most significant mapping efforts we've experienced to date. Very ambitious. With less than 20 percent of the world's seafloor currently mapped, [01:05:00] tell me a bit about the role that you, with Martin, will be filling.

LM: The Seabed 2030 program was something that basically came in response to a challenge that was put out at the Forum for the Future of Ocean Mapping in Monaco in 2016. This was a forum that GEBCO, the General Bathymetric Chart of

the Oceans, the folks who work out of Monaco put on, and the Nippon Foundation, who have always had a huge interest in maritime issues. They fund a Nippon Foundation/GEBCO graduate training program at the University of New Hampshire. They've done that since about 2006 or so, where six students from around the world are brought in each year for a year and a half training program. The director of the Nippon Foundation, Yōhei Sasakawa, [01:06:00] basically threw out a challenge to the community at this forum and said he'd like to see the whole world ocean mapped by 2030. And so a group of us led by Martin put together a prospectus, a proposal, a plan for how this might happen. It's a very ambitious goal. I can't guarantee that it will happen, but every step we make closer to it will be helpful. This was presented to the Nippon Foundation, and in 2017, and as you mentioned, Mr. Sasakawa announced his willingness for the Nippon Foundation to fund not the actual mapping, the actual mapping as I've mentioned, is a three to five billion dollar effort, but to fund an infrastructure that would help facilitate getting that mapping done. So that's what Seabed 2030 is about. It has four regional centers [01:07:00] that are responsible for different parts of the world ocean. There's a center at Lamont-Doherty, that's worrying about the Atlantic and

Indian Oceans. A center in New Zealand that worries about the South Pacific. A center at the Alfred Wegener Institute in Germany that worries about the Southern Ocean. And then a center that's shared between the University of Stockholm and the University of New Hampshire that worries about the Arctic and the North Pacific. Those four regional centers then accumulate all the data they can in their region, clean it, process it, and submit it to a global center which sits at the National Ocean Center in the UK. And they're the organization that puts out the GEBCO maps, the global maps, the GEBCO Grid, as we call it now. Every year, year and a half or so we have a new one come out. [01:08:00] Before Seabed 2030 the last GEBCO Grid came out in 2014, but now we have produced one in both 2019 and 2020. And that has increased the coverage of the seafloor with high-resolution data from six percent to 19 percent, which is a huge leap. Now that huge leap was related to a lot of data discovery, data that was out there that just had not been submitted to the global center. And so those kind of increments will not happen continuously, every year. Now we have to actually get out and start collecting more data. Martin and I share the leadership of the Atlantic and North Pacific Center, and again, there are three other regional centers and we now have a full-time

director who sits in the UK. [01:09:00] So there is a group of about six or seven people we call the project team that provide the management and direction for the program. With close oversight from the Nippon Foundation, (laughs) I should say.

JF: Up until that point you already had significant international experience, collaborating on an international level. How does this effort feel to you as compared to the others?

LM: This one, to be honest, because as I mentioned, oceanography is such an international effort, is very similar, although not of the same magnitude, to the Ocean Drilling Program in terms of the international partners. It doesn't feel very different in that sense. And almost everything we do is tied in internationally. The ocean doesn't know about boundaries and doesn't care about borders. It just flows here and there. And so [01:10:00] to study it, we have to do it collaboratively. So it really doesn't feel much different than any of those other international efforts.

JF: It's certainly an exciting endeavor. I'm not exactly clear -- I know in November there was a Presidential memorandum on developing a more coordinated strategy for mapping the US EEZ, and then also to map the Alaskan coastline. How

will this Seabed 2030 work, in particular the Arctic and North Pacific effort, marry up with this other --

LM: This is wonderful, actually. It's something that, in the international community, makes me so proud, because first of all the US has had an amazing track record of allowing all the data collected with public funds except when national security concerns are in place, [01:11:00] to be made publicly available very quickly. And we're, I don't want to say unique but close to unique in the world in that. Most other countries will collect data and then keep it for some reason and not make it public or make it public in some diminished way. So we're really good about that. And so when the US national strategy for mapping its EEZ, which is being done very much in parallel with Seabed 2030 with a goal for the deeper waters of the EEZ by 2030, and the very shallow waters which take a little more effort by 2040, when that happens, this becomes a huge contribution to Seabed 2030. This is an example of a government stepping up and saying, "We will do this." If every coastal state stepped up and did this we'd only have to worry about the deep-sea part of Seabed 2030, and that's a much smaller problem, because deep-sea mapping happens quickly. So Seabed 2030 and the national strategy really go hand in hand. What the US is doing is an absolute contribution

because we have this policy of making the data available, a direct contribution to Seabed 2030 -- and the Nippon Foundation and Seabed 2030 are thrilled about it because this is setting an example for every other nation.

JF: At this point it's 11:22. Should we pause here?

LM: Yes, if we can take a break now because I actually need to get prepared for my next call, which is with the State Department, I have to say. If you want to leave the -- can you just leave this link open?

JF: And I can pause it, yes. I'll just pause the recording but the link will be open [01:13:00] and I will check back at what, a quarter of?

LM: Give me at least 20 minutes with them and check back about then. But hopefully -- okay?

JF: Okay. Pausing the recording here.

LM: All right, I'll see you. I'm going to leave and then I'll just sign back in.

JF: This is a continuation of the oral history interview with Doctor Larry Mayer. Larry, I would like to talk with you a bit more about some activities that took place when you were at Scripps, and then some of your more current endeavors. But before then, I would like to ask you about your children. I believe you have two? A daughter, Elisa, in South Carolina, and a son, Aaron, who's a US Naval

attaché in Brazil.

LM: Yes.

JF: And you're also a grandfather.

LM: [01:14:00] Yes. My happiness. (laughs)

JF: Let me ask you about your son. I see he did a tour in Iraq, and two tours in Afghanistan.

LM: Yes.

JF: What was it like being a father with a son serving in areas with military conflict?

LM: That wasn't fun. I'm very proud of him, obviously, but I have to admit, particularly the first time we dropped him off, it was at BWI for his flight to Iraq, his first tour. And this is done at the special end of BWI, where the military flights leave from. And that's an evening I'll never forget, I mean, never -- I don't think [01:15:00] a father ever thinks that he's going to be sending his son off to a war. It's a terrible, terrible thing to have to experience as a father. But fortunately everything worked out. It worked out.

JF: And he is now a deputy US Naval attaché in Brazil.

LM: In Brasilia, yes. He had two more tours in Afghanistan after the Iraq tour. Then -- I'm trying to remember the order. I think a tour in Japan and now in Brasilia, yes.

JF: And your daughter is a new mother, a fairly new mother.

LM: Well, 18 months now, so. She's already thinking about another one, so. (laughs)

JF: So let's jump ahead back to your days [01:16:00] at Scripps. While there, you were selected as an astronaut candidate finalist for NASA's first class of Mission Specialists. Tell me about that.

LM: That was also an interesting experience. So this is about 1978, I guess. At that point, Skylab hadn't been flown in a long time. There was a big lull in, manned space activity, and I guess NASA was scheming up what their next big program was going to be, which was the Space Shuttle. I wasn't paying much attention to it, but my officemate, a woman named Kathy Crane, whose dad worked for the federal government in Washington, went home for Christmas break and I guess they had over to dinner a friend of her dad's who was a NASA official. And he was describing to Kathy and her family this [01:17:00] new program they were thinking about, the Space Shuttle, and he was saying they were really going to start searching for a new type of astronaut, what they called a Mission Specialist, which would be an astronaut scientist to run a series of science programs on the Space Shuttle. And they didn't really know how to define this position but the closest thing they could think of was the chief scientist of an oceanographic

expedition, and so they were going to particularly be looking for oceanographers. And so Kathy tells me this story and she says, do you want to take a ride in space? My attitude was - who would say no -- sure! Interestingly, later, when I was selected as a candidate finalist, I was surprised with how many people said, "You're crazy, I'd never do that." To me, this would be phenomenal -- I had always thought about being an oceanographer, never thought about being an astronaut but I said, I'll be happy to take a ride in space. [01:18:00] So Kathy and I both applied and believe it or not Kathy and I both became astronaut candidate finalists in the same class. It wasn't until I literally arrived in Houston and started to fill out all the papers that they gave us that I realized that what I was applying for was not what now is called the Payload Specialist, which is what I had envisioned this thing to be, which is when you take a flight and run an experiment and that's it. But a Mission Specialist, is a full-time position -- we're filling out forms for a GS13-type position. I realized I was signing up for a full-time job to do this for a long time because at that point -- by the time the selection was made it was probably 1979 or '80. It would be 10 years or so until any of that new class would fly. And so it was signing up for the long term but

I was still thrilled with the idea. [01:19:00] It was real fun for a week or so to be treated like an astronaut. Have a locker in the astronaut locker room.

I also realized that it's not all fun. They made it very clear that it's a really hard work and you have to -- for your entire career, you have to stay in really good shape, you have to study all the time, and the third component of it is you also have to be on top of your public relations and outreach type activities, [01:20:00] and so it's a lot of demands. They had remarkable physical screening during that week. Every nook and cranny was probed and prodded. And after they sent us home they said, well, you're not going to hear from us unless you're imminently in danger of dying from something we've found or you've been selected. And I went off right on a cruise and I was sailing across the Atlantic, and this is in the old days before Internet or satellite communications on a ship. And the captain calls me and said that the marine operator has been calling the ship, there's a call for you from NASA. And I'm going, oh my God, I've either been selected or I'm going to die. (laughs) And so we tried to call back, we tried for like a week, a week and a half. Every day, tried to call back and again in those days, communications from the ships was very poor, and we never got connected and so [01:21:00] for a

week and a half I didn't sleep. Was I selected as an astronaut? Am I going to die? Finally we arrived and I think it was Cádiz, Spain. And I remember running down the pier and finding a phone, the old days with coin phones and things like that, trying to make this call to NASA, and I finally get in touch with them. They said, oh, yeah, they had decided that they wanted to ask us all another question. And that was, now that you've seen it's not all glory and excitement, do you still want to do this if you were selected? And so first off, this is a huge letdown, no, I'm not going to die and I'm happy about that one, but no, I wasn't selected. And so I had to think about that, and I did know one or two people who said no. It wasn't what they had envisioned. And I greatly respect them. I said yes, though. [01:22:00] And my rationale was this. I had always wanted to be an oceanographer, and the reality of what an oceanographer was was not what I had envisioned from watching Jacques Cousteau shows -- each day on the bow, looking out, the whales breaching, things like that. The reality is that about 90 percent of our time is in an office or at a computer, and about 10 percent or so, maybe more in my case, 20 percent, is at sea and doing the things I really wanted to do, the excitement of discovery and exploration, and all that. But that 10 or say 15 percent

makes the other 85-90 percent all worthwhile. In the astronaut case I realized that here it's going to be 95 percent at least, if not more, of the mundane stuff, and just five percent of that real thrill of sitting on top of a rocket. But, I felt that that five percent would be worth the other 95 percent for me. So it was a very interesting thought exercise that they [01:23:00] made us go through.

JF: And an honor to be selected as you were, to be selected as a finalist.

LM: As a finalist, yes -- I am honored and happy. But, I wish I was selected. (laughs) Really selected, though. And the interesting NOAA connection is that Kathy Sullivan was part of that class too, and she was the one who was selected, and good on her. Well-chosen. (laughs)

JF: Around the 2014 to '19 period, you became the founding director of the School of Marine Science and Ocean Engineering at the University of New Hampshire. As a founding director, how did that develop? Was that similar to CCOM where you had a concept and a vision and made it happen?

LM: [01:24:00] No, no, it was very different. And this was not a similar story at all because what the Marine School at UNH was was really a grassroots effort. One of the great

unknown facts is -- remember I talked about all those schools early on that people would say, if you want to be an oceanographer, go to Scripps, Woods Hole, Lamont -- nobody would ever say University of New Hampshire. But if you look at the amount of ocean science that's done at the University of New Hampshire, by federal funding levels, it's consistently in the top 10 or 12 in the country. Ahead of many other places that you often think of as oceanographic centers. I recognized that when I got to UNH, as did other people, but nobody outside knew about that. There's a lot of tremendous things going on, but it's spread out amongst 11 different departments and institutes and here and there. [01:25:00] There's no one focal center. When you think about University of Miami and the Rosenstiel School of Marine and Atmospheric Sciences -- we actually have more federal funding for ocean science than they do. But there's no single entity here that focuses the attention. It's spread out in the biology department, the earth science department, and so on. So there was a real grassroot effort from early on -- I didn't start it, of people saying it would be really nice to consolidate marine activities and create an umbrella of some sort, a school of marine science, that would, from the external perspective, let people recognize what UNH does.

And from an internal perspective, there's efficiencies to be gained. Why should we have six different departments that have to maintain small boats? We can consolidate and do things like that. So there were lots of really good reasons, and like anything within the university, lots of bureaucracy [01:26:00] to try to get anything different changed. And this kind of lingered and was talked about for a number of years, and -- you have the year of when it started. I forgot what year it was.

JF: Somewhere between 14 --

LM: 2014, and finally, a proposal was put forth through the Faculty Senate, went up through the ranks and was generally accepted by the administration. The proposal called for an international search for a director of the marine school. That was the proposal that was accepted, and I remember being kind of pulled aside by the President and the Provost [01:27:00] and the Vice President of Research one day and saying, look, we're really excited about this marine school, it fits all the goals and strategic directions of the University. It's going to be tough to do an international search right away. Would you be the interim director for a year or so -- and I said, sure, for a year or so. Well that one year dragged out to six, and so I was the interim director, but all that time waiting for

somebody to replace me, because to be honest I have enough other things to do. I was terribly supportive of it, but didn't really want to face the needed internal university politics that I'm not so good at navigating. We needed somebody much better at doing that, and finally, just last year, they did a search. It was not external, it was an internal search, but there's somebody else who now is really the director of the marine school. [01:28:00] I can't say this was something that I had the vision for. It was something that I supported and was willing to step in on an interim basis, but unfortunately that interim was a little longer than I had hoped for. (laughs) It's in very good hands now.

JF: You mention how many different hats and roles you were filling. When I look at your current list, in addition to the work you do through UNH and CCOM and the international work, you're chair of the Ocean Studies Board, the National Academies --

LM: Now that's a big job. That's part of the reason why I can't devote a lot of time to being something like the director of a marine school at the same time, because now that the Ocean Studies Board, plus a few people, have become the US National Committee for the Decade of Ocean Science in support of Sustainable Development and as Chair

of the Ocean Studies Board, I have become Chair of the U.S. National Committee for the Decade. [01:29:00] So that's really kicked up the responsibilities there as we try to communicate about the decade and try to organize and facilitate US activities within that context.

JF: And you are a member of the State Department's Extended Continental Shelf Task Force.

LM: And that's the call I had to go off to do, yes.

JF: Chair of MARUM Science Advisory Board.

LM: I am, yes. MARUM is just a phenomenal research organization at the University of Bremen, but with arms that reach well beyond that. I've been involved with them for maybe 10 years but to watch them also go from something small to the level of research that they're doing now is phenomenal, so that's been very exciting.

JF: In 2018 you were elected to the National Academy of Engineering [01:30:00] for developing techniques and technologies in coastal Arctic and ocean floor mapping. Tell me about that honor.

LM: Well, that just shocked me -- I had no idea it was happening. It turns out to be a long and drawn out process. Now that I'm in the Academy, I now recognize what a long and drawn out process it is. I'm terribly appreciative of the people who nominated me and again, I

was just totally shocked -- I had no idea it was happening and it was totally unexpected. I'm thrilled, of course, but feel terribly humbled by it too. I go to meetings with these people and say, oh my gosh, I'm not in their league. (laughs)

JF: In February 2020 you received the Walter Munk Medal. And the honor said that in addition to your research in technologies and software tool development transforming areas of ocean science, [01:31:00] that you also have been influential in defining the international efforts to map the world ocean by 2030. What has that honor meant for you?

LM: Now this again -- I had no idea it was going on and I was shocked, and my reaction to these things is always that they either made a mistake or -- I did have a roommate, an officemate at Scripps whose name is Larry Mayer too, and he's a limnologist, as opposed to ocean science. So maybe they meant him. So that's usually my first reaction to these kinds of things. But again, it's just unexpected and I was overwhelmed, really. I do what I do and I enjoy what I'm doing but I never think that I'm doing anything all that spectacular.

JF: Congratulations.

LM: Well thank you. As I said, my greatest achievement has

always been surrounding myself by very very smart people. [01:32:00]

JF: Keeping good company.

LM: Exactly.

JF: So there are a few things -- I'll jump around a bit here, there are a few things I wanted to ask you. The President's Panel described, as you know, key exploration objectives, and it also called out challenges and described them as "fascinating challenges". Today, what new challenges are fascinating you? You're involved in many.

LM: That's a great question. Obviously, the one that hangs over my head all the time is Seabed 2030. You talk about an aspirational challenge. I'll just leave it at that. My strategy for meeting this challenge is that it's going to have to be met by new and exciting [01:33:00] technology, and so I'm focusing a lot of my energy and effort in trying to facilitate new tools that'll help us achieve a goal like that. So that's kind of one side of my life. The other side of my life, and technology is always part of it, but I've kind of come back to some of the paleoclimate stuff and this really involves the Arctic -- since 2013 I've had three or four cruises on Swedish vessels. One on a sailboat, believe it or not. And three on the *Oden*, the icebreaker *Oden*. And those cruises have been focused

mostly on looking at what's going on in Northern Greenland. We had one across a good part of the East Siberian Shelf, one to Petermann Glacier, and one to Ryder Glacier in Northern Greenland trying to understand the very very rapid degradation of the Greenland Ice Sheet which has [01:34:00] huge implications for global sea level. And so there the challenges are logistical challenges. It's never easy to work there. Last year we went to, I mentioned Ryder Glacier, this is at the top of Greenland, it's a place that nobody had ever been on a ship before because nobody could ever get there before. But the ice had receded last year enough to let us slip in and so the idea of going someplace where nobody's been before in one sense is exciting, but also trying to understand what the processes are that are leading to this rapid degradation of the ice sheet are critically important. So, again, to do these things we always call upon new technologies and so I always try to keep my focus on how we can do this easier, better, cheaper, safer and so on. These are the challenges I see.

JF: [01:35:00] We talked a bit, when we were talking about the establishment of the Center for Coastal and Ocean Mapping, we spoke about the interface role that that was filling. In today's landscape and looking ahead, are there other interfaces you see that could be more seamless than they

are?

LM: That's a very good question. When the Center started in 2000, again, modeled after what was going on in New Brunswick, the Chair in Ocean Mapping there, the idea was we serve as a research arm, in part, for NOAA's Office of Coast Survey, developing new technologies in hydrography, and a training arm in terms of training the next generation of hydrographers and ocean mappers. And that's not just [01:36:00] for NOAA, that's for the community, the nation, the world. But we also wanted to bring in industrial partners. And so we created a program of industrial partners and we now have over 50 industrial partners, and we have an annual meeting where they come and every year we're trying to find a bigger venue because so many come. This year we had to do it virtually but we had over 120 folks participating. And so this is the traditional interface that we talked about before in terms of engaging industry and NOAA and the academic community all together. And I think that the change here is something you mentioned earlier, that's happened of late, is now the philanthropic organizations have gotten very involved too, and so we're trying to engage them too, not in terms of bringing the money in but just so that we all speak as one community, and we're not stepping on each other's toes [01:37:00] or

duplicating effort and things like that. And here's something where the national strategy on ocean mapping may play a real important goal in that I hope, having been at the White House symposium, where partnerships were emphasized that we may expand on this. I think what we need to do is find more formal ways to engage all these, now four different partners, the NGOs, the academics, the federal government, and industry in terms of coordinating effort. If you think about something like trying to map the entire EEZ or the world ocean, there are a lot of assets out there but they're operated by different groups. We have to make sure that they can know what each other's doing and that there'll be a single list of what the highest-priority mapping areas are, at least from a federal perspective, and people don't have to guess. To me, it's an [01:38:00] absolute sin to send the ship out anywhere and not turn on the mapping system, but it's just as much a sin to turn it on in an area that you've mapped already when you could just offset the ship track and map a new area. And so I think there's a lot of room for enhancing these partnerships through some sort of mechanism of coordination. Again, here's where sometimes the government steps on its own toes or is its own worst enemy in terms of rules and regulations defining what they can and can't do.

But we have to find a way to do it. I described at the White House symposium, the World War II movies where the admirals all stood around a giant table with sticks and pushing ships and coordinating massive activities. When I think about a national ocean mapping program where all these assets are available -- industry ones, NGO ones, the academic ones, I wonder if we can recreate that capability using modern technology. Can we use modern technology to have unified coordination of activities. That's easy to say, [01:39:00] but it's not so easy to do.

JF: Dr. Mayer, we've covered a lot of ground. A lot of water. I have a few closing questions for you, but before we get to that point, are there things I haven't asked you that you might want to talk about here or tell me about?

LM: No, I think you've covered a lot of things, and much more than I remembered. (laughs)

JF: In 20 years, I would love to do another life history with you. I think your CV would be probably three times as long as it is now. In my tally, you have at this point participated in more than 90 cruises. You've served on at least 19 international panels. Thirty-four national panels. You've been involved with more than 65 publications. And been involved with countless other related science [01:40:00] endeavors. The Millennium

Council that led to the President's Panel on Ocean Exploration had a theme. The theme was "Honor the Past, Imagine the Future". When you think today, when you think of the future of ocean exploration, what do you imagine?

LM: I guess, first and foremost, and I've said this before, I would love to see ocean exploration looked at globally, nationally, individually, with the same enthusiasm and excitement that people look at space exploration. I certainly understand the thrill of space flight, of space exploration, obviously -- I was thrilled about trying to participate myself. But I don't see any less excitement or importance, I actually probably see a bit more, in applying that same [01:41:00] concept of exploration to the three quarters of our planet that's covered by water. I think the fact that we can't see through it as easily probably contributes to some of the lack of enthusiasm, but it doesn't make it any less exciting or any less important or any less hostile or any less alien. And so I would hope that we can, over the next few years, really build the grounds for that excitement, because with that will come the exploration that will lead to discovery, which will lead to solutions to many many issues we face in terms of feeding the planet, and in terms of resources and climate. The oceans distribute global heat, and how that heat is

distributed is controlled by passages in the seafloor, so understanding the bathymetry, the depths, help us model all this. And so to me it's a short answer saying, [01:42:00] I want to see that level of excitement for ocean exploration that we have for space exploration, but it's all the downstream benefits of that excitement that really will make for a very exciting future.

JF: Thank you very much for your insights and your time today.

LM: My pleasure.

JF: It's greatly appreciated.

LM: That's great. (laughs) Okay. Well thank you.

END OF AUDIO FILE