Oral History of John Vittal

Interviewed by:
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Weber: Today is April 26, 2017. I'm Mark Weber of the Computer History Museum. I'm here with email pioneer John Vittal and pioneer of some other things. And thank you so much for doing this.

Vittal: My pleasure.

Weber: So I'd like to start with your background. What is your full name and when and where were you born?

Vittal: John Vittal. I was born in Long Beach, California in March of 1947.

Weber: And tell me a bit about your family.

Vittal: It's fascinating. My mother's parents came from Russia and Germany. My father came from France. My mother went to William & Mary and got a degree in Biology with a minor in English, or maybe it was the other way around. I can never remember. And then she ultimately moved to Los Angeles and went to UCLA as the first female graduate student in Chemistry. And when she got out with her advanced degree, which I believe was only a master's, she couldn't find a job doing anything but home economics. And so it was fascinating. She ended up teaching English for the Foreign Born. I'll get back to that. My father came over after the First World War. He went to the Sorbonne when he was 16 if I remember correctly. And then the First World War happened and he ended up fighting for the French and being in counterintelligence in Austria and fighting that battle. He went on and ended up-- the French did not want to see him go after the War, but he had dual citizenship between France and Austria-Hungary and now it was France and Yugoslavia. And so he came out through Yugoslavia and ended up in New York. He had the idea that even though he was trained as a cabinet maker and fine woodworker that he would become a dentist. And his brother was living in Chicago, so he came through Ellis Island, and I actually found his records in the Ellis Island database.

Weber: And the name is the same?

Vittal: Ah, it started out as Vitaljich and he modified it. Well, it was Vittal in French and Vitaljich in Slavic, and so it depended on which one he wanted to take at the time. He ended up in Chicago. Went to dental school and that lasted, I think, three days. <laughs> He couldn't stand staring into people's mouths. He ended up taking a vacation to Southern California a few years later and he still had the return ticket when he died. <laughs> He opened up a business and he ended up taking English classes at night because he was not a native speaker-- I mean, he spoke eight languages, but didn't know English-- and who was his teacher but my mother. And he asked her out one time and she said, "It's not appropriate. You're my student." I think he made some comment like, "What's the matter? You're too good for me?" <laughs>

And he was friends with the principal of the school and so it ended up being a big, happy family and they got married and settled down in Long Beach and raised my brother and myself.

Weber: And what did he do then at that point?

Vittal: He started a cabinetmaker business.

Weber: Right, okay. So he continued, yeah.

Vittal: And so he designed and built furniture and he was very, very good at it.

Weber: And were you raised around making things and doing things?

Vittal: Not so much. He went on and since he had fought in World War I, when World War II happened, he decided that the should enlist. But given that he was born in 1896, it meant that he was close to 50, and so they did not want him. And so he drove from L.A. to Washington, D.C. and knocked on people's doors and proved to them that he knew something and that they could use him. And so he flew in World War II for the U.S. Ended up mustering out as a bird colonel.

Weber: What's that?

Vittal: A full colonel, not a lieutenant colonel. He was part of the crew that went into the camps immediately after the war, and so he saw all this stuff. He knew hardship from the first World War when he went hungry and had to steal eggs to get some food to eat. He saw that effect in World War II and said, "I don't want to raise my kids having any stigmas associated with them." And so he tried not to push us in any direction, both religious or educationally. We were young. We could do what we wanted to do. And so when I decided to become a mathematician, in effect, and went to college to do so, he said, "Fine. I'm in full support." And he never even taught us really how to use the machinery that he grew up using, but it's part of the blood because you stand around and watch people, you learn what they do. And so, I build things now.

Weber: And your mother with her technical background, was she-- She wasn't pushing you towards science or--?

Vittal: They weren't pushing us anywhere.

Weber: And I mean, so they didn't push religion but was religion important to them?

Vittal: It wasn't that important. My grandfather, my mother's father was Orthodox Jew. My father married-- was probably Catholic, given where he came from. But he never really said what he really was and what his beliefs really were because that would be influencing the kids. It was fascinating.

Weber: But your mother was raised in an observant family, though.

Vittal: And her father took me to shul on Saturdays every now and then.

Weber: And politics, was that important to your dad?

Vittal: Well, since he knew Eisenhower. <laughs> Given that everything-- Let me put it this way. Given that everything else was make up your own mind but look at it carefully, politics just followed that mold.

Weber: But I mean, he had strong convictions to go back to the Second World-- to want to serve, but more--

Vittal: Yes. But that wasn't a political thing-- a statement, that was a defend your country.

Weber: Yeah, self-defense.

Vittal: Or your adopted country.

Weber: And so what as a kid, talk about your-- what subjects interested you? What did you like in school, dislike?

Vittal: I went to my fiftieth high school reunion a year and a half or so ago, and some of my fellow students there said, "You know, you were bright. Sometimes it came across that you knew more than the professor, the teacher. I don't know why. <laughs> But it just came across that way, and that you were interested in everything." And that actually was one of the problems that I had in grad school, but we, we'll get there eventually. <laughs>

Weber: But any particular teachers that influenced you as a kid?

Vittal: Well, I gravitated towards the sciences. Math, definitely. Not English. <laughs> Chemistry. I was very interested in Chemistry. Not so much Physics.

Weber: What did you think you wanted to be when you grew up?

Vittal: My mother was a teacher. I figured I might be a teacher. I didn't know. Eventually, when I tried it, I discovered I was bad at teaching. <laughs> And so--

Weber: And Electronics was not of any particular interest?

Vittal: It was interesting but I didn't gravitate towards it because I don't know why, I just didn't.

Weber: So how did you decide where to go to college, though?

Vittal: Interesting story. My brother was at Stanford and but he ended up getting kicked out because he fired an air gun at a campus policeman. And so, and he wasn't the most studious person in the world.

Weber: But it got enough to get into Stanford.

Vittal: He had enough to get into Stanford but not to stay there. He ended up getting his degree from Stanford, but after he went into the Army and came back. So I applied to Stanford because Stanford was one of the better schools around. They said no. I applied to Reed and Berkeley, but my parents couldn't see me going there. We're talking 1965, so it's the start of the Free Speech movement or Free S-whatever movement. <laughs> And so, I knew more people that were going to BYU than anywhere else. For some reason, the school that I went to in Long Beach, that was where people were going.

Weber: Because your parents didn't want you to go to Berkeley or Reed, right?

Vittal: They didn't want me to go to Berkeley or Reed and they had the purse strings.

Weber: Yeah, yeah.

<laughter>

Vittal: And so I ended up going to BYU. And I didn't like it that much, but after a while it's hard to get out.

Weber: <laughs> Why?

Vittal: Because then you have to start over in effect.

Weber: Okay.

Vittal: And so it takes longer. And besides that, they saw that they liked what they-- my parents liked what they saw, and so they wanted me to stay there and stick it out, and they had the purse strings.

Weber: But they obviously, from what you said, had no connection with Mormonism.

Vittal: No.

Weber: That's what, a majority Mormon school. So what was-- why did-- They were just looking at the academics or?

Vittal: They were looking at the social atmosphere and the academics.

Weber: So they wanted--

Vittal: Because they were fairly conservative that way.

Weber: So what had you done to cause them to be so concerned? <laughs>

Vittal: They weren't concerned, they were conservative.

Weber: Right. But I mean, had you rebelled--

Vittal: No, I was not a--

Weber: Rebelled in high school or--?

Vittal: I was not a particularly rebellious kind of guy. My brother was, but I wasn't.

Weber: They just wanted to prevent what could happen.

Vittal: Correct.

Weber: Okay. So how was it at BYU?

Vittal: Let me say that the school likes to act in loco parentis, and so it's kind of like you had a parent there and the whole school was your parent looking over your shoulder. And so you couldn't do any of the things that kids wanted to do necessarily. And so that was a negative. The positive is that you got a decent education. They didn't teach you how to think like places like Stanford and Reed do. But they did teach you the basic stuff. And I didn't have to study, so that was another positive at some level, but it was a negative long-term, because when I finally got to graduate school a little while later, I didn't know how to study because it was suddenly hard. And so I had this learning experience that I had to go through.

Weber: And which were the subjects that you gravitated towards as an undergrad?

Vittal: Math and Computing. Chemistry. Hard sciences. Statistics, all of that. I got a degree in Math.

Weber: And Computer Science.

Vittal: But and they offered a Computer Science degree three weeks before I graduated.

Weber: Right, because that's--

Vittal: And I had enough credits that they could give me a double major.

Weber: Because that's right around the time when Computer Science programs were really getting off the ground.

Vittal: 1969 was the start.

Weber: Yeah.

Vittal: Yes.

Weber: But what was-- So how did you get into Computing-- Well, I assume it's in college, but what was your first exposure to Computing?

Vittal: I took a Machine Language class if I remember correctly. I got a job in the Computer Center. It was something that I could do and they paid you the lofty salary of $1 dollar an hour. But it was money that didn't have any purse strings attached to it.

Weber: So before the Computer, what, you were going to get a Math degree. What did you see your-- what did you think you would become at that point before the computer exposure?

Vittal: Probably a math teacher. Probably high school. I may have gone on to grad school, I didn't know. But with computers, I said, "This is my calling."

Weber: Why? What appealed to you about it?

Vittal: It was just exciting. It was something that I picked up and gravitated to. I would sit in the Computer Center all hours of the day and night, submitting programs, <laughs> because back then you had to punch cards and submit things and eventually you'd get some printout. And so you'd debug the code and it taught me a lot.

Weber: And what sort of programs did you write?

Vittal: I don't remember at this point. <laughs>

Weber: And what appealed to you about it? Making something or the--?

Vittal: It was making something. It was, in effect, it was doing something with my hands even though I was dealing with a keyboard. It was a creative process because that's what programming really is is a creative process and it's kind of like cooking. You can have the basics and you could do good things or bad things and you can fix mistakes.

Weber: Cooking, <laughs> that's not always possible.

Vittal: You can always start over. Just go to the market.

Weber: And what sort of computer was-- what system was it?

Vittal: I started out on a punch card machine, the IBM 604, 609. They had a--

Weber: Look at the camera. Sorry.

Vittal: They had a 7040 on campus. I remember when the first 360 came to Utah and it was at the University of Utah and we took a field trip to go look at it. And I'll never forget that when they were showing it to us, you had these big cabinets, and this is the memory, and this is the CPU and this is the disk drive and this is the tapes. And you opened up the cabinet and they're mostly empty, except that we opened up the cabinet door of one of them and there was this guy inside madly working a slide rule.

<laughter>

Vittal: This is the guy who was doing all the computation.

Weber: Yeah.

Vittal: It was fun. So most of my programming, I did on the 7040.

Weber: But you went, University of Utah you said you visited.

Vittal: Yes. That was a field trip to the University of Utah.

Weber: But did you see the graphics people there?

Vittal: Not at that time.

Weber: Right.

Vittal: That was 1968, '69, and that was a little early for the graphics people. I don't think the Sutherlands were doing it then.

Weber: It's about the time.

Vittal: Yeah.

Weber: Dave Evans started it.

Vittal: Yeah.

Weber: So you managed to get the Computer Science degree at the end. Did that make much difference in terms of your job prospects to have that officially there?

Vittal: It didn't matter because I went to grad school immediately after graduating, or I should say, I took a three month hiatus and I had a job programming in RPG over the summer and then started grad school.

Weber: Yeah. You went to UC Irvine.

Vittal: Exactly.

Weber: But I mean, did being, having that computer degree, did it make any difference that it was officially a computer degree from Brigham Young?

Vittal: I don't think so.

Weber: And you already were planning to go to apply to grad school in Computer Science anyway.

Vittal: I had already been accepted by the time I got the Computer Science degree.

Weber: Okay. All right. So talk about grad school then.

Vittal: Grad school was fascinating. I went there because Julian Feldman and Fred Tong were there who were two of the authors of papers in the book, "Computers and Thought." And so I thought I might do something with A.I. Soon thereafter, Dave Farber came as a visiting professor. Other people came, like, Dick Hamming. And Dick was probably one of the more influential people in my life at that point.

Weber: How so?

Vittal: Because he cared about what you wanted to do and what you knew about and guided you, whereas a lot of the other people, including John Seely Brown, just wanted to teach you what they knew in some sense or how they thought. One of the challenges that John gave me was "have a new idea a

day. Most of them will turn out to be lousy ideas, but some of them will have a gem eventually."
Interesting idea that I then followed through with by telling some of my staff ultimately to do the same sort
of thing.

Weber: And would you write them down? Did he suggest that?

Vittal: It didn't matter.

Weber: Well, as long as you remember them, right?

Vittal: As long as you remembered them, and I had a pretty good memory back then. I don't so much
anymore. <laughs> But because of that and because I had all of these ideas, there were other people
that showed up. Rusty Bobrow was one, and Rusty was finishing his [Ph.D.] degree at MIT and ended up
leaving Irvine because he never finished his degree while he was there, finished his thesis and went
back. And I ended up working with him when I was at BBN several years later. John Brown, similarly. But
throughout this, I wrote towards the coming up with a topic for a dissertation, I wrote a lot of papers about
some of these ideas.

Weber: What, these ideas, meaning?

Vittal: That I came up with.

Weber: What?

Vittal: And let me give you some examples ultimately. What's fascinating is that I found some of these
papers last week when I was going through my filing cabinets. One of them was on connecting Farber's
Distributed Computing System Network to the ARPANET. One was on a structured object-oriented
language. A third was a syntax-driven text editor. And there were a few others. I showed these to my son
who happens to be in the computing industry now, and he said, "These were from 1972 and '3? Some of
this stuff isn't being done yet. They're still undecided problems-- unsolved problems." "Yes, my son.
That's what you do as a grad student. You come up with hard problems and you try to solve them." And
that's one of the things that drove me in my whole career.

Weber: So then which ones did you focus on then?

Vittal: I ended up taking a leave of absence and my advisor at the time was Martin Kay, and he was the
Chairman of the Department of Computer Science at Irvine, as well as associated with Information

Sciences Institute in Marina del Rey. And so he got me an internship at ISI, it was effectively December of 1973. A month later while I was supposed to be working on my dissertation, they said, "Well, we have this job that you have to do-- that we'd like you to do," not that you had to do. And they told me about it and I said, "Sure," so I became full-time employed and I never went back and finished my dissertation. But there was another reason for that. The job was to get the Xerox graphics printer working on the PDP-10 at ISI. And it turned out that ARPA had one at their offices in Washington. And one of the things that this job did was let me fly back and forth to Washington to try to get it to work. Another side effect of this--

Weber: But you already had one at ISI. Why did you need to--?

Vittal: To make-- to transfer the software.

Weber: Okay. Oh, okay.

Vittal: To install this--

Weber: So you were testing it at ISI but getting the one in Washington.

Vittal: Install the software on the XGP at the ARPA offices. And so I met a lot of the program managers.

Weber: Because what year was that?

Vittal: This was 1973-- 1974, excuse me.

Weber: So Larry Roberts had just left, right?

Vittal: Right.

Weber: So it was Bob Kahn.

Vittal: Bob-- Bob Kahn was there. Steve Walker was there. Steve Crocker had left or was about to leave.

Weber: And Licklider came back there sometime in that period.

Vittal: Lick came back, but I don't remember when. I never met him. But one of the side effects of this job and meeting these guys is that I was getting a lot of email. Because several years earlier, Ray Tomlinson, who ended up being a friend, had sent the first email in 1971 and so--

Weber: Wow. Networked email, you mean?

Vittal: Networked email, you're right. <laughs>

Weber: I mean, seriously, though, you had--

Vittal: No, I--

Weber: You had probably used email for years on some sort of timesharing system, so.

Vittal: Yes. I had used--

Weber: And when did you first use email?

Vittal: Back in grad school. We had a Sigma 7 and it had rudimentary email and chat and it also had a PDP-10 running TOPS-10, but I don't remember it having email when I was there.

Weber: Okay.

Vittal: But they were literally on different sides of the same floor in the computing center, and so I could run from one to the other to send people mail if I needed to. <laughs> It was kind of comical, now that I think about it.

Weber: Okay. So anyway, you were getting more email.

Vittal: I was getting, you know, as many as ten emails a day and using SNDMSG was fine to send mail, but using RD, which Larry Roberts had developed, to process my mail was problematic because you couldn't do anything with it. You couldn't file messages, you couldn't do any of the things that you normally do with email today, and that made me think that maybe something could happen. The guy in the next office was a man named Martin Yonke. He was a grad student from the University of Utah doing a stint and working on his dissertation at ISI and being employed. To get back to my dissertation topic, it was very interesting in why we were friends and talked a lot to each other. I was starting to focus on a

syntax-driven editor for programming languages. He was working on the debugging environment for programming languages. Those were part of the same thing, part of debugging environments of today in effect. Eventually, he went off to talk to his dissertation committee to get approval for his idea and they said, "No, we don't want you to work in the debugging environment, we want you to work on the editor." Or maybe it was the other way around, I don't remember now. So my dissertation topic suddenly evaporated because somebody else was doing it, and he didn't have the forcefulness to say, "No, somebody else is working on that" to his committee. But at the same time, he had gotten a copy of a program called WRD from Barry Wessler, who was a program manager at ARPA. And Barry, this was a successor to RD that he was writing in SAIL, the programming language. SAIL is a derivative of ALGOL. And so, Marty and I worked on WRD to get it working. Or, excuse me, it's not WRD, it's NRD is what Barry gave us. Our renamed version was WRD. And Martin thought that it was probably a little too complicated, so he forked the development into a thing called "Banana RD." And I said, "This is too verbose and too insufficient for my needs." So I took another fork of the same code and created a program called "MSG."

Weber: But this is all on the side of what you're--

Vittal: This is all on the side. It was not supported or even known by the people at ISI. But that didn't stop me.

Weber: And had you met Barry in Washington then?

Vittal: I had not met Barry at all, because by the time I was going there, he was either, he was, I think, off doing Telenet.

Weber: Oh, true, yeah. No, he left with Larry. I mean, before Larry, even.

Vittal: Yes. And so, I did MSG and this was probably the middle of 1974, and my advisor had moved up to Xerox PARC. And so I sent him a copy of MSG and--

Weber: And who was that?

Vittal: Martin Kay. And I was visiting PARC a lot in those days. I had a weekend, so I hopped in the car and drove up.

Weber: But before he came, why? Who did you know at PARC?

Vittal: Nobody.

Weber: But before he moved, you had visited PARC already? Or after he moved there?

Vittal: After he moved to it, I visited PARC.

Weber: Got it. Okay. Sorry.

Vittal: And I didn't think anything of it, and I kept implementing MSG and working on the XGP until the beginning of '75. At which point, Steve Crocker had come to ISI and needed a project to work on, and so I was getting frustrated. And, I really thought that we should throw all the code away and start over from scratch on the XGP. And, so, Steve took it over, and I went off to do other things. One of those things was work on the SIGMA project, which was part of the military message experiment. But throughout all this, at one point in the beginning of 1975, Jerry Elkind, who ran the Computer Science Lab at PARC, came down to ISI to visit and to give a seminar on what was going on at PARC, especially in his lab. And so he was talking along, and I went to the seminar, got in late, and so I was standing in the back of the room. And Jerry said, toward the end, something to the effect that "we've had a lot of success with all the stuff that we've done at PARC, but none of it has had the impact on our lives, in the same way, as something that that guy back there in the corner did-- has done." And he was talking about MSG. Because not only had I given it to Martin Kay, Martin gave it to all his friends at PARC, and so it exploded virally. Within a half an hour of that seminar ending, I was part of a conversation with Tom Ellis and Keith Uncapher, the people that-- the Associate Director and the Director of ISI, who were telling me why I shouldn't have done what I did. <laughs> Especially, since they had a contract to do Message Systems and were deeply involved...

Weber: Well, because they didn't realize that...

Vittal: Because they had no knowledge that I was actually working on this thing that had become popular. And so the cat...

Weber: <inaudible>

Vittal: ...was out of the bag, so I released it.

Weber: But at PARC-- I mean, at this point it only worked over the ARPANET. I mean...

Vittal: Correct.

Weber: But all the people at PARC had access, so they were using it internally to send it, like, to the person in the next office. They might be going out on the ARPANET to send email.

Vittal: Correct.

Weber: Similar to today.

Vittal: Similar to today, and I was sending mail to people all over the country who were on the ARPANET.

Weber: Sure. No, but I think of the internal Xerox email didn't come until Laurel much later.

Vittal: That came...

Weber: Right. And that would've...

Vittal: ...if I remember right, in '78 or '79.

Weber: Yeah. Okay. So...

Vittal: And a lot of the functionality, I am told, was cobbled from MSG. And, actually, a lot of people have told me that they were cobbled from MSG, stole ideas from MSG about how to actually implement things. And, indeed, another apocryphal story is that at the end of 1975, the folk at BBN were in the middle of working on a system called MailSys or Hermes, as part of the Hermes Project, which was an ARPA funded email project. They were also part of the Military Message Experiment, which was to develop an email system for the Navy, specifically, I think, CINCPACFLT in Hawaii, to handle all their daily message traffic, which they were getting through AUTODIN and the other mechanisms. Anyway, Steve Walker-- well, excuse me. One of the people at BBN was Austin Henderson. Steve Walker had told Austin that he should talk to me to "figure out how to do email right." <laughs> And so he came to the Message Services Committee meeting in December of '75, and we had chats. And I ultimately within four months had a job offer from BBN.

Weber: The Message Services Committee, what was that?

Vittal: It was a committee that Steve Walker had formed to discuss issues around electronic mail.

Weber: Compatibility and standard...

Vittal: Compatibility, standardization, et cetera.

Weber: And this was a discussion group online or what?

Vittal: It wasn't yet a discussion group online. We had periodic meetings, and one just happened to be ISI, and I wasn't part of the management structure, and so I didn't get officially invited to it. I just went to it.

Weber: But was that related to the contract you said ISI had to develop messaging?

Vittal: Only peripherally. But those were the people who were doing email, officially, at ISI. And so they were all part of the invitation group.

Weber: And once they realized what you had done, they didn't actively invite you to join, but they didn't bar you from the room, either?

Vittal: Exactly.

Weber: And then, the Hermes project was related-- I mean, connected to ARPANET, at all, or totally independent?

Vittal: It was on the ARPANET.

Weber: Okay.

Vittal: Of course. But totally independent. The Military Message Experiment was intended to be a competition. "May the best group win." And the participants were the SIGMA project at ISI, the Hermes project at BBN, and the DMS project at MIT. The DMS project never officially got funding for the MME, but they participated anyway. They were invited to participate. The group that won was ISI, because they had the best system and it was more architected toward the military than it was toward general email. Hermes...

Weber: And this was quite different than what you had done?

Vittal: It was very different from what I had done. Hermes tried to treat email as a very robust system that you could configure to whatever way you wanted to. So it was more than it should've been and therefore less than it needed to be. And so people, for the most part, didn't like it.

Weber: So give an...

Vittal: Including people at BBN.

Weber: So give an example of the kind of feature that would be too much customization on a...

Vittal: How to edit your message, whether you treat the messages as a database or a repository or just a linear set of emails that you separate off into different files.

Weber: And you could choose...

Vittal: You could choose these mechanisms.

Weber: Boy.

Vittal: And they didn't pick the defaults particularly correctly.

Weber: Actually, this might be a good time to-- so could you describe, well, the features of some of these systems? Perhaps, the example of, you know, sending a message, what would the steps be? Or, let's say, receiving and replying to a message. So start with MSG and, you know, when you first worked on it, how was it different from what you're already using with from Ray and Larry? So what were the features that you added and what was your thinking about it?

Vittal: Well, when I got 10 or maybe 15 messages a day, which seems like a drop in a bucket compared to the volume, the spigot that we have today. You wanted-- I wanted a way to read the message, file it in a particular file that was appropriate for that message and who it came from.

Weber: And what was it like...

Vittal: Maybe, reply to it, forward the message to somebody else for whom it might be relevant, and so forth.

Weber: And what were the...

Vittal: A lot of those functions, like filing and forward and reply, didn't exist in any system.

Weber: So you would have to manually do what, then, to do that?

Vittal: So to reply to a message, for example, you'd have to copy the original-- to get the effect that you do today, where it includes the text...

Weber: And to start off, so the messages came in, but they're just one after the other. There's no nice list of them; right?

Vittal: Okay. Messages were stored in a file in your account on the PDP-10. A program would have to read that and parse that file. Which means understand where a message starts, where a message stops and, perhaps, what some of the fields were in the headers, who it was to, who was carbon copied, what the subject was. What was the date, et cetera. And so once you had that and WRD and NRD had those.

Weber: So you would see a list with...

Vittal: You could see a list, and RD had that list. And it allowed you to select a message and type it out. Remember that back then we didn't have graphic displays. We just had...

Weber: Sure. Yeah.

Vittal: ...glass teletypes.

Weber: Right. Selecting it meant it would print out line by line.

Vittal: Line by line on the screen, stop at the bottom.

Weber: Right.

Vittal: Let you continue if it was longer than a page, et cetera. So to reply, you just have to create a new message.

Weber: And paste in.

Vittal: And copy the relevant parts of the text into it. That was very difficult. To forward a message, you'd have to do the same thing.

Weber: Why was it so difficult?

Vittal: Because you didn't have editing capabilities, per se, on the terminal, on the system that you were dealing with. And the innovation that I guess I did, even though a lot of people were starting to think about it, because Hermes did it shortly thereafter. A little system called HG that Jim Calvin did at BBN, it happened shortly thereafter. The Unix Systems at the time, it happened shortly thereafter. But everybody tells me, and by all the looking that I've done says, that MSG was the first. I mean, we all worked on this in isolation from each other, for whatever reason.

Weber: So there were no good editing tools for copying. So how would you do it, then, if you needed to copy in order to forward? What was the workaround for it?

Vittal: I don't remember what the mechanism was.

Weber: Okay. Something unpleasant?

Vittal: It was something unpleasant. And now, all you do is type forward...

Weber: Sure.

Vittal: ...the message message number that you wanted, because all the messages had numbers associated with them, and it was a linear index into the number of messages in that particular file that you were dealing with. And it would take the text of that message and put it into SNDMSG and let you type in the addresses and maybe change the subject, and maybe add a couple lines of text at the front.

Weber: And reply would automatically copy the body of what you were replying to?

Vittal: Exactly.

Weber: Which, again, was the same.

Vittal: It's the same mechanism.

Weber: And then, you could just send it, yeah.

Vittal: What MSG did was it used SNDMSG-- the thing that Tomlinson and Julie Sussman did, way back when, as the mechanism to send email and to edit an email that you were creating.

Weber: And then, you talked about adding some way to categorize by mailbox or folder, whatever. That was the other part...

Vittal: RD had a way, ultimately, to take a message and put it into another file. And all that it did was tack it at the bottom of that file and delete it from the one that you were in.

Weber: So what were the features you added with MSG?

Vittal: The main innovations were forward and reply, which I called answer at the time.

Weber: Okay. And it was a more integrated...

Vittal: It was completely integrated, all in one system, and I guess that was the first time that that had been done, also.

Weber: But there was no way to categorize or have multiple places to put the messages? I mean, they were just stored in one long list...

Vittal: Well, RD let you, if I remember correctly, let you move a copy of a message to a certain place, to another file. But MSG let you copy a message so you could have a copy of the same message in multiple files.

Weber: Like an alias type thing? Okay. Although you're literally copying it multiple times.

Vittal: Exactly.

Weber: Okay. And then you were talking about the committee, the group where you were meeting, comparing these different systems. So what...

Vittal: The Message Services Committee.

Weber: Right. Well, I mean, that's ISI for their particular contract; right?

Vittal: No. The Message Services Committee had people from all over the country.

Weber: Okay. The groups you had mentioned.

Vittal: Right.

Weber: And talk about, let's say, at that time, if you were to receive a message and reply to it on those different systems, do you remember enough-- you know, what were the big differences in the way that what the experience would be like?

Vittal: That's a hard one to answer. MSG had-- was a very different system from typical systems on TENEX, which was the operating system on the PDP-10's that we used. It used single-character commands instead of being able to type the first several characters of a command and the Escape to fill out the rest of it. Like, C-O Escape might give you Copy. So I'd have single-character commands, like Read for "R," which expanded to Read, for reading a file. Or "T," followed by a message number for typing out a particular message in the file that was current. Or answer a particular message.

Weber: "A."

Vittal: "A." Or "F," for Forward.

Weber: And so in TENEX how would it work? So you would look at your-- you would have a list, as well, of your incoming email?

Vittal: No. What I'm talking about is this is the interface...

Weber: Right. Right. You read...

Vittal: MSG's interface on TENEX.

Weber: Okay. Right. But TENEX also had some built-in local mail; right? No.

Vittal: Only SNDMSG.

Weber: Okay. So...

Vittal: What it did was you had a mail dot text, if I remember right. Which was the file that your mail got delivered to in your account, and that was done by the operating systems somewhere. Actually, it was, probably, done by the FTP daemon, originally CPYNET.

Weber: Right. And you could use different programs...

Vittal: And you could use different programs...

Weber: ...to deal with that...

Vittal: ...to process that. Hermes used one, was one program, HG another, MSG a third.

Weber: So, let's say, with Hermes where you had lots and lots of choices, what would it be like-- I don't know if you used it enough. But what would it be like to receive and reply to a message in Hermes?

Vittal: It was similar. You had to type more and it was the-- part of the problem with Hermes was that if you typed a question mark, saying, "What can I do here?" You'd be given too many options. And trying to find the right one-- <laughs>

Weber: Like, for instance, how to store it as-- whether to treat it as more of a database or just...

Vittal: Treat it as a database or what can I do here? Well, you can type the message number or you can type a whole string of stuff, which describes a set of messages. Or for the set of commands, you might have a long list of commands as opposed to, well, a maximum of 26. <laughs> Which was part of the intent, which is why it had to be Answer, as opposed to Reply, because "R" was already taken with Read.

Weber: But you could forward or reply in Hermes. It would paste in the body?

Vittal: It would do the same thing, it had their own editor.

Weber: Okay. But it was just more steps?

Vittal: It did not use SNDMSG.

Weber: It had its own protocol?

Vittal: It has its own internal mechanisms.

Weber: And then what was the other one you said?

Vittal: HG?

Weber: Yeah. So what would that...

Vittal: That was something that Jim Calvin did when he was a graduate student at Case Western, if I remember correctly. And he brought it to BBN with him.

Weber: So what was that like to use, if you used it?

Vittal: I never used it, to be honest. It was for Jim's own use. He never really distributed it.

Weber: And then, what else was out there? There were a number of others.

Vittal: Well, every operating system had their own...

Weber: <inaudible>

Vittal: ...set of emails. And that brought its own set of problems, because what you had to do was-- what you needed was a standardization of the format for what emails would look like.

Weber: Oh, yeah, and sorry. What I didn't ask you-- I know it became a huge problem later, but suppose you sent a message from MSG to Hermes, would it elegantly-- because it was using the same mailbox on TENEX, in that case, it would be okay; right?

Vittal: In that case, it's okay. Because...

Weber: But if you're sending to another operating system, that's when you got...

Vittal: Right. I mean, for example, the at sign, this was one of the objections to using an at sign by the community, is that Multics, that was an end of line character.

Weber: Yeah, I remember that.

Vittal: And so we had to change the syntax or they had to specialize a syntax on Multics to, instead of using an at sign, say, "Person at BBN, space, A-T, space," as opposed to the at sign.

Weber: And what would happen if you got that, let's say, out of Tenex? So...

Vittal: Oh, that's fine.

Weber: Okay. It would automatically...

Vittal: Because what you needed wasn't a standard, and we actually, ultimately, wrote that into the standard, to go back to the standards issue. There was some RFC's that blithely stated what common usage at the time was. I think it was RFC 524.[1] I could be wrong about the number. Steve Walker formed a committee named the Computer Aided Human Communications Committee, CAHCCOM. At the beginning of 1976, it had four people on it; Dave Farber, who was running it; John Seely Brown; Ken Pogran, who was part of the Multics implementation group, dealt with email and Multics; and me. And one of the tasks that he gave us was to develop standards for email. And so that committee formed a subcommittee to develop the email standards, which included Dave Crocker and Austin Henderson and Ken Pogran and myself. And the four of us started deliberating on standards, and we came up with RFC 724. I forget the actual date. And we termed it a proposed draft standard, and we followed that with RFC 733, which we called a standard, and we got approval from Steve to call it a standard. Because up until then, there were no standards in the ARPANET. There were just suggestions that you followed. <laughs> And for the most part, that standard holds true today. So yes, there are a lot of things that have gotten added to it. But the structure of the fields like To and CC and BCC and addresses and the actual syntax that you can use for an address, and so forth, remain the same. There were minor differences added when we went to the Internet in 1982.

Weber: Three was the changeover, but yeah.

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[1] [interviewee's note] The correct RFC is RFC 561 "Standardizing Network Mail Headers." RFC 524 was "A Proposed Mail Protocol."

Vittal: Three was the turnover, but the standard was done in '82.

Weber: But you were meeting online or you were all local?

Vittal: Well, Dave was here in LA-- not here in LA, down in LA. Ken Pogran was at MIT. Austin Henderson was at BBN. And I was first at ISI, and then mid-1976 at BBN.

Weber: So you're mostly doing it through email, then?

Vittal: We were doing all of it through email. We'd met, I want to say, every six months or so.

Weber: And for that purpose?

Vittal: For that purpose.

Weber: And who was funding it at that point?

Vittal: Well, Austin and I were being funded through the Hermes project, so ARPA. I don't remember-- let's see, Dave Crocker was at MIT-- excuse me, at Rand and so whatever funding Rand had, I think it was NSF funding, maybe ARPA funding. And the MIT Multics funding, whatever that was, for Ken.

Weber: And you said John Seely Brown was also...

Vittal: He was part of CAHCCOM. But, in fact, it didn't meet very often. It didn't last very long because Steve ended up getting what he wanted, namely a standard. <laughs> But it started us thinking about the more global issue of computer aided communications, and it was funny because in 1988, when I had moved from BBN to Xerox to-- I was now at GTE, and Dave Clark came by GTE to give a seminar, and he and I chatted afterward. And first of all, my presence at GTE was astounding to him because he hadn't understood that I had actually moved back to Boston. But that's a separable issue. But his comment was, "Little did we know when we were developing email back in the early '70s, mid '70s, that what we were doing was creating a new paradigm for communications." And he's right. We did. And it's one that we use commonly today. There are others, like Facebook and...

Weber: SMS.

Vittal: SMS or texting, Twitter even, Instagram even, Snapchat, a whole bunch of them today, all slightly different paradigms of communication. But back then, there weren't very many. There was the phone and email.

Weber: Well, Telex.

Vittal: Telex and faxes, ultimately.

Weber: Telex and then more ordinary, telegrams.

Vittal: Correct. You're right. Telegrams actually happened.

Weber: Yeah, and that's the end of their era. But the other parts of the world they were pretty active for quite a while longer...

Vittal: For quite a long time, yes.

Weber: But when you were doing the standardization, the work of the Engelbart's group was all-- I mean, that was done. But were you looking at that, as well?

Vittal: We were not plugged into that.

Weber: Okay.

Vittal: Yes, I had visited them, earlier. I don't remember when. Probably, around 1976, one time when I was up talking to people at PARC, I'd go over there or there was a meeting at SRI. I'd seen the demos. It never really entered my consciousness, but you're right. One of the things that they did was structure things. They also had, for example, attachments on email. It was email in Augment by then, before anybody else.

Weber: And attaching multimedia or just documents?

Vittal: I don't remember. I say that it was before everybody else, but I'm not sure that that's true, either. Because Al Veza's group, MSGDMS at MIT had a form of attachments, also, for their email.

Weber: But many years ago when I interviewed Doug Englebart, I remember him talking about, kind of, format wars over email. But I don't remember now, I'd have to look back at the interview, to remember if it's-- but he was talking about within, kind of, his group or larger. But all sorts of conflict over what the fields should be and that sort of thing. So maybe he was talking about...

Vittal: There were all sorts of conflict. Two groups were formed to discuss email issues. One was called Message Group, MSGGroup. It was started by Steve Walker in June of 1975, if memory serves.

Weber: It's useful, you've just done a timeline <laughs> it's right in the back ...

Vittal: I'm still trying to remember. Well, one has a hard time remembering these things...

Weber: That's pretty good, though. Okay. So they formed that group.

Vittal: And a guy named Einar Stefferud, or Stef for short, moderated it and he was an active moderator. Some other people started a group called Header People, and it was started by Ken Harrenstein at MIT.

Weber: At MIT?

Vittal: He was at MIT at the time, if I remember...

Weber: Wasn't he out here? Later? Anyway.

Vittal: I thought he was at MIT when he started it.

Weber: Okay.

Vittal: I could be wrong.

Weber: All right.

Vittal: And, it was intended to be a free-for-all discussion about emails and email headers, in particular, and formats sent and names and the like. Header People devolved into <laughs> a shoot the messenger kind of thing, where MSGGroup lasted a fairly long time and talked about real issues. People would

announce things like new versions of software on MSGGroup. Or I remember announcing the standard, RFC 724 and 733, on MSGGroup, as opposed to Header People.

Weber: But you were getting both, I assume?

Vittal: I was getting both. By then, 1979, I wasn't being funded by the Hermes group anymore. I was off doing other things, but I still kept my finger in.

Weber: And whatever happened to your syntax driven languages thesis?

Vittal: It went by the wayside.

Weber: So email became-- your hobby became your main thing; right?

Vittal: Well, for a while. Because I had other interests, also, like programming languages and AI. And so one of the things that I did-- I'm trying to remember what I did immediately after I left the Hermes group. One thing was do other things about email. So, for example, I developed this system called R2D2, which was designed to send programs around the country using the email infrastructure as the mechanism, and have it get interpreted by the email client on the other end. And so, for example, you could send a questionnaire, and it would ask you questions, and as opposed to asking them linearly, it would actually be a tree structure. So, depending on how you answer a question, it can pose you other questions.

Weber: And that would be in the local program such as--

Vittal: And it would be a program that was running inside the email system at the remote site.

Weber: In the client app.

Vittal: In the client of the recipient.

Weber: Right. So it would--

Vittal: And it would form up email and send it back to you with the answer!

Weber: So sort of applet-type stuff.

Vittal: It was sort of an applet, sort of like Javascript and that mechanism. And it's a similar in style mechanisms that Javascript used, and that General Magic used when they did their thing.

Weber: Right, Telescript.

Vittal: Telescript, yeah.

Weber: And then you might not know the Austrian Moupin [ph?] did something like that in the mid-'80s.

Vittal: Did not know that.

Weber: Yeah. But, oh, and SMS Toolkit does something like that today. Okay, but that never developed beyond--

Vittal: We tried to get funding for it. It was a time when Steve Walker as on his way out from ARPA and the military message experiment was in high gear, and so he didn't have any extra funding. And so we never could get it funded.

Weber: But you were looking to get it funded as what, an ARPA type thing?

Vittal: An ARPA project-- program.

Weber: You didn't think of commercializing?

Vittal: No, we didn't think about commercialization in those days. We were part of Research. Research doesn't talk commercial.

Weber: I mean, BBN is sort of halfway. But yeah.

Vittal: BBN tried to commercialize things sometimes. They never really succeeded. For the most part. The people on the commercial side would probably object to that characterization somewhat. But the reality was in the marketplace nobody took them very seriously.

Weber: Yeah, and now I'm thinking like the C30 which paved the way for Cisco.

Vittal: Yes.

Weber: Yeah. I mean, they did sales and then just to banks in Europe and stuff. Okay. And then so what else? You were talking about related projects from email, an offshoot--

Vittal: So I thought at that point, I started thinking about going back to grad school to finish up my degree, but my thought process said that I was fully employed, I had no prospects for anything but full employment, I was doing interesting things, and I had a full salary. And if I went to grad school, how long would it take me to make up the difference? And would it really buy me anything career-wise? And so I made the, perhaps, wrong decision to not go back and finish my degree.

Weber: And this is-- you were married by that point?

Vittal: No, I did not get married until 1987.

Weber: So, you weren't even thinking about--

Vittal: I wasn't encumbered.

Weber: You could have gone to grad school, yeah.

Vittal: Yeah. We're talking about 1978/'9 issue, roughly.

Weber: Yeah, right.

Vittal: But at that point, I started getting into A.I. again. And Ron Brachman and the KL-ONE group at BBN, was all into knowledge representation languages. And that group included Bill Woods and Candy Sidner and others. And Candy and I were talking at one point with a guy named Dick Pew who ran the psychology group at BBN. And talking about how people learn systems. And we thought about, was an interest of mine, you know, how do you learn how to do things? How do you take a system and understand what's different from what you have now versus what you were using before? And whether that's a new version of, for example, Microsoft Word <laughs> versus the one that you had been using; or an operating system, OS-10 versus OS-9, or whatever.

Weber: Yeah, but like whatever I was asking earlier, the difference between using different email programs.

Vittal: Exactly. And we came up with the idea of taking a knowledge representation of the two systems and smashing them together to understand the differences, and taking your mental model of a system, which might be different from the actual system, and finding out how all those three mesh together, and use the differences to train you, to guide you into understanding a new system.

Weber: But how would you elicit the mental model?

Vittal: That was one of the issues. <laughs> And we never did resolve that. It was something, again, we were-- wrote a paper about the idea. We tried to get ARPA funding for it. And we hit a dead wall. And so we dropped it. And so instead I went off and started working on a project to identify whether this object coming out of the sky at you is an airplane and whether it's a friendly, or it's a foe, or it's an independent, neutral. A formal terminology is friend, foe or neutral in identification. So it's a four letter acronym, IFFN, "Identify: friend, foe or neutral." And we did it for the Navy.

Weber: But this is what visually recognizing?

Vittal: No, it was by program, taking radar or sonar images.

Weber: Right, so image recognition and so forth.

Vittal: So it's partly image recognition. But when you have a plane coming at you, and it looks kind of like a 777, but really it's an Airbus, or maybe it's a C30 that's made to look like an Airbus with the radar signature similar to the 777, how do you identify those? And without-- because the transponders that they use might be spoofing something. And so we actually got funding from the Navy to do some of this work. And going back to Rusty Bobrow, who I had as a professor in my second year of grad school, I was working with him at BBN on this stuff.

Weber: So this is more pattern recognition, or--

Vittal: It's pattern recognition, deep A.I. And about that time, meaning the beginning of 1982, I met a lady in Los Angeles, and decided I didn't want to have a commuting relationship. <laughs> It's a little far to go from Boston to L.A. every couple weeks. It's also expensive. <laughs>

Weber: And tiring.

Vittal: Tiring. And so I moved to L.A. and went to work for Xerox to try to commercialize Lisp machines, or A.I.

Weber: Hm. For Xerox? What were they--

Vittal: For Xerox.

Weber: What were they making?

Vittal: Well, one of the things that happened is that on the Alto, Warren Teitelman developed a thing called D-Lisp, which was a graphical interface to Interlisp. And I was working with him on some of that somewhere around 1980, and ended up being one of the few people outside of PARC that had an Alto in their office. <laughs>

Weber: He was.

Vittal: Me.

Weber: Oh! Okay. When you were at--

Vittal: BBN.

Weber: Wow. <laughs> And connected network to the other Altos through POP or what?

Vittal: I didn't have to be. I was just talking to TENEX for Interlisp, because we were big Lisp users at BBN. And they wanted this stuff done. We wanted the stuff done. At roughly the same time, there were various efforts around the country to develop special purpose hardware for running Lisp, because TENEXs were overloaded, shall we say. I forget what the name of it was, but there was an effort at BBN to do that. There was an effort at PARC to implement Lisp on the D machines. There was an effort at MIT to come up with the machine that ended up being the machine that Symbolics sold. And there were one or two others in there. And so that was a progenitor of the Lisp machine business, and I went to Xerox to help and commercialize that, and get it going. And I learned a lot, shall we say. <laughs>

Weber: But this was which-- so the Xerox office was where in the L.A. area?

Vittal: The Lisp machine effort was being run partly out of PARC here in Palo Alto, and partly out of Xerox Information Systems in Pasadena.

Weber: So going back to email a little bit. So during most of your efforts were in the ARPA community and research community.

Vittal: Correct.

Weber: The people you're working with and the systems you knew. How much were you aware of what was going on in the commercial networks. I mean, CompuServe had some before their CompuServe Information Systems, I believe they had email of some sort for the corporate customers, certainly TimeNet did.

Vittal: They did. I was not particularly aware of those efforts. I became aware of the commercialization because BBN wanted to commercialize email, and there was an effort in a division that was run by either Bob Bressler or Dave Walden to do so, and they wanted my comments, but I was busy doing research and so I decided not to move over.

Weber: Around what year?

Vittal: 1981, '80/'81? And I got, every now and then, I would get a phone call from somebody in the military who was leaving and wanted to start a business. And one of them asked me if I wanted to be part of a startup doing email. None of these in retrospect, none of these were particularly successful except maybe software.com, which ended up selling itself for a lot of money. And I know some of the people involved, and they made out like bandits.

Weber: And they had email early on.

Vittal: They provided a lot of the email infrastructure for a lot of commercialized piece at some point.

Weber: And then also the-- I guess it's a little later email started up on LANs for office stuff. It was early '80s that was beginning, right?

Vittal: Well, Xerox had Laurel, which was late '70s, '78, if I remember right, or somewhere around there, which used Grapevine as the validation infrastructure and distribution infrastructure. That begat-- that was the lead-in to the Xerox Office Systems, Xerox Star, which had email on a LAN, and a lot of the people who worked on it demanded an interface to the Arpanet at the time, because it was roughly 1980-ish, or--

and then the Internet. And so they had to build a special interface at PARC to actually do that remote interface. But, yes, I don't remember so much Wang having email.

Weber: Good question.

Vittal: It's a good question, I don't know.

Weber: And Novell is later on.

Vittal: Novell is later on.

Weber: But your UUCP was also, that's the period they were starting, and they did the store-and-forward email, right?

Vittal: They did the store-and-forward specifically because the Internet hadn't happened and taken over the world, and you had different formats in these other networks and how do you do it? And so they had a dial network that was done called UUCP to accept email, and based on the address, dial out and transmit email in bulk, and vice versa.

Weber: And you were aware of this at the time, but--

Vittal: I was.

Weber: But probably it seemed very primitive, or--

Vittal: It seemed primitive, but it was a necessary thing to have happen. You had people who had worked on the Arpanet who were now working at universities, perhaps, that didn't have the Arpanet-- weren't blessed, shall we say? Didn't have the funding, whatever. And they wanted the facilities. Mail was part of the UNIX distribution. But they had to cobble things together to get it onto the Internet-- onto the Arpanet to get wider distribution, otherwise you were just talking to your friends on NSF or whatever.

Weber: But the standards were similar to--

Vittal: Exactly.

Weber: -- ARPA was-- the only difference was the store-and-forward. Obviously, that was in the UUPC protocol to automatically do the right--

Vittal: Correct.

Weber: Yeah, I mean that was invisible to the email program at either end.

Vittal: Yes.

Weber: Right.

Vittal: And they had to come up with a different format for the addresses to show the path, because it was a very convoluted syntax if I remember right. I don't even remember what it was. I just remember that it was convoluted. <laughs>

Weber: Okay, and so, yeah, so let's go back to the course of your career. So then-- so you've moved out, back to California.

Vittal: I moved back to California to commercialize Lisp systems. Xerox ultimately decided that they didn't want to be in the Lisp machine business, and so they spun it out-- I forget the name of the company, but-- and at that point, I was-- I had just gotten married, and I had a decision to make. I could come to work in Palo Alto for the new Lisp machine company. I'm glad that I didn't, because it didn't last very long. I ultimately took a job to run the Machine Learning Group, which was the largest machine learning group in the world at the time in 1988, at GTE Laboratories. And that was a fascinating time! And we had a whole lot of fun! I remember having bowling competitions using water balloons in the hallways. <laughs>

Weber: But you were quite a few years at Xerox, then, right?

Vittal: I was at Xerox for six years, roughly six years.

Weber: And how did your-- because you became a manager in that period, or--

Vittal: I ran the consulting and training business for the Lisp Machine Group. That's where I cut my management chops. I got my management badge. <laughs> And it was fun! Got to travel all around. I

started the consulting business, and ran it up to a million dollar run rate in six months. Hired the appropriate people. It was a good thing. Then I got married and left.

Weber: And Xerox pulled out of that.

Vittal: And Xerox was pulling out of the business anyway.

Weber: And your wife did something in computing? Or--

Vittal: Actually, no, she's trained as a Chemical Engineer. And she was at 3M, and she had actually come to Xerox to take a class from one of my staff. And her boss had asked her to take me out to lunch. And as the saying goes, lunch turned into dinner, turned into a lifetime. <laughs> But at her goodbye party, her boss at 3M said, "Well, I'm responsible for bringing Alicia into this group; I'm responsible for her leaving, I'm sorry to say." <laughs>

Weber: But she didn't want to move to Palo Alto.

Vittal: Well, she didn't know what she wanted to do. She was looking for -- we were looking for a job in the same place. She had been working on scaling up the chemical process to make the adhesive for Post-It Notes. And then by the time she met me, she was working in Lisp, because they were doing some work in what, in effect, became Made-to-Fit Levi's. And so she has-- her name's on the patent.

Weber: But there's no connection with the adhesive for Post-It Notes.

Vittal: There's no connection there. <laughs> So she had started going into this A.I. stuff and programming and whatever. And which is why she was in Pasadena taking a class from my staff, and how I met her. And so we ultimately decided that we wanted to get married. Then we had to decide where we were going to live, because she was still in Saint Paul at 3M.

Weber: Oh, right, she had come out just for the training. Yeah, yeah.

Vittal: She had just come out for the training class. And so she wanted to stay there until she got the patent. Which happened. In the interim we got married. And so we had this commuting relationship, and commuting marriage. And it was starting to wear on both of us. And ultimately we said we should find a place to live. And then around then was February March that I started interviewing and found-- decided to go to GTE, and run the Machine Learning Group.

Weber: And that was based where?

Vittal: Waltham, Massachusetts. Boston.

Weber: And this is-- GTE had bought Telenet before that, right?

Vittal: They had bought Telenet.

Weber: But I assume it sunk without a trace inside.

Vittal: It sunk without a trace somehow. And at least I was never involved.

Weber: But did you know of it?

Vittal: Yes.

Weber: Yeah. But I guess all the people you knew from ARPA had left when it was bought by GTE.

Vittal: They had left long ago.

Weber: So you don't really know what happened to it within GTE.

Vittal: No.

Weber: Okay, so talk about the Machine Learning Group.

Vittal: So it was ten or twelve people doing fundamental research in machine learning. And one of the things that we did was figure out how to automate or reduce the amount of breakage at a lighting plant, because GTE also owned Sylvania at the time, which made light bulbs. And specifically, in this case, fluorescent tubes. And we went up several times to the lighting plant and realized that this was a Rube Goldberg kind of device. We realized that whatever A.I. and machine learning could do for the lighting plant was second or third order. There was so much that they could do just by doing intelligent things at the plant themselves, that we bowed out. Similarly, we had an effort to look at telephone calls on the cellular network to figure out whether they were dropped calls or something else. And we could look-- we had call records that we weren't supposed to have and all sorts of other things. Never forget going

through the list once and seeing some calls in rapid order, a 30-second call to Columbia from Houston; a 25-second call two minutes later from Houston to Columbia. We were-- at three in the morning-- we were wondering if these were drug calls. And so we had-- we were just very curious about it, but we couldn't do anything, like call one of the numbers and ask them what they were up to. <laughs> You can imagine doing that, and imagine the trouble you'd get into if you did. So we didn't do any of that. So ultimately-- and that was probably around 1995 that the Internet started to happen, commercially and for real.

Weber: The Web.

Vittal: The Web. And I was one of the people that knew something about that since I had worked in networking back at Irvine, and I kept track-- and at BBN at some level, because I was peripherally involved. And I was Mr. Email, or whatever you want to call it at one point. And so I knew a lot about that. And I knew the players. And so I got tasked to in effect transition from machine learning to something else. And so I want to call it Advanced Applications. And so those applications could be intelligent agents that work in the network to do things.

Weber: So it's similar to what you'd done with--

Vittal: So going back to the R2D2 work, for example. It could be anything else in that regard. And so like we called it the Special Information Systems Group. And that's what it was. I was the software side. And sadly, we had to let go of a lot of the machine learning people who were very good. But then some of them transitioned over into the new realm. Some of them didn't. It's what happens, I guess. I don't like it, but that's what happens. And that went on until GTE and Bell Atlantic merged to form Verizon, and Verizon took its 800 people combined Research Group down to 350. They stated very categorically that, "We don't do research. We expect our vendors to do it for us." That was disheartening to say the least. I was one of the people, I had transitioned-- excuse me-- I had been working closely with the GTE Strategy people to understand about this Internet thing, and to know how to position it. I didn't know where to go with that. When the VP for Strategy for GTE comes and visits you in your office, unbeknownst to the Director of the Labs, <laughs> you sort of get your hand slapped. I found my hands being really slapped when they said, "Okay, you're part of the Technology Strategy Group," which is not something that I was particularly interested in. I was more interested in doing technology, rather than strategizing about it. And I'd worked with the people who were doing commercial strategy. And so I got laid off. And a couple months later, 9/11 happened. And we all know what happened after that, in terms of the market, in terms of finding jobs, etcetera.

Weber: Yeah.

Vittal: And so I had to transition myself, and I was kind of an entrepreneurial guy, and sort of had an idea about business from my Xerox days. And so I started helping-- where "help" is a strange word-- but

mentoring, providing technical experience, providing managerial experience, guidance-- whatever you want to call it-- to a range of startups. And I'm still doing that today.

Weber: And when did Verizon form out of GTE and-- at Bell Atlantic?

Vittal: That happened in 1998 or so.

Weber: Okay, so not long before 9/11 in the big light of--

Vittal: Not a <inaudible>.

Weber: Yeah. I mean, there was never--

Vittal: I mean, it's they went along as separate entities for a long time. And then they tried formally to merge things around 1999/2000, and I went along with things for a while. Partly they wanted me to go along. GTE had a formal retirement plan. And I didn't have my numbers yet. And I was of a certain age. And so they waited until I got my numbers, and then they said goodbye.

Weber: So at least you got the pension.

Vittal: I got my qualified pension.

Weber: And the way email has evolved, anything that's surprised you about what's happened?

Vittal: Well, one of the things that we talked about when we were doing the standards was how to make life easier in the long-run and what we should do. And we talked about instead of having a flat text to represent an email, to instead to have a structured mechanism to describe the contents of an email, including the headers and everything else involved. Had we done that-- and it might be an example today of the kind of structure we were thinking about, maybe XML. If we had done that back in 1977, we wouldn't have had to have MIME per se. Attachments would have been a lot easier and a lot sooner coming in all sorts of forms. We might have had an easier mechanism for validation and authentication of users and people, and therefore, perhaps spam wouldn't have happened as much. Or any of the other things that you see that you think are wrong with email. But they had their startings back in the open mechanism that we developed for the Arpanet way back when, and we didn't change when we had the chance. And so we've been living with the legacy ever since.

Weber: But if you'd done a more structured XML-like format, why would authentication have naturally followed that?

Vittal: It wouldn't have naturally followed it, but it would have a place to put it, both embedded in the email, and the systems could have evolved to permit it.

Weber: And because I mean today you can do HTML in the body of an email, but it's--

Vittal: People do it regularly.

Weber: Right, but it's not built into the larger--

Vittal: No.

Weber: -- standard, basically, right? And how about webmail, did that-- the switch to having away from the local client-- I mean, in a way it's just back to more like a timesharing system in a way. But how did you feel about that? Did that surprise you at all?

Vittal: It didn't surprise me, it was a natural evolution at some level. Because ISPs could either give you a program to read email on their system, like EarthLink. Or they could provide you a web interface, or they could-- this was before SMTP and those things. Or they could provide you a web interface to their email. SMTP happened, so you had a way to get into your email, remotely from a client. The clients hadn't necessarily evolved yet. I don't remember the timing sufficiently well to say which came first. But the configuration that you had to go through to get connected to your email on a particular ISP was a pretty onerous and bug-- not bug-free kind of activity. And people had a lot of trouble doing that. And so they had to provide a better mechanism for people, or a mechanism where it was easy. Web email's the way. It made sense.

Weber: And anything else you'd like to cover or that we missed?

Vittal: There are probably a whole bunch of things. But you know, we can do it again!

Weber: <laughs> The follow-up. Well, thank you.

Vittal: My pleasure.

Weber: Great interview.

Vittal: This was a delightful thing!

END OF THE INTERVIEW