Joytika Virmani Interview

JOANNE FLANDERS: Today is the 11th of September 2020, and this is an oral history interview being conducted with Dr. Jyotika Virmani via the Zoom platform. Dr. Virmani is in Los Angeles, and I'm in Bethesda, Maryland. Good morning.

JYOTIKA VIRMANI: Good morning.

JF: With these oral histories, I like to start at the beginning. So tell me, when and where were you born?

JV: I was born in Manchester in the UK, United Kingdom, in 1970.

JF: What are your memories of growing up in Manchester?

JV: (laughs)

JV: I have very little recollection of my very early years other than stories that my parents had told me. When I was one, for the first time, for my first birthday, I climbed on to the table, and they were holding, as every parent does, a one-year-old birthday party, and that's where the glasses were. The story is I climbed on the table, and they didn't realize I could do that till they heard the glasses crashing on the floor and me giggling too -- and then picking the next one up. That's something that's not really a memory, but it's a story. But then, I actually was sent to India to live with my grandparents, my aunts

and uncles, because my mom was doing her PhD in chemistry, and my dad was a lecturer in economics at the -- that -- it was then the Manchester Polytechnic but the Manchester Metropolitan University as it's known today and so my earliest recollection actually is from India as a toddler. And I was going to nursery school, and we'd have little uniforms and [00:02:00] so I think getting out of school and seeing my maternal grandfather there, playing with my aunts and uncle, my aunt getting married, things like that are still in my head. And then so back in the UK, I returned when I was around three or four I think. In the UK, it was things like learning -- it was a foreign country. I didn't know English, I knew Hindi, so having to learn English basically as a three- or four-year-old listening to it for the first time. It was cold and gray and not what I was used to and but -- you know, and then eventually getting into primary school.

JF: Are you still bilingual or trilingual?

JV: Yes, yes. There was such a concerted effort for me to learn English [00:03:00] because obviously when I went into primary school, I was already behind everybody else. But I remember I'd be taken out of the class to be taught specifically English to the point where I think around the age of 10 I've, kind of forgotten my Hindi because they

were speaking in English, so that I would pick it up faster as well. But then, technology helped I have to say. We got a video player and so then we got Indian movies and so I would listen to the Hindi and some of them would be subtitled and I -- and it just all came back, so now I am bilingual, yes.

JF: You mentioned in your questionnaire that your father was born in, if I pronounce it correctly, Dera Ghazi Khan.

JV: Dera Ghazi Khan.

JF: Ghazi Khan, so --

JV: That's where he's from, yes.

JF: -- the Punjab region of Pakistan. [00:04:00] I was reading that that's primarily -- the majority is a Sikh community.

JV: It's actually a Muslim community now because it's in Pakistan during the partition. But Punjab in its entirety is Punjabi generally majority Sikh, but there are Hindus as well, so we'd be Punjabi Hindus. It's very complicated because in the partition, Punjab was slot -- divided between the two countries, the region of Punjab.

JF: During the partition of India?

JV: Yes, yes, I'm sorry in 1947, yeah.

JF: And so his family fled as refugees. What was that like for your father? Does he talk about it?

JV: Yeah, he's actually written some of his memories down; it's really interesting for me to read, you know, for our generation to read. [00:05:00] But, yeah, it was a very turbulent time obviously partition. He was a young man at the time, and you could see the -- I guess the rumblings and the talk and the politics of this is coming. But there are some incredible stories like... They were a Hindu family, but they had a lot of Muslim friends. They've lived there for generations, everyone got along, and there was no problem on a person-to-person basis. It's really the political level where it really started to create some trouble and rift. So, stories of Hindus and Muslims fighting and then them protecting each other as well because they've been friends, on both sides -- protecting [00:06:00] each other from mobs and just -- it's just all sorts of things, getting on the train, being carded to take on the train to get out of -- to get into India. It's one of the largest refugee movements in history I believe. I'd have to check the numbers, but I think it's something like 14 million people, about seven in each direction. Because just as what was going on in what is now Pakistan where the Hindus were leaving, the Muslims were being attacked in India and they were -- so it was a two-way thing.

JF: So how remarkable is it then, your father had that experience and then was able to go to the UK and is lecturing in economics?

JV: It's incredible, incredible story. [00:07:00] They were, he was born to wealth in Dera Ghazi Khan, so the family comes from -- you know, there's... I think my great-great-grandfather maybe set up a school there, so it's... There's all sorts of -- like there was land -- they had land, they had property. My father was born as the heir to all of that and the boy, so it was a big -- he was like the heir to this empire essentially, not literally empire but... And then to go from that to fleeing for your lives and in a refugee camp where there was, I think, 14 members of the family in one `room, complete change in fortune, very drastic. He has stories of where it's really education [00:08:00] that pulled them out of this, all of them, every one of the siblings, they all -- it was all education based. He would work during the day and then study at night by lamplights, streetlights because that's the only lights they had and really get -- work two or three jobs a day to really pull themselves up and out of this situation. Yeah, it's through study. He actually got a scholarship to go to Europe, and I think he went first in

the Netherlands and then from there to the UK and got this position, so --

JF: So was he in England during World War II?

JV: No, no, because the partition was 1947, so this would all be afterwards.

JF: After the war?

JV: Yeah.

JF: England was really rebuilding probably itself.

JV: I think it would have been after that even because [00:09:00] in -- I think it took -- from going from one-room poverty to even -- in India, to something more would have taken a few years and then. I mean he was in the UK, I'd say, in the 1960s.

JF: I see, I see. So your mother is also from the Punjab region?

JV: Yeah.

JF: So how did they meet?

JV: But on the India side.

JF: Oh, interesting.

JV: Or what is now India I mean. You know, Punjab like I said, is one region but also, yeah, (inaudible).

JF: How did they meet?

JV: Ah, (laughs) so it's an Indian, you know, arranged marriage?

JF: Mm-hmm.

JV: My dad had already spent a year or two in the UK and his parents said, "Hey, come -- please come back, we want you to meet some [00:10:00] ladies," and so... And my mom was also -- she was educated. And so they met because their parents and their families introduced each other, and they met, and the engagement was announced a few days later, and then two days after that, they got married. It was really fast, but they liked each other, and they both had this drive for education and self-learning in common, and so... And they're still married. They just celebrated their 52nd wedding anniversary.

JF: In the UK?

JV: Yes.

JF: Are they --

JV: Yeah, and, yeah, quarantined in the UK. (laughs)

JF: Right. And it sounds as if they are also a match because they both were technically inclined it seems since because of what they studied and lectured --

JV: Yeah. My dad was more of a social scientist. [00:11:00] My mom was more on the science side, so she did a chemistry PhD. She actually has a master's in computer science back when it was a very young career -- well, a young subject. I was already born and living back in Manchester at the

time. I remember the cards that you'd feed into the computers, those -- the... I can't remember what they're called now, but... You know, that's the early, early days of computing, so she was involved in that. She's professionally had the more technical science interest and study area, but my dad is the one who -- I call him an early adopter of technology. He was always watching the technology shows and, "Oh, here's a new piece of technology we should look into and try out." Even to this day, [00:12:00] he's in his '90s, and he's talking about the robot vacuum cleaners and the... (laughs)

JF: Interesting. When I was reading about your early education, you talked about, let's see here, before college, before the Imperial College, actually in your high school years, you were already focusing on math and physics. You were able to do that at the high school level?

JV: Yes, so the UK education system is set up differently than the US. You do general like humanities, science, arts, everything till around the age of 13 and then you pick, because you then do -- well, back then it was O Levels. If you've ever seen *Harry Potter*, it's you start the owls and the... Anyway, so you do [00:13:00] your O Levels. I think I did 10 O Levels, but you start to narrow down

because it's two years of focus on a certain number of topics. And then after that, for those who were planning to go on to university for sure, and even if you're not, you do what were then A Levels and then -- and those are even more difficult. And so you narrow down yet again and so that's between the age of 16 and 18, you do -- most people do maybe three or four A Levels. I tried five, and it was really difficult but anyway. Yeah, you focus in a lot more, a much earlier stage in the UK in education.

JF: In one of the articles, it mentioned that the Lovell Telescope was nearby and that, kind of, piqued some [00:14:00] of your interest. But I'm sure there were a little -- must have been more around how you ended up in physics and math as a girl?

JV: Yeah, that's true, yeah. Actually, I think Jodrell Bank because I call it Jodrell Bank, but the Lovell Telescope is at Jodrell Bank, we'd go there as kids. My parents would take me, it was -- and my brother. It was very close to where we grew up. If you ever go, it's this massive structure, and especially as a child, it's much bigger, but even today, I see that, and it's just awe inspiring to see this big telescope so close. I always was interested in astronomy and so we'd spend time at nighttime in the back garden looking at the stars and so I always had that

interest. But I think what also helped is we had a lot of good British science fiction television, and I was just [00:15:00] hooked on that as well, so *Doctor Who*, it's all about space and time traveling, and we'd get some *Star Trek* or *Space: 1999* some old -- you know? I really enjoyed all of that. And then, as I said, both my parents had an interest, one professionally and one because he just loved it, so yeah.

JF: And you said that it was also a very supportive environment?

JV: Yes, definitely.

JF: Do you have siblings? Are you --?

JV: Yes, I have a younger brother.

JF: Oh, you do? Okay.

JV: Yes, sorry, I don't think I wrote that in the survey.

JF: What can you tell me about him?

JV: Obviously, I was the biggest influence on his life obviously because he went on to do physics as well, (laughs) so we both did physics. He's now married. He's got a baby boy [00:16:00] -- well, baby being a toddler I should say, lives in London with his wife. He did his PhD from Imperial College where I did my undergraduate. He did his undergraduate at Cambridge, his undergraduate degree,

and he's now a lecturer at Brunel University in mathematics.

JF: Very interesting. I want to talk more about your interest in sci-fi because I know that, what I read about your husband, he's in that other dimension himself. I definitely want to talk to you about that and the work that you've done with him over those years. But before we get to him, I'd like to talk quickly about some of your early work that led up to your time, your PhD years that you call the 10-year saga.

JV: Mm-hmm. (laughs) [00:17:00]

JF: And then your work -- you had a few other interim stops on the way before you started to do the incentivization work with XPRIZE and then were you are today. And so Imperial College, physics you said.

JV: Yes.

JF: That seemed a natural --

JV: Yeah, yeah. You know, my intent was actually to do astronomy, so I never lost that, so... But getting a good physics degree and specializing in astronomy was my intent going in. But in the final year, in the third year -- and again back then, it was a three-year undergraduate course -- I did an astrophysics course at the same time as an atmospheric physics course. And I decided I liked the

atmospheric physics better, so that's how I ended up doing that for my master's. [00:18:00] Because in the UK, it's -- one of the most common topics of conversation is the weather, and I always wondered as a child why all these weather events were happening in the same year, and it's only once I was doing my master's that I realized it's this thing called El Niño that created these huge shifts globally.

JF: Well, I guess so atmospheric physics, that would play a role in climate modeling.

JV: Yes, definitely, yes, and weather, weather, climate, mm-hmm.

JF: It's very marketable these days if you had stayed in that one, so...

JV: (laughs) Yes.

JF: I have to ask you, you graduated from Imperial College in '91 and then I believe you were at the GEC-Marconi Research Institute?

JV: Research Center, yes, GEC-Marconi Research Center, yeah. [00:19:00]

JF: Those years, it looked as if that was over the '92 -- 1992 period and when I was looking up --

JV: Two years.

JF: Two years, okay. When I was reading about Manchester, it talked about the Manchester bombings.

JV: Yes, yes.

JF: Do you recall that?

JV: Yeah, yeah, so I wasn't there on that day. My parents had actually gone in to town, and they -- I think they were fortunate they left before the bomb went off, the big one. But it was quite horrendous because I don't think we'd ever had anything quite that large. Before then, we'd had smaller incendiary devices both when I was in Manchester and in London, so we grew up, you know, like we're all... There was one time at Imperial College where they had to postpone or call a halt [00:20:00] to the exam because there was report of an incendiary device not too far away. Another occasion, I remember we were all told to stay away from the windows, so... And then you know they removed the trash cans, the bins in public places. I mean I knew people who even went so far as to get under and check under their car every time before they drove off. Yeah, we grew up with that trained into us, drummed into us, look out for suspicious packages. There's one occasion when my brother and I were shopping in Manchester city centre and we got home and, you know, a cup of tea, turned the news on, see what's going on. And there were a bunch of incendiary

devices found in the very area, and the very shops that we had kind of been in, but again, we [00:21:01] had already left before. So Manchester, the centre got sealed down, and the bomb squad comes in and diffuses things. Yeah, we grew up watching out for suspicious packages and behavior and things.

JF: Right. And there was another -- they also call it a Manchester bombing in ’96, but I think you were already in the States by then?

JV: Yeah, yeah, and, yeah, and I was -- yeah, that was... Yeah. That it did change some of the city centre, and they rebuilt it, and it’s amazing, you know. There’s an angle where you can capture in one photograph the cathedral from, I think, the 1100s and the chrome and glass from the late 19... you know, like hundreds and hundreds and hundreds of years of [00:22:00] building styles in one image.

JF: That sounds beautiful. So, at that point, you won a -- right around that time period, you won a Rotary Foundation Ambassadorial Graduate Scholarship, and you said that was very instrumental in allowing you to go to SUNY at Stony Brook?

JV: Right, that’s right.

JF: Was that your first time out of the -- I mean in the States?

JV: No, I had actually traveled for a vacation. My aunt and uncle lived in New York, so after I finished my A Levels, I came over and visited them for a month. But, yeah, so the Rotary Clubs and the foundation, they actually sponsor international students to go deliberately from one country to another for a year, and they pay for everything to study but then also to give talks at Rotary Clubs in the foreign [00:23:00] country about what life is like back in their home country. And then when they return, they give talks to Rotary Clubs there in their home place about what life was like. It really and truly is like an ambassadorial type of exchange program that gives students the ability to study in another country as well. It was a really, really great program.

JF: It sounds like it. Over the years, you've been awarded a number of fellowships and scholarships, very significant ones. What are your thoughts on how crucial that was for the path you eventually were able to take in terms of all the education you have --?

JV: Yeah. Yeah, no, it was huge. You know, it's -- oh, are we losing our connection here?

JF: No, is it [00:24:01] sort of...?

JV: Is it --

JF: Am I frozen?

JV: Sorry.

JF: Okay.

JV: No, you're moving now. I think it may have corrected itself, I hope anyway. Yes, the fellowships, so those were all -- after the Rotary Foundation one, the rest were from the College of Marine Science. It was department of marine science when I joined and transitioned to college. I was there for a long time. But they were by -- voted in by the faculty, so it was really merit based, but obviously the donations were from benefactors. And it's huge because as a graduate student, it's really difficult. You have your graduate work to do but then you also have to live and support yourself. And so if your advisor doesn't have the grant money or [00:25:00] you need something in and above and beyond, it's really -- it's --

JF: Challenging.

JV: -- it's so huge to have that kind of support that allows you then to focus more on your work, so...

JF: Exactly. When you were at Stony Brook, you mentioned this, sort of this pivotal point where you were encouraged to take courses that there had been a line between up until about that point. And so you took your advisor Marvin Gellar's suggestion and stepped across or merged those two lines in your studies. And interesting to think that

wasn't that long ago and now how significant this idea that it's one global system, and everything is interconnected. Tell me about that.

JV: Yeah. Yes, certainly, yeah. [00:26:00] I did, I applied to do atmospheric science because that's what I had decided. From Imperial College, that was my real thing. I like to say I stepped down from space to the atmosphere. But then at Stony Brook, the atmospheric science department just that year had merged with the marine science department to form the marine and atmospheric research center there. My advisor because of course again, this was -- he wasn't paying for this because Rotary was paying for it, so he said, "Well, why don't you take an oceanography course or two, a marine science course or two because you can, and it's here and it's..." you know? And I entered with only one year of funding, so I didn't know -- it's not enough to finish off a master's, so I didn't know what -- my intent was really like I'd have to go back. [00:27:00] It was like, "Okay, fine, this sounds great," and that's where I really learned the weather and the climate really is both. And it's just two different languages, the ocean -- the marine science and the atmospheric scientist spoke back in those days, but really it's one continuum was my realization and so it was really great. I mean it was just

such a pivotal thing to do, to walk that boundary of the two and to realize the connectedness of the whole system. Because in atmospheric science, you also look at the cryosphere and the effect of mountains and different land on the atmosphere. And then you look at -- from the ocean side, there's the ocean, and so to me it was just that the whole planet is connected by doing both of those things. And then I was fortunate [00:28:00] because my advisor did get a grant from NASA that allowed me to finish off my master's. I think I did it in something like less than -- about 18 months --

JF: It's very fast.

JV: -- from start to end. Yeah, it was quite intense, but it was good.

JF: How pivotal, what role did that play in what you ultimately -- you ended up then going on to University of South Florida.

JV: To do oceanography.

JF: Yes.

JV: Yes, so just as what happened -- just it was a repeat of what happened at Imperial really in the sense of I took two courses side by side, and I decided that this was the one I would switch to and then I did this in Stony Brook. I was doing more atmospheric science by far compared to

oceanography at Stony Brook; I just did [00:29:00] three core courses at Stony Brook. But then, as I said, I realized that's all weather and climate, and I need more on the ocean side to really get to grips with this. I learned about El Niño and these climate -- these global shifts that happen in the atmosphere. I looked for an advisor who was doing work in global-scale oceanography-type studies. And so I applied, and I got in and so I have -- my advisor was Doctor -- Professor Robert Weisberg.

JF: So you were in South Florida. At that point, you've been in the States two or three years?

JV: Yes. I moved here from the UK in August of 1993, graduated [00:30:00] in May of '95, and then -- and, of course, I went back to the UK and took a break. And I think I moved back in August of '95 for my PhD, to start the PhD. Yeah.

JF: I know you had been here for a number of years, plus you said you had vacationed in New York with relatives. What was it like being a British citizen of Indian national origin living in the US? What did that -- and being a woman as well, so -- (laughter)

JV: There's a lot of that -- a lot in there. (laughs) It's a little question, a lot of answers. I still remember the very first time in Stony Brook when I went to the grocery store. First of all, we didn't have midnight, 24-hour

grocery stores. That was a weird revelation, going by night was strange. [00:31:00] And then I remember like standing there in front of the milk and trying to work out which was the one that most closely resembled the one I had back at home. I mean there's so much choice, it's really hard, and all the words are different except for milk. Like I have no idea homogenized, there's so many -- you're like, what is all this stuff? That was one strong memory. Ordering eggs, ordering eggs is still difficult for me. It's like you have a code here, over easy and whatever, whatever. I say, "Just do this, cook it on both sides, that's how I like it" because I still can't tell. (laughs) Another interesting thing is the hardest words for Americans to understand from British people is water, [00:32:00] and that was the one word that I'd have to keep repeating in restaurants over and over is, water, can I have some water because it's just pronounced differently. That was interesting, getting on a bus. I think it took me a year. I think every time I move it takes me about one full seasonal cycle before I start to feel some familiarity with that place. The way I've looked at it -- I look back, I think it's seasonal related and you know this is what's coming, fall is coming, this is what to expect, and then -- and that's when it starts. For that first year, anywhere

new is always much trickier. But what it did feel like is actually it feels like you're a child again, which is a rare thing to have -- to be able to experience. Because it's not just what you're learning [00:33:00] academically is new, but everything about life is new. Everything, like I said, from the milk to the getting on a bus, the location. Driving even back in those days was like you're on the wrong side of the road. It's really actually refreshing. It keeps you young.

JF: Absolutely. And even the smells are probably different.

JV: Everything. You can just imagine after that period of time, you've forgotten what it was like to be a child. You can just see where that comes from again. It's really enjoyable.

JF: A magical opportunity --

JV: Yes.

JF: -- to have it that way. You were at the University of South Florida for 10 years.

JV: Mm-hmm.

JF: I know that many things happened during those 10 years, and at one point for instance, there was a two-year run of [00:34:00] dramatic hurricane season.

JV: Yes.

JF: And out of that grew your *Tropical Storms Blog*, which you still maintain today and (inaudible), I'm assuming. But you also lost valuable data. Was that PhD data?

JV: Yes. Oh, yes, so (laughs) the saga of my 10 years. Most PhDs, they should take somewhere between five, maybe four years to six years, and that's what I intended to as well. But my data was going to be from some moorings in the Pacific Ocean on the equator. In planning out ship time, you usually book it a year or two in advance, so we knew. [00:35:00] I got in, started the coursework, started the research on what topic I would do my dissertation on. I had started all the groundwork and then I got there at the end, yeah, towards the end of '95. In 1997 is when we were going to deploy the first mooring and so that's when I'd start to get the data, and then '98 work it up, '99, and so five years or so. We went out in April -- March, April of 1997 along with a group from Woods Hole. The idea was it was going to be an array of three moorings that crossed the equator. South on the equator was the one I was working on and then -- and one to the north, and we deployed, and everything went really well. What was unusual though [00:36:00] was that was the -- we were on the first Kelvin wave of the '97-'98 El Niño, and it was unpredicted, and nobody knew it was coming. The first clue was we picked up

-- we sailed out of Peru, and we had a couple of Peruvian colleagues on board, and they said, "It's -- the sharks are closer to the shoreline," which is unusual and that happens during an El Niño because it's -- the water changes. But the first real clue was when we were on the equator and we were going to deploy the mooring, and you take a reading of which way the currents are, and the currents had reversed. Then there was this scurry back and forward of emails and what's -- you know? And so anyway, so everyone was like, "Oh, you're going to have the most amazing data set. You've caught the beginning of this El Niño, it's going to be phenomenal, nobody has got this." And I was, "Oh, this is great, this is fantastic." [00:37:00] Because of that, we then deployed a second mooring, which was later in the year, so that that way, we would catch the whole years' worth of data instead of just... We were intending to go back and recover it, but this way, switching out, we'd have a full year's worth of amazing catching-this-event data. The second cruise was supposed to be scheduled for March of the next year, about a year or so later, and it was moved forward by about three months. I think it was February; it was probably moved forward to November. We left home, all of us who were on that vessel, before Thanksgiving, so nobody was at home for Thanksgiving. We deployed the

mooring in the middle of the cruise, so around December twelfth or something like that, [00:38:00] and (laughs) this is the big adventure. When you drop a mooring in the Pacific, you have an -- obviously you have to have a heavy anchor that goes with it, and it takes about 45 minutes for the anchor to drop to the base of the sea floor. We dropped the anchor and we'd -- and it's -- you're on the equator, it's very hot, you're in a metal boat, so you start work at 5:00 in order to get everything done -- it takes hours and hours, so you're done by 11:00 a.m. We'd all been up a long time already. We dropped the anchor overboard and then a squall came through. The mooring is floating loosely, the anchor is on its way down, we backed off so that we wouldn't hit the mooring as this squall came. We backed off, the squall came through, it passed by, 20 minutes, half an hour, I don't recall the exact [00:39:00] time now but... And we went back to see, you know, the mooring, and it wasn't there, and we looked and looked and it wasn't there. And then we started to do a search pattern -- there's no surface sighting of this mooring. Now, what we did have on the mooring were acoustic releases, which when you go to recover a mooring, you can't drag the anchor back up, so you have a release that releases the chain from the anchor and pulls the whole

thing on and that -- those would transmit. We eventually did a search to see what the -- what those devices were telling us. It turns out they were horizontal, which means that the mooring had sank to the bottom of the ocean and was lying horizontally instead of vertically because those releases would be vertical otherwise. Again, we were working with Woods Hole, they were on board with us, and they had brought a dredging [00:40:00] gear, which the best way I can describe it is it's like two anchors, maybe -- like a foot or two, you know, not very big attached to two hooks, which are attached to a single chain. And then that one chain in the middle is attached to the boat, and you drop the whole thing down, and you drag and hope that the hook catches it. We worked out roughly where we thought the mooring would be lying. We dropped the anchors, we dragged perpendicular to that, and you can watch the tension on the boat. And so after a few hours -- so keep in mind, we've been up very early. This thing happened probably about, I don't know, eight hours later. Then, we did the search rescue, like searching, searching all through into the night. The next morning so we didn't get much sleep [00:41:00] at all. The next morning, we started this dredging operation to drag to see if we could hook it -- very small chance of this happening. And we did, and we

got it, and it came up, and it was -- you know, it came up the following night, so it's like we've all been awake for 36, 40 hours, whatever it had been. A very tense situation because there's a lot of tension on everything at this point. You're pulling up this heavy mooring, which is drenched. It got to the surface and it was -- it wasn't a hook. It was the chain that connects the anchor to the rest of it, had snagged on the rope of the mooring, and the whole thing just was pulled up just like this. It was amazing to see this. The consequence though was obviously I didn't get any data from that particular [00:42:00] -- the second half of that year, but we had recovered the previous mooring, so... The way I describe that experience is like it was shooting an arrow, four and a half kilometers in the dark, because the sea floor was four and a half kilometers' depth, and hitting bull's-eye. It was amazing to be a student just to experience that. But I didn't get any data from it, so everyone was very depressed because we lost it. When we pulled it up, the acoustic Doppler current profiler had squashed under the pressure. It's rated down to 2,000 meters, so it was outgassing, so no one could go near that for days, it was sealed off. The foam itself was like a scrunched up sponge thing that it took a few days for it to re-pop itself out. We lost

almost all of the temperature measurements [00:43:00] there somewhere in the bottom of the Pacific. We did pull up some sand from the seafloor. (laughter) Anyway, it was a mess. I had the meteorological packet on there, my advisor did, and that was gone. It's a little expensive mess with no data, so that was that. And then when we got back with the mooring we did recover, it was the second hit because we had 10 temperature pods, which due to a manufacturing issue, nine of them stopped working after the first week of deployment. I had no temperature like throughout the column. The met packet, the data logger had, at some point, taken in water, so there was no met data. It was really very limited. I had currents and some temperatures and then sea [00:44:00] [sparse?]. It was not enough for a PhD. It took a year for us to recover so now we're at the end of '98 and so then I restarted. And I remember my advisor, like talking to him in the office when he convinced me to stay and to change my topic area from deep sea to coastal oceanography, and that's why it took me so long. But what I did -- the silver lining is I had a really deep understanding of the deep ocean and then I got another one for the coastal ocean, so essentially, I had an understanding broader than many would maybe normally get.

JF: At the most discouraging part of that situation, were you considering letting go of your studies or did --? [00:45:00]

JV: I mean, yeah, it was one of those where -- yes, in a way but also not because it was kind of a -- it took so long to realize how bad the situation was that you were already over the initial shock of it. The cruise itself, that was a cruise that -- I don't know if they'd ever do this again. But we went home for Thanksgiving, the mooring sank right in the middle, and then we didn't get back into port till the day after Christmas, so nobody was home for Christmas. That whole time was like everyone was down for some reason or another and -- yeah. It was the biggest El Niño, and we didn't quite catch it. But everyone was very like, "Oh, it happens once in every physical oceanographer's lifetime. You got it out as a graduate student, you know, it would be fine." Everyone was really [00:46:00] trying to boost up my spirits there.

JF: Gotten it out of the way.

JV: Yeah, you've got it out of the way, it's fine.

JF: Well, one of the themes I see reading through the interviews you've done and the information that's available on you is that you do seem to have a sense of -- a very strong sense of resilience. And people talk about your

humor and your optimism and your perseverance. What do you think about all of those attributes that are poking around you in your life?

JV: (laughter) Yeah, if I didn't have any sense of humor, this would be a completely different story. Yes. You know, I grew up on British television, we got crazy sense of humor over there, so... Yeah, the sense of humor and then the optimism I think. And I think I get that from my parents, my dad especially because of what he has been through. [00:47:00] Always even when we'd have little setbacks as kids, it would be like, "Keep smiling, keep going on, one day it will all work out, don't worry" that kind of attitude, so... Yeah.

JF: It sounds like they gave you a really solid foundation --

JV: Mm-hmm.

JF: -- for putting one foot ahead of the other. So you finally received your PhD and... But you have a number of positions that you went -- it sounds like you went back to the UK, you're involved with -- you were there when the Icelandic Volcano erupted?

JV: Erupted, yeah

JF: It sounds fascinating, worked at a regional production center -- prediction center for global ash production, so you went from --

JV: Yeah. I was at the UK Met Office. It's the equivalent of the National Weather Service, so it's the UK's weather service. [00:48:00] I was there actually in a different department, and I had friends who were actually directly involved with the prediction of volcanic ash. The way the world is divided, there are seven centers that predict all the volcanic ash for a particular region, and the UK Met Office was responsible for the region that included Iceland. And the reason is you have one center for aviation, so there's no two different opinions and two different... The other centers back up the modeling and forecasting, but really that was a time when all flights shut down because it was a global shutdown and a lot of people were stranded and things. I actually knew because one of my best friends who I'd made at the MET Office [00:49:00] at the time was one of the people working on that specific thing. And she'd been there for a few months before I joined, and she's like, "Oh yeah, it's a really boring job this --" You know, it's kind of this boring but quiet because there's not... But we were supposed to go for a coastal path walk in January, and she called and said she had to cancel because there were rumblings from a volcano in Iceland. That was in January. I knew that there's something brewing, but it really kicked, it really

erupted in April, and at that point, everyone is working like normal nine-to-five type -- it's science research type jobs. And the day it happened and everything, especially for her, the team she was in, it all switched, [00:50:00] and everyone 24 hours a day, they were in shifts, they had going back at 2:00 a.m. home and coming back, so... They were in rotation. Everyone on the planet seemed to want to talk to them from the government to aviation, to the press, the public, everybody. They pulled me in and others in to help manage that whole thing so to -- so that they could carry on doing the predictions and then produce the valuable data.

JF: Very interesting. Was it that job that caused you to return to the UK, or what was it that spurred you to leave the US?

JV: Oh yeah. Yeah, yeah. I got a job at the UK Met Office. Between my PhD and that job, I did a year or so of postdoc work as a postdoctoral while I looked for other [00:51:00] positions. And then the job I actually got then was as the coordinator for the Florida Coastal Ocean Observing System Consortium.

JF: Absolutely. You went from one role there to being hired as the first executive director there.

JV: Yeah. Yeah, (laughs) yes, I did. Because after six months, they realized I was kind of running it. And I had an amazing management committee consisting of the president of my marine lab and the deans of various colleges, and of marine science around Florida, and the chairs, so it was all the leaders in marine sciences around Florida was my management committee, and essentially in a way, my mentorship committee for that. But, yeah, after six months, they realized [00:52:00] it wasn't so much coordinating as I was just I guess --

JF: You were leading.

JV: Yeah, and yeah, and so... Instead of asking for a pay rise, I asked for a position and title change. (laughs)

JF: And they gave it to you, and it was the first of -- first executive director roles that you were --

JV: Yes, yes.

JF: -- offered. You know, it sounds like it was a very dynamic position there because of all these programs and institutions and labs and some that were private, I guess, private companies as well?

JV: Yeah.

JF: So one thing that's interesting is in one of the interviews, you talk about your comfort with working with many different personalities, the people from different

types of institutions. Talk to me more about that. Do you feel that's something that just came naturally to you, or that was learned over [00:53:00] the years?

JV: I think it was learned in the sense of, so my parents were first generation in the UK, so they were migrants, and so they had a very strong community of Indians who moved to the UK. And so every weekend, we would all meet and so it was learned that you have this community and you get to -- that as children, you don't choose who they are. You have to learn to adapt and work and play and whatever with them, and so, which is the same I think for every community essentially. I think from that it was learned, a very much learned from childhood experience, so yeah.

JF: And it served you well. [00:54:00]

JV: And then the additional -- you know, at Florida COOS because until then you're in academia, so I did GEC-Marconi. That was kind of a research-type endeavor before then. I've been mostly in academia until then. The learning I had there, I was working with people who were in business, people who were in politics, people who were -- you know, they had different approaches and different speeds of doing things and different ways of doing things, yeah.

JF: So you had your experience, research experience in academia and then you began to shift into the world of philanthropy, bringing your research and science with you. And I know that in between [00:55:00] there, it sounds like you went back to the UK and perhaps worked in the Met Office again?

JV: That was my first time at the Met Office. I did it for -- let's see. Gosh, even I can't remember -- isn't that --? No, I did Florida COOS, then I got the job at -- in the UK Met Office, and I had always -- you know, after my PhD, I had always intended to move back to the UK, but then I got this Florida COOS position, so I stayed in the US a while longer. But I applied, I got this position in the UK, I moved back, and then in April of 2010, two things happened: Eyjafjallajökull, we've already talked about the volcano in Iceland. The same exact week was the oil spill in the Gulf of Mexico. During the day, I was there working, helping to manage this disaster going on in the UK -- well, [00:56:00] in the world. And then I'd get home at night and watch the news and there on BBC was people I had worked with in Florida or, you know my job at Florida COOS allowed me to also work with people across the gulf. I got involved in the Southeast Coastal Ocean Observing System Regional Association, so really all the way from DC to Texas. And there were people from around the gulf who were on the news

talking about the disaster that was unfolding and so -- yeah, so I moved back to Florida. People were asking me if I could come back to Florida and would I join and take a position in Florida, so I eventually did. I eventually took up the associate director of the Florida Institute of Oceanography. And I accepted that in the summer of 2010 and then it took a while [00:57:00] for the visa -- we fast tracked it, but to get the visa through but -- so yes.

JF: So you mentioned the visa, you weren't then a naturalized citizen?

JV: No, no, no. No, it was all student visas and --

JF: Right.

JV: Because my intent was to move back to the UK.

JF: Of course. Well, the Gulf of Mexico spill, Deepwater Horizon, that pulled you back --

JV: Mm-hmm.

JF: Yes, and you were at the --

JV: I was in an interesting position, which was a little unique in that my PhD in the end was OAS interactions on the West Florida Shelf. I went from deep sea to coastal, so it was Gulf of Mexico-focused work scientifically. And then with Florida COOS, as I said, I got to know people really well across Florida but also from Texas [00:58:00] up to DC. I was one of the few people who could come back and know

everybody already, like hit the ground running in terms of knowing who people are. They had already worked with me so that I think was an additional reason for asking. And again, this is a crisis scenario, so I accepted it before the well had been sealed off, which took a long time and then it was just the visa we were waiting for.

JF: So if I'm pronouncing it properly the, Florida COOS, is that how you --?

JV: Florida COOS, yeah.

JF: It sounds like it was an instrumental role among many, but it sounds like that one really...

JV: Yeah, I think every role it feels like has been super instrumental. (laughs)

JF: They built on each other in some ways or...?

JV: Very, very much so, yeah.

JF: Segues to another. [00:59:00]

JV: Yeah, I can connect one to another, yeah.

JF: Fantastic. So I have to ask you because we've now spoken about at least five or six different roles you've filled. What were your expectations [01:02:00] when you were in graduate school? What were your expectations of where it might lead you to, and looking back --?

JV: Yeah. I think at least back then, most people who entered to do a PhD, they were, "I'm going to be a professor, I'm

going to do research, I'm going to be somewhere, I'm going to teach." I think that was my expectation too as a graduate student was I'm going to be a professor somewhere and do professor things, research and teaching and things. But one of the things I learned though because I did have such a long time in -- during my PhDs, I actually took part in a lot of other things during that time because I had already done coursework. And so I did participate [01:03:00] in committees, and I was very active in the college as a student. I taught one -- as a guest lecturer for one class every year, and through that experience, I decided, I don't think teaching in a traditional setup is quite my thing. Until that experience, I had never really thought about this. Yes, so yeah.

JF: Because the -- some of the key roles you've filled have really been leading efforts -- coordinating efforts and leading efforts.

JV: Yeah. Yeah, I don't know how that happened. (laughs) I think it was really it's because, as I said, I took part in so many things and I was on committees and did things [01:04:00] as a student in -- during my PhD because I had extra time I guess. Really, I think it was fully first recognized when I was offered the Florida COOS job, so I didn't apply for that. That was some -- so yeah. I had

started to look for jobs, and I had asked the dean of the college if he -- Peter Betzer if he would be a referee for me, and he said, "Well, what kind of things are you looking for?" And he, of course, has seen me for 10 years evolve and participate and get these fellowships. I was there when the college became a college from a department. And so he, of course, led that from being chair of the department of marine science to the dean of the College of [01:05:00] Marine Science. And he set up a college transition committee to look at what does it mean to be a department and what additional stuff do you need to be a college. And so I was the student, he asked me if I would be the student member on that committee, so I would gather the input of the students, and I actually learned a lot about what it takes to run a college during that experience. That was partway through this whole 10 year saga. That was huge. I had worked with him in a different capacity. And he was involved with Florida COOS, and they were looking for or they decided to look for a coordinator and so he put my name forward. And all of a sudden, I got this phone call from this lady Donna, and she's like, "Is this Dr. Virmani?" "Yes." "The [01:06:00] president of Mote Marine Laboratory would like to talk to you," and I thought I was like, "This is so -- what, what -- he had

never -- Peter never told me that he'd put --" It was just very much out of the blue and I was like some president of somewhere like Mote who I already -- knew about Mote wanted to talk to me? Anyway, so they asked if I'd come and interview, and the interview was actually in the senate building of the -- in Tallahassee Florida Senate. And there was this group of people I had only ever heard of from places -- chairs and deans and president of this -- and anyway, I got the job.

JF: What did it feel like when they said you have the job?

JV: It was great. It was good, it was really, really great, but it was a new position in a way. And so my adviser [01:07:00] who I did my postdoc with, Bob Weisberg, he advised me really nicely that I should negotiate 75 percent of my time there and retain 25 percent for research in case it didn't work out. And so that's what I did, and I just got pulled into that more and more, so I think after a year or so, I switched to full time probably.

JF: Full time?

JV: Like doing Florida COOS for -- yeah I don't remember what the time frame was now but -- yeah.

JF: A combination of roles you applied for and were offered and others that were -- they reached out to you?

JV: Yeah, yeah. Yeah.

JF: A nice mix there. So tell me about how it was. I think you applied for the [01:08:00] initial Ocean Health XPRIZE role. Was that --?

JV: Yeah, that was actually perhaps one of the very cold applications I've made. The other one was the UK Met Office. I didn't know anybody there; I didn't know anyone here. Just to backtrack slightly, so because I had the job with Florida COOS, that was during the time when Peter stepped down as dean, and the college got a new dean, Bill Hogarth who was previously from NOAA actually.

JF: Yes.

JV: I got to know Bill from there and so when I left or rather when I was asked to come back, it was Bill who said, "Can -- what would it take if we would like to have you back here?" Because he was then running the Florida Institute of Oceanography as the director as well as being the dean of the College of Marine Science for a short while there. And he said he'd like me to come back as his associate [01:09:00] director, so that was nice.

JF: Is that the point in time when you moved to LA?

JV: No sorry, that was when I moved back from the UK to Florida, and that was in 2010, October 2010. And then I was at the Florida Institute of Oceanography for three

years. Prior to me moving to the UK, I actually met my husband and --

JF: You did?

JV: -- but obviously I was that -- I was at this convention at Dragon Con, and he was there. That's where we met, so as you pointed out earlier, our mutual interest in science fiction. I left there early to fly to the UK to interview for the Met Office job that I then got, so it was not even a thought in my head. But anyway, I moved back [01:10:00] and we started dating and so we got married in 2012, but I was in Florida and he was living here in LA, so it's long distance. But in that year, that first year, Bill who was the director of the Florida Institute of Oceanography took on the interim presidency of USF-St. Petersburg, the University of South Florida - St. Petersburg. He was dividing his time mostly over at the university it seems with some FIO stuff in that year. And he finally moved back to FIO in the summer of 2013, which is when I started. I finally had the chance to look for a position because I was juggling a little bit more during that year while he was interim. [01:11:00] I started to look for a position, this was the first one that came up, XPRIZE. They were looking for a technical director based in LA for the Wendy Schmidt Ocean Health XPRIZE. I applied, and I was one of

the last, I believe, to apply, but fortunately for me, the recruiter saw and really pushed -- wanted me to interview. It was a crazy time. It's always a crazy time, (laughs) so...

JF: And then you were offered the position, you moved to LA.

JV: Yeah, yes.

JF: You married, or as you said you were already married by then?

JV: Yes, so yes, so it was the first time we ever lived together was the -- (laughs)

JF: All right. (laughter) What was it like to work in an environment where there are ample funds to fund things that are -- that [01:12:00] were going to benefit humankind? Did it feel that all empowering? What did it feel like?

JV: Well, it is a job, but it is -- to me, it wasn't so much the funds, and it was more the -- perhaps the ideology and the -- you really -- you're given this thing. The funding is raised by another portion of XPRIZE, right?

JF: Mm-hmm.

JV: I was more on the operations side.

JF: I see.

JV: And the challenge is we want to test all these sensors, they're all prototypes for the most part, never been tested in any meaningful way before, but you have to make it fair,

and let's set up the test bed. The prize lead, they launched it [01:13:00] in the fall of 2013 and I joined -- like I started work three months into the launch, so part of it was team recruitment. I was there quite early on in this whole process, so I learned a lot in that time. But my job as technical director was to really set up the testing and make sure that it was fair and equitable. That meant everything from security to the guidelines, working with judges, with the advisory board on the technical aspects, with the facilities that we actually did the testing in, which the first one was in Monterey Bay Aquarium Research Institute. I spent weeks, weeks living there and so I got to know the people there fairly well as well. [01:14:00] The second round of testing was at the Seattle Aquarium, so I got to know people on the operations side. We had a tank built specifically for the competition. And then the last round was on the *R/V Kilo Moana* off Hawaii six days at sea to test in the deep sea. But the tank in MBARI, it's amazing if I look back at it. It's something when you're developing technology and a sensor, you develop it one piece at a time. You test a little, then you do, then you test, and you do, and you test. And there we were, crazy people putting all these prototypes in the same test tank at the same time and

measuring the pH in the water and then of each, because you have to have it in the same water so that you make it equal. Anyway, it's like [01:15:00] -- it's nothing that probably any manufacturer would ever, ever do is to put multiple different sensors of prototypes in the same place at the same time. There was certainly challenges but as we get through -- as you get through each challenge, it's like, yes, we've crossed this. It was great. I mean I could speak in public anyway, but I really learned public speaking, media -- talking to the media. Again, it was a lot -- it was all sorts of skills. But I think I left XPRIZE -- I mean I ran and then after that, I ran the Shell Ocean Discovery XPRIZE, so, yeah, we awarded this one, the Wendy Schmidt Ocean Health XPRIZE in July of 2015, but they had already -- XPRIZE had already offered me the [01:16:00] lead for the Shell Ocean Discovery XPRIZE in May, I think, of 2015.

JF: Very much a job altogether, and coordination and leadership, but as you said, sort of a segue also into just the power of, I guess, engagement and communications because you said suddenly you were on --

JV: Yes. A lot of that but also I -- you have this -- it's not impossible. Any time anyone says something is impossible it's not impossible unless it's constrained by the laws of

physics. That's the only real barrier to anything to be honest. Everything else is kind of human made. It's a structure we've set up permitting or [01:17:00], like I said, you can't -- most people would say, "You can't possibly do this." The way I view XPRIZE is you're given these very loose, like this is what we want to achieve, now you figure out exactly how to make it happen. But the thing that we want to achieve has never been done before, ever. It could be the biggest, the fastest, the -- you know, whatever thing it is. It's your job to set up the testing or the competition to prove to the world that this thing that they've never seen before can be done. And so in a way, the competition itself is something that's never been done before because it just hasn't, right? It was great. It was really, really, yeah, a different mindset now.

JF: It sounds as if [01:18:00] that's as powerful -- doing something that's never done -- been done before, could be as powerful an incentive as the purse, the cash.

JV: Yes, yeah from --

JF: Depending on --

JV: Yeah. When we survey teams afterwards, so the purse it may be the initial like, oh, wow, that's great for a competition. But when we survey them afterwards, it's

really that sense of achievement, the human spirit, we did this, we participated, we -- and they meet people, like-minded people from around the world that... And it may set up a new industry or a new direction for technology. That's the team side, but from the operations side, it's just amazing. It's just this experience of opening up your brain, thinking of things differently because again this has never been done before. How are we going to make it work, how are we going to make this happen, what is the angle that's not [01:19:00] yet been thought of?

JF: Going into it, what did you expect? You know, looking back, is it what you expected or -- you didn't see it --

JV: I mean, I knew about XPRIZE since the early days, since the Ansari XPRIZE for space travel was awarded back in 2004. It was always this like geeky -- the geeky Oscars I guess you know, of the... Like you talk to many people and they've not heard of XPRIZE, but when I tell my friends who go to Dragon Con, they all knew about XPRIZE already. You know, it has a very high profile and reputation in that world, in the science fiction world as well. [01:20:00] Yeah, so you have this, oh, this is what it's going to be like, but I knew it was going to be a job. I mean reading that job description that I applied for, it was very much a job. What I did enjoy was -- so I moved there from the

Florida Institute of Oceanography, which was post oil spill. The RESTORE Act was being written, and I helped write a little piece of that. It was very political, very -- But when I got to XPRIZE, it was nice in the sense of it was more -- I was using my scientific knowledge and wherewithal. It was in ocean acidification and not really what I did my PhD in, however I had done work with technology and sensors and moorings and deployments, so that was -- it was nice to do both. It was a really good blend of both technical expertise and management [01:21:00] needed.

JF: Brought you back to the bench I guess if you will?

JV: In a way, yeah.

JF: And it sounds as if -- and I again, I want to talk about your husband but before we do that, you then applied for the executive director position.

JV: For the Schmidt Ocean Institute.

JF: Yeah, the first executive director position.

JV: Yes.

JF: And it sounds like it was a long -- they did a very thorough search?

JV: Yes.

JF: And then you were offered the job. Tell me about that.

JV: (laughter) What we've missed is the Ocean Discovery XPRIZE saga with the hurricanes, which I don't know if I mentioned in the --

JF: You did not. Tell me more about that.

JV: For the testing for Ocean Discovery, we had set up a test bed off Puerto Rico for the first round of testing. That was supposed to take place [01:22:00] from September to November or December of 2017, and the Puerto Rico got hit with hurricanes Irma and Maria in 2017. The first one, Irma came through somewhere around September sixth, and we'd been working with colleagues and the test, you know, like people in -- on the island. We'd been there a couple of times to set up things for many, many, many months. When the first storm came through, we got -- we managed to get in touch after the initial day or two, and they said, "Well, yes, it's going to cause a delay." We pushed back the testing for all the teams to -- I think we pushed it back to October to give Puerto Rico time to reestablish. Maybe November actually but... [01:23:00] And then two weeks later, the second one came through, and that's when everything changed because first of all, there was zero communication. We had no idea what was going on on the island. All we could see was the news reports, so every day, me and my team, I had all of us -- we met every day.

We all had our tasks of scouring and looking at this and trying to reach this person. There was that personal angle of here are people we know, we've worked with, we've become kind of friends with, no idea if they're dead or alive at this point, nothing. And then on the other side, we have around 400 people that were ready to ship to Puerto Rico teams who -- the teams fund themselves by the way, so who were really understanding and waiting for us to make our next move, give us a little time, which was great. [01:24:00] But they could not, it looked like the island wasn't going to come back for months, and in self-funding themselves, they didn't have the funding to hold on for months. I was faced with this scenario of being caught between a rock and a hard place basically. The competition had to move forward because the teams couldn't wait because of funding criteria. But it couldn't move forward in the place -- in the way we had set, and it took a long time to set up that test bed. But part of the test bed was offshore. We had to have a gold standard map, which we'd already got in hand under lock and key. We also didn't know how severe the impact to that map was anymore because the hurricane was so strong, so it would have actually changed, and we couldn't do another map. That was a really tricky, tricky time [01:25:00] and I remember driving home

one night and thinking this is it, this competition is now dead in the water, it's finished. You know, 2017 would have been over a year and a half -- about a year and a half since we launched. We launched in December of 2015. I was like, that's it, we're done, and then I was sitting at the traffic light just -- and then it just hit me of what to do next, and it was we should do a technology readiness test. We should travel to each of the teams and whatever body of water they can find, it doesn't have to all be the same, and we just test the technology against a number of criteria to see whether they would have even survived the first tests. Down to 2,000-meter depth, do they have the pressure sensor rating, [01:26:00] so it doesn't squash, you know, can they navigate, can they show us collision avoidance? So all these criteria. Anyway, got back in the next day, spoke to the team, we started to plan this out, and in six weeks, we turned everything around, and we got on the planes, me and my team. We split into two groups of two, and we travelled the world, crisscrossed for months. I think the last test was in early February in India. From mid-November to early February, we just went there, and we tested everyone individually, and that got us through. (laughs)

JF: Oh, that's amazing.

JV: It was another amazing experience, yeah.

JF: So you earned your stripes after that.

JV: (laughter) [01:27:00] And then we finally made it, and we made -- we had a great award ceremony in Monaco at the Musée Océanographique. When we redevised that first round of testing, we wrote up the plan, and then we ran it by the judging panel, and we ran it by our advisory board. We had a good solid, 18 brains of experts like poking holes and making sure it would work from all angles. And everyone pulled together across the whole competition, and with the support of everyone at leadership XPRIZE and off we went, and we weren't seen for months. And that in itself was an amazing experience, I have to say, because we would travel for -- we'd be in one country for four days, switch time zones, currency, language to another country, switch time zones. For every [01:28:00] four or five days we were doing this, and after a while, you -- really that intense travel, you learn people have certain similarities. It doesn't matter if they speak a different language or a different currency, different time zone, everyone wears blue jeans, everyone has a mobile phone. I mean there are certain things that are really in common; it's amazing.

JF: And you were able to maintain the equity throughout, it sounds as if.

JV: Yeah, yeah, yeah, we had a really strong judging panel, independent judging panel that were on the ball and were amazing, so yeah. And then we all got together in Monaco and celebrated this massive adventure that everyone, teams, judges, advisory board, our technical consultants, those of us from XPRIZE in this event [01:29:00] that all of our partners -- yeah, and now, that technology is out there. It's great.

JF: Fantastic. Very, very successful, and so now, Schmidt Ocean Institute technology development position --

JV: Actually, so how did I do --? We were reaching the last few months of the Ocean Discovery XPRIZE. By this point, I was actually the executive director of Planet and Environment at XPRIZE. I was working on how, and had a hand in multiple planet and environment-related XPRIZES. I've worked on prize designs for an earthquake prediction XPRIZE, cyclone prediction XPRIZE, zero waste mining, the future of forests, so a whole bunch of different things. But it was around March of 2019 when [01:30:00] I got the -- people at the Schmidt Ocean Institute and other entities in the Schmidt entity, organization reached out to me to say, "We'd like you to apply for this position." And I think they were doing that for many people, so it was not just -- that they had candidates that they wanted to see

apply. And I was like, "Well, I'm wrapping this competition up, I'm not sure yet what's next to XPRIZE." XPRIZE is a nonprofit, so it's very much funding based, and XPRIZE had said, "We'll find -- don't worry, we're going to find -- we'll be okay, we'll find something," and they did and it was great. But if you're going to switch from something as intense as an XPRIZE, the time to leave is probably best at the end or the beginning of a competition. We awarded in May, [01:31:00] I actually went ahead and launched the Rainforest XPRIZE in November, but during that year, I was interviewing for this position, and I didn't know that I got it, right? So launched the Rainforest XPRIZE and then I heard in December that I got the position -- this position, and thought it was great. (laughs)

JF: How did the news come to you?

JV: It came to me from the VP of HR, so yeah.

JF: You were in LA at the time, still?

JV: Yes, I think I was in LA at the time, but it was very -- you know? Again, I was now leading another XPRIZE. You know, at this point, I was the face of the Rainforest XPRIZE. We had sponsors, philanthropic sponsors for that [01:32:00] competition, so telling people had to be done in sequence and in order, and it was right before we all broke for the Christmas holidays. I didn't want to tell my

bosses at XPRIZE right the day -- you know? Literally, I think it was the twenty-second or third of -- or somewhere in that time frame.

JF: Right.

JV: I waited till after Christmas, but before the New Year to call them and tell them, at least to tell Anousheh who's the leader of XPRIZE, the CEO of XPRIZE, my immediate boss.

JF: Well, congratulations.

JV: Thank you. Yeah and then we announced it formally in February.

JF: And it's similar to the Florida COOS job. You weren't stepping into someone else's shoes, is that right?

JV: Right, right.

JF: It's like carving out a new [01:33:00] --

JV: Yeah it's a --

JF: -- role.

JV: -- new role. They already put a lot of thought into what they wanted to see, and I believe the final few candidates brought very different things to this. [phone rings] Do you want me to --? [phone rings] Sorry, the phone is ringing, can you hear that?

JF: I can but --

JV: It doesn't matter, right?

JF: Right.

JV: Okay. No, no, that's fine. They brought back -- yeah. Yeah, it was a new position, so yes, some of it is I'm carving this a little, but they've already put a lot of thought into what they wanted, which was great. It was a very long process, but I'm glad because it also means that they thought about what they wanted, and it was me that they -- what I brought to the table is what they really wanted, so that was nice too [01:34:00] -- at least I hope it is, we'll see.

JF: Well, I have several things I want to ask you specifically about the role there and what you will be doing.

JV: Yeah.

JF: But before we do that, I have to ask you, you started a new position and then a global pandemic.

JV: Yeah, I started at exactly the same time. Yeah, I started on the twenty-fourth of February. My first thing was flying up to Menlo Park for onboarding, and then from there, I flew to Denmark for a UN meeting all in the first week. Landed in Copenhagen, and they have the very first case in Copenhagen. From Copenhagen, I flew to Australia, Perth via Singapore by which time, it was growing slowly, so in Perth there were four cases I think. [01:35:00] By the time I flew back March seventh, eighth, I think it was, via -- across Australia and then back to Los Angeles, so it

was literally around-the-world trip right as everyone was just getting this thing going. Literally, it was the same time. I was very lucky that I was able to fit that in because I went to Australia to see the vessel, to meet the crew, and captain and stuff, so that was really good. And then I got back, and we've been in quarantine ever since.

JF: And it sounds as if the *Falkor* has still been able to carry out some of its work at least.

JV: Yes, and some of that I think -- so I enacted what I did for ocean discovery when we were in that crisis scenario. We very, day by day, [01:36:00] carefully feel our way through, all the changing situations, the rules, the travel, the restrictions, the regula-- what can we do. It's not how normally we would operate. Normally, we have a schedule for the year or two years ahead of time, but in this case, that all went out of the window. And it's just slowly working your way carefully, cautiously through each day. We've been very lucky. I think also we were lucky because when I left Australia, when I left the *Falkor*, I watched them sail off on a cruise before -- like a research cruise for 30 days. We already had scientists on board; they were already working. The decision, they decided that they would stay and finish that off and then we also have very good communications capabilities with the *Falkor*, so

we did our first telepresence cruise over the summer [01:37:00] with the scientists at home and we had crew and people on board. And then we actually got scientists back on board in August. We have a very extensive policy -- procedure I should say for getting people on and off the vessel because we have to do that with our own crew, so we did slowly shift out and change out the crew.

JF: These people coming from different continents I imagine.

JV: Yeah. Mm-hmm. Yeah our crew, I think, are from 12 different countries, so we had to keep track of all the regulations in all the -- it's very, very complex, but I have a great team. And the other thing is we have great support from Wendy and Eric Schmidt, so we were -- we could keep going.

JF: Persevering through.

JV: Slowly, slowly, step by step, day by day, sometimes our hour by hour [01:38:00] this year it's been, but yeah.

JF: Understandably. I have some questions and they may be premature given COVID situations and things are tempered somewhat. But in terms of activities that you'll be leading and involved with there, I'm curious about the protection and restoration component that potentially *Falkor* and the Schmidt Ocean Institute may be involved with.

JV: Actually, it's more... We do a lot of research, exploration of new areas, and technology development work. It's really how does all that feed into and assist with potentially protection or... I think on the restoration side, it would more be if there's some technology that helps or [01:39:00] does the data --? We've been diving and mapping off the -- in the Coral Sea Marine Park. How does that help for the marine park managers, that kind of data as well as the science, right? It's not so much that we do it directly, but we try and provide the data that's needed for the science of the --

JF: For others --

JV: -- for others to use and to expand on.

JF: Similar to -- mm-hmm.

JV: Yeah?

JF: Similar to OER.

JV: Yeah, yes, exactly, yeah, we don't do the policies ourselves or the restoration ourselves necessarily.

JF: Now I noticed that one of the cruises -- I was looking down at the -- what the original plan had been for this year and there was a microplastics.

JV: Yes. That --

JF: It was postponed perhaps?

JV: Yes.

JF: I should ask you what -- the focus of that was going to be. And the second question, you know, for those who have the [01:40:00] ability to explore in deeper depths, where do you see the need in terms of what people should be looking for and how they should --?

JV: Yeah. What's happened this year, we've maintained as much of the operations as we can, but of course, it's not just us. It's the scientists as well who -- and their -- and in many cases, their home institutions said you can't travel, you can't take students, there's no field, you know, we're not taking that risk and... In that case, that's what happened with that one. It was just one of those you can't, it's going to be impossible for him to travel and his team to do the work that he had originally hoped to do. We're hoping actually to try and fit that one in perhaps next year if we can, but it's a very, very, very fluid schedule at the moment for obvious reasons. [01:41:00] But I was looking at, I think if I recall correctly, and please keep in mind, I'm new to the organization, so I'm not -- I mean I joined, and everything changed. (laughs) But I think it was looking at the connectivity from land to deep sea if I recall. We'll see if we can hopefully perhaps work it in at some point. But again, before I joined they

had scheduled scientists till 2022 back to back, so it's a very -- we'll see. We'll see how it all fits.

JF: Absolutely. One of the questions I have for you is technological advancements related to the collection of deep water samples, and I think that you may be involved with that. [01:42:00] I'm curious about that and also what you think about a repository for these kinds of samples. How do you see that?

JV: Yeah. Yeah, so I think the repositories exist. We had Western Australian Museum with us on board in April, and they collected samples, and those will go into their repository as well as on display. Those actual samples do exist in various places around the world. I think what you may be referring to are things like the squishy fingers is the nickname, the soft robotic fingers, right? Deep-sea creatures, a lot of them are very fragile and so collecting a sample which people, you know, scientists need for taxonomic identification. If it's a new species, you can't just visually say, [01:43:00] it's a new species. It's looking at what the connections are to existing species and so you need a sample. How do you bring that back from this environment of high pressure or where the squishy, the soft bodied, without damaging the sample is the question. That's one potential deep-sea technology that could be used

for that even -- not even in deep sea but anywhere, but yeah, so we're hoping to continue some of that work. Yeah. And then there's others that are in development as well but different ways of tackling the problem of sampling. eDNA for example is now up and coming, and that's a really interesting one where you don't actually collect a sample. It's really [01:44:00] you know, an electronic way. Water runs through, and there's a DNA left from the signal of whatever is in there, so that's a good one.

JF: What was there --

JV: What was there, what quantity, you know, so it may revolutionize how fishery counts are done or looking for invasive species and faster ways of doing things like that.

JF: Well, and that brings me to the topic of artificial intelligence. Do you see Schmidt becoming more involved in that area in the --?

JV: Yeah, I think, yeah. Part of my job is -- so the Schmidt Ocean Institute has -- was established in 2009, and it's kind of like it was a proof of concept. It was disruptive, offering free ship time to scientists [01:45:00] at no cost plus an ROV that can go down to 4,500 meters depth. We also have a high-performance computing system for use for the -- by scientists and the developers who come on board. It's done a phenomenal job in the last 10 years, and this

whole getting a new reorganization and structure and executive director is really essentially recognizing it's now ready to move to the next level. My job is what does that next level involve and look like, and that's where the technology and my XPRIZE and technology upbringing, I guess, the background really will come into play I hope -- is really keeping an eye and looking at some of these new technologies, including machine learning, including artificial intelligence, but also recognizing [01:46:00] that we want to have people at sea because it is a different interaction. It's a different kind of exploration, and technology won't be able to do all of the scientific work we need it to do, at least not in the next decade, so... There are limitations to that as well at least at the moment.

JF: Sure.

JV: Yeah, so it's really looking -- so when I have a moment, [laughs] putting the pandemic aside, that's what I would -- that I'll be focusing on.

JF: Precisely. We have not yet talked about your husband, and you said you were married in 2012, but you actually met before that at the Dragon Con convention?

JV: Yes, every year we go to Dragon Con, mm-hmm.

JF: What is that convention?

JV: It's like Comic-Con for those [01:47:00] who know Comic-Con, but it's in Atlanta every Labor Day weekend. Actually, it's like a pop culture convention I guess in that you get everything from science fiction to costuming to writers. There's some big name writers that appear there. There's TV, film actors, there's also science tracks, robotics, makers, movement, tracks, space tracks. I've actually given talks at Dragon Con and been on panels at Dragon Con talking about XPRIZE. Or I did a joint one with some people from NASA on why do humans explore, so there is -- there's some that are skeptics. People go there for a whole host of interests. [01:48:00]

JF: Quite a hybrid--

JV: It's great.

JF: It sounds like it's a very hybridized--

JV: Yeah, science meets science fiction.

JF: Fascinating. Okay, so your film credits, I watched *Hashtag* last night.

JV: Oh, you did? (laughs)

JF: And I was fascinated trying to figure out, well, where is it going, and then it, very well done.

JV: Thank you.

JF: -- it's one of several film credits you have and...

JV: One or two --

JF: One or -- yeah, right, exactly. And so, this one has won awards, it's been a nominee -- at festivals, it's won awards. It's --

JV: I'm very proud of this.

JF: Successful, absolutely. So what are your thoughts on...? Is this a field that you want to continue to be involved with?

JV: It's really my husband's field, more so than mine. The first one I helped him on was [01:49:00] called *Cowboy Creed* and, you know, I -- it's a whole different jargon, a whole different industry, a different way of doing certain things. But for this one, he asked if I would be the producer because he was watching how and what I was doing at XPRIZE, and it's actually exactly the same. You're given this broad mandate of what somebody wants to achieve, and you have to make it materialize. Find the place, find the equipment, find the people, pull it together, how is it going to -- you know, so that's what a producer does. It's all the logistics in that sense. He said, "You're better than many producers I've seen and I'd love to have you produce this." And I was like, "Well, I have no idea what I'm talking to people about -- I've no -- ." He actually taught me a lot about the jargon of the film industry, and I learned a lot from that experience [01:50:00] alone. I

know what people do and what a digital ingest technician is, and this, and a that. And so yes, that's how I got involved in this. I might do it again. I think I wouldn't do it side by side with running an XPRIZE. That was a really tough four years, really, really difficult few four years or so there. But just because of the demands of running an XPRIZE, it's just so -- like it's actually being producer on a big budget film, land another film at the same time, you know? It's a lot of work. It is a lot of work. The end product was great. A lot of that is hidden, a lot of that is my husband, not me. Yeah. [01:51:00] (laughs)

JF: Well, I was very impressed that the money was crowd funded through Kickstarter.

JV: Yeah, that's our second Kickstarter. That's a whole other experience. If anyone wants to do Kickstarter, there are certain things you should be prepared for. I think I worked out in the month of fundraising, that between him and myself, just the two of us, let alone anybody else, we spent about 700 hours in that month just doing the Kickstarter campaign. It is really intense. It's like every waking weekend, evening continuously, and that's in addition to doing XPRIZE for me, and I mean it's a lot of work, so, but it worked.

JF: It was successful, right, you've been successful at it. It's two hours here, [01:52:00] and I just have a few more questions. Before I ask you these, is there something we haven't talked about that you would like to, that we haven't touched on?

JV: I don't know. Actually, I don't think so. I think you did a really thorough job, yeah. I guess somewhere in that history, one piece I didn't mention was, so I worked for GEC-Marconi after my undergraduate, but I didn't apply for that job either because I got an internship with them. There's a scheme in the UK where industry or companies will pay for your education, and in exchange, you say you'll work with them for two years or something. That's how that materialized. But it meant that I got -- you know, I didn't have to look for a summer job because I worked there in the summer. They covered expenses and then I had a job to walk into, so that was nice too. [01:53:00]

JF: It worked out very well --

JV: Yes.

JF: -- very well.

JV: -- that was nice. That was a lot of good things. Yeah, I think you've covered a lot.

JF: Yeah. Well, you have a very broad history and very interesting history, and I felt like I was doing some

globetrotting myself as I was reading about where you've gone and where you've been. (laughter) One of the things, and I think perhaps I picked this up in the *Marine Technology* [*News*] review that you were named -- you mentioned that they profiled you, and you were named number five out of --

JV: Number five, yeah, top 100 this year, yeah, number five.

JF: Congratulations.

JV: That's an honor. That's like I -- yeah, wow.

JF: Absolutely. And in that article, I believe that's where it was mentioned a cusp -- on the cusp of streams coming together, [01:54:00] ocean infrastructure and more sort of coming together, and you were, I believe, predicting that we're going to see a rapid increase in technology changes --

JV: Mm-hmm. Yeah.

JF: Perhaps through crossing of different science disciplines. We work -- NOAA works with the Smithsonian National Museum of Natural History, and there's an Ocean Hall there. It's 23,000 square feet. It's 12 years old at this point. We worked with them to --

JV: Is it the Sant Hall?

JF: Yes, it's the Sant Ocean Hall, and there's a gallery there called Ocean Systems Gallery that's 12 years old, and

there's an opportunity potentially for us to have it renovated. Currently, the idea of that gallery is that it informs visitors on the four different disciplines, science disciplines through which we study the ocean and so in each corner there's a piece of equipment that's representative of geological oceanography, biological --, physical -- .

JV: Sure.

JF: And it's very separate, [01:55:00] and it's CTD, side-scan sonar, drifting buoy, undulating recorder. Although we -- really, pen has not gone to paper yet, we know that 12 years in, this is not how the ocean -- this is not the future of how the ocean is going to be studied because equipment will be more hybridized, and it's so much more advanced than it was 12 years ago. Without giving you a chance really to even think about this, what are your quick thoughts on what kinds of equipment might you suggest be in that type of new gallery on the new ways that we're studying and exploring the ocean?

JV: That's a great question. There's a huge shift in terms of autonomous technologies. One of the breakthroughs from the Ocean Discovery XPRIZE was launching something from the coast, no humans at sea, a robot basically [01:56:00] with nobody on board, and it goes out to the location. It deploys another robot and recovers it with nobody on board.

Now you have robots that can put sensors out there, and they can bring sensors back home with no one out there, right?

JF: Mm-hmm.

JV: That whole aspect of autonomy. I think a new -- another big shift that's about -- we're about to see is communications. The Starlink satellite has over 700 satellites up there now. They're in beta testing. The idea is something like 12,000 in total, but it's going to blanket the world. We're going to have much faster transmission capabilities from the ocean than we've ever seen before, bigger bandwidth -- you know, like be able to transmit more data. That will go into a cloud instead of having a disk or some physical device, which means that anyone from anywhere can access it once you [01:57:00] give them permission, etc., etc. That will speed up our ability to get data in real time. We're really heading towards a smart ocean now. More robots are out there deploying and recovering sensors eventually. They can transmit to the coastline because of communication so if anything goes wrong, somebody on the shore will be able to adjust and account for it. And then we're also going to, I think, see a boost in underwater communication capability so that's the next -- you know, but also in power. It's really the

fundamental, but building blocks are shifting in a way versus the... The sensors are there as well, you know, eDNA and things like that, but what platforms do they go on and how do they communicate is really what's opening up the ocean to the world now in a way that never existed. [01:58:00] And then add to that, then of course, there's the machine learning and artificial intelligence aspect, what that, I think, will do is shift where our scientific focus is. I guess a relatively recent, meaning a-few-decades-old example is when my advisor was going to sea, they would plot contours with pen and paper of data points. When I went, it was done by computer program that would do the contouring, and it was much faster and it could do a lot more. That basic level of stuff will be done automatically, so it's no longer -- we won't need to do it ourselves. It's all being done automatic, right? We will shift where we look as well, and what we look at. We're moving to smaller scale, we're moving to integrated, but we're also looking at the vast large scale. I think in [01:59:00] the next 10 years, we will have a map of the entire sea floor for the first time in human history at a high resolution.

JF: At 2030?

JV: 2030.

JF: Seabed 2030?

JV: Seabed 2030, yeah. That is going to be a huge shift because we'll know where the seamounts are, we'll know -- so it's going to open up another huge area in terms of capacity. And then the final big piece is the shift in how we communicate with the public. It will be augmented reality and virtual reality versus two-dimensional type stuff. You could pull up your phone and see an octopus swimming around your living room or around a classroom and talk to kids like that in a different way. That's going to be a big shift as well. One [02:00:00] interesting XPRIZE that's currently underway is the Avatar XPRIZE, and that's a very sophisticated haptic suit that you wear, but the avatar is a robot that could be a hundred miles away. You would see, smell, hear, feel what the robot is. On land, the advantage of that technology is if there is an earthquake, instead of sending people to rescue people, you send the avatar in, but it's controlled completely by the expert people who would normally go in. That is due to be awarded, prototypes will be in existence by 2023. If you add on to that a layer of how do we make this a marine related one, there's a potential that by 2035 or '40, we will have underwater avatars. Those who don't dive can go [02:01:00] experience the ocean in a fully haptic suit,

three-dimensional. You feel the cold, or you can turn on and off sensors. You still breathe but you can -- instead of -- I wrote this in an article recently that's not yet been published. But anyway, instead of sitting on a park bench watching the birds, you may sit in a coral park bench watching the fish swim by. Anyway, that's where -- that's my short quick -- you asked for it. (laughs)

JF: I love it, I love it. Are avatars given names by chance?

JV: Yeah, you can give it I'm sure, I'm sure once they exist, sure.

JF: Well, Jovian might be a good name.

JV: Oh. (laughs)

JF: Well, thank you so much for your time.

JV: Thank you.

JF: We really appreciate it, and [02:02:00] I will send you a Google link to look this over.

----------END OF INTERVIEW----------

Reviewed by Jyotika Virmani 1/3/2025