Dr. Andrew J. Viterbi, Ph.D. serves as President of the Viterbi Group LLC and co-founded it in 2000. Dr. Viterbi co-founded Continuous Computing Corp. and served as its Chief Technology Officer from July 1985 to July 1996. From July 1983 to April 1985, he served as the Senior Vice President and Chief Scientist of M/A-COM Inc. In July 1985, he co-founded QUALCOMM Inc., where Dr. Viterbi served as the Vice Chairman until 2000 and as the Chief Technical Officer until 1996. Under his leadership, QUALCOMM received international recognition for innovative technology in the areas of digital wireless communication systems and products based on Code Division Multiple Access (CDMA) technologies. From October 1968 to April 1985, he held various Executive positions at LINKABIT (M/A-COM LINKABIT after August 1980) and served as the President of the M/A-COM LINKABIT. In 1968, Dr. Viterbi Co-founded LINKABIT Corp., where he served as an Executive Vice President and later as the President in the early 1980's. Dr. Viterbi served as an Advisor at Avalon Ventures. He served as the Vice-Chairman of Continuous Computing Corp. since July 1985. During most of his period of service with LINKABIT, Dr. Viterbi served as the Vice-Chairman and a Director. He has been a Director of Link_A_Media Devices Corporation since August 2010. He serves as a Director of Continuous Computing Corp., Motorola Mobility Holdings, Inc., QUALCOMM Flarion Technologies, Inc., The International Engineering Consortium and Samsung Semiconductor Israel R&D Center Ltd. Dr. Viterbi serves as a Member of Advisory Board of JGV Growth Equity Fund, Provigent Inc., L.P, Impinj, Inc., Jerusalem Global Ventures I and Jerusalem Global Ventures. He serves as a Member of Scientific Advisory Board at NeuroVigil, Inc. He serves as a Member of the United States President’s Information Technology Advisory Committee and Trustee of the University of Southern California and various other educational, scientific, and philanthropic institutions. He is a Trustee of Sanford-Burnham Medical Research
Institute and Mathematical Sciences Research Institute. From 1963 to 1973, Dr. Viterbi served as a Professor at the University of California, Los Angeles, (UCLA) School of Engineering and Applied Science, where he did fundamental work in digital communication theory and wrote numerous research papers and two books, for which he has received international recognition. Dr. Viterbi continued teaching on a part-time basis at the University of California, San Diego until 1994, where he is a Professor Emeritus. From 1957 to 1963, Dr. Viterbi was a Member of the Communications Research Section of the California Institute of Technology Jet Propulsion Laboratory. While there, he was one of the first communication engineers to recognize the potential of digital transmission techniques and propose them for space and satellite telecommunication systems. Dr. Viterbi has received numerous awards and recognition for his leadership and substantial contributions to communications theory and its industrial applications over the years. Dr. Viterbi is a Fellow of the IEEE, a Marconi Fellow, and a Member of United States National Academy of Engineering, the United States National Academy of Sciences, and the American Academy of Arts and Sciences. He has received honorary doctorates from universities in the United States, Canada, Italy, and Israel. Dr. Viterbi received a Ph.D. from the University of Southern California in 1962, an M.S. and B.S. degrees from the Massachusetts Institute of Technology.

Source: Bloomberg Businessweek
INTERVIEWEE: Andrew Viterbi

INTERVIEWER: Mark Jones, PhD

DATE: December 15, 2006

VITERBI: As I said, the first Viterbi decoder on a chip was done in the mid 80's at Qualcomm, mid to late 80's. At Linkabit I know we worked very hard to make an MSI chip with about 100 gates and that was somewhere between '72 and '75 and it almost bankrupted the company.

WEST: Jerry Heller talked about this. You had a supplier problem.

VITERBI: Yeah several sequentially. There were several of them; more than one flaked out on us. In any case that was an ACS, add compare select circuit which had maybe a hundred transistors maybe a little more. That was the integration technology of the early 70's.

WEST: What would it take to do the first Qualcomm chip? How many transistors are we talking about there then?

VITERBI: Oh here?

WEST: No, for the Viterbi decoder on a chip.

VITERBI: On a single chip?

WEST: Yes.
VITERBI: Oh I could have told you that a few years ago. It was certainly less than a million. I would think a few hundred thousand. But I don’t have a firm feeling. But compared to today’s integration this is ridiculous.

WEST: But it’s a factor of a thousand more complex then the chip you did at Linkabit in the mid 70’s.

VITERBI: Factor of a thousand.

WEST: You said a hundred transistors.

VITERBI: Well, yes, yes, yes. Well, I can just do a multiplication. That chip had to be replicated 64 times plus all of the periphery, plus whatever else. So, it had to be at least a thousand times, so you are right. It’s in the hundreds of thousands definitely.

WEST: I am kind of starting from the 30’s and going through roughly when you were going to retire.

VITERBI: The 30’s is when I was born.

WEST: Right. Bergamo.

VITERBI: I can show you my honorary citizenship out there. You read Italian. So, yeah okay. I retired on March 9th the year 2000.

WEST: By-the-way did you start the Viterbi Group before then or did you start it after then?

VITERBI: I started it after then. Well, the Viterbi Group is what you see right here.

WEST: Right but Audrey went into business with you.
VITERBI: Audrey went into business with me. We actually rented this place I think in May or June. Miss Fox joined us in July. We thought about it but we didn't do anything until then.

VITERBI: On JPL NASA well I think my involvement...

WEST: I have some specific questions about that.

VITERBI: Well, I brought in Irwin and it was kind of a funny story. I don't know if you got it.

WEST: Which is what?

VITERBI: Well, I met him in 1962...

WEST: Sixty-three at the National Electronics Conference.

VITERBI: That's correct.

WEST: Because you won an award for the 62 papers.

VITERBI: Right we won the best research paper and the best tutorial paper. I have the research. Irwin said, "I've got a sabbatical coming up. I'm thinking of coming to the west coast. Do you think JPL is a good place?" I said, "It's a great place." I don't recall whether I said, "Send me the application I'll put it in," or whatever. But anyhow I told him where to send it. It came and he got a rejection. So, then I went to see my bosses' boss - Eb (for Eberhardt) Rechtin.

WEST: Right I know the name.

VITERBI: Then he was probably an assistant laboratory director. No he was division leader chief. I said, "Look he is a great guy, and MIT professor and you are turning him down." So, that got turned around immediately. He came for a year. At that time we had a space
problem, so he spent a year in a trailer, an environmentally suitable trailer but nevertheless a trailer.

WEST: In one thing you wrote you implied that you met Irwin when he did a job interview at JPL in '59.

VITERBI: Actually we must have run into the hall without knowing each other at MIT because I didn't leave until June of '57 with my Masters and he came after having gotten his Bachelor's at Cornell in '56. So, for one-year we overlapped but we never met. So, the first time we met was when he came to an interview at JPL and I guess it was when he was getting his PhD I assume that was '59 yeah.

WEST: So you remember meeting him then?

VITERBI: Oh yeah definitely. I knew of him, his thesis or some other things. We were pretty close to that MIT group.

WEST: But he said that he essentially didn’t really get to know you until he came out to JPL.

VITERBI: Oh sure. Except we had met in '62 and '63 we had chatted. But sure it wasn't until—I had never been effectively in the same place. After that we worked together to some degree. I was at this—at this point I was already, by the time he came out I was at UCLA full-time. So, I consulted one-day a week, so I saw what he was doing. As a matter of fact I just wrote a...

WEST: The 2006 IEEE Processing Study I have that one.

VITERBI: No, no I wrote something. I don't think it would be online, although it might be. I have it at home. It's the Emeriti newsletter.
WEST: I have that.

VITERBI: You have that. So, there I actually describe how he came to...

WEST: Yeah I read that.

VITERBI: How he came to UCSD and he turned down the UCSD offer initially.

WEST: Right he said that in one of his interviews. So, the puzzle I have in trying to tell this story of the 50’s and 60’s, you write your textbook, your two textbooks, and I have that and I understand where they come from.

VITERBI: Actually the second textbook with Omura didn’t get published till ’79 I think. I left- my first textbook was ’65, ’65 or ’66.

WEST: Seventy-three is the one with Omura.

VITERBI: No, ’79. I can quickly find that.

WEST: Copyright is ’66.

VITERBI: Sixty-six right. It was largely on much of what I had done at JPL but I was at UCLA at this point. The next book was largely on the courses I taught at UCLA and my research at UCLA and it started actually writing it in ’71 or ’72. But when I left in ’73 I enlisted Omura to help me, and he wrote the last two chapters. Let me see and this has, it’s in here somewhere, oh gosh, here it is copyright ’79. Then the third book, the CDMA book is ’95.

WEST: Well, actually as long as we are on Jim Omura, did you participate in hiring Jim Omura?

VITERBI: Yeah, at that time UCLA kind of had a very weird organization. There was a very strong school and department. Actually initially there was a Dean L. M. K. Boelter who ran
everything. By the time I got there he was on his way to full retirement that year in '63. But he still had control in some sense. In any case the school and the department were really one, and everything else was divisions. So, I was in the division of System Science, which consisted of communication control and maybe some OR, operations research, and that sort of thing. So, there wasn't even a chair, I don't even recall what its title was. The head of that division was an Indian professor, Professor A. V. Balakrishnan. So, he really made the recommendation. I was involved in interviewing him, and I was very positive on hiring him because he was a student of my friend and actually somebody who had been in my group when I was group supervisor at JPL, Tom Kailath who had since gone to Stanford and went to Stanford in probably '62.

WEST: I have those tapes.

VITERBI: In this point Jim came to us in the mid 70's. I'm sorry not the mid '70's it was the late 60's.

WEST: Tom Kailath you implied somewhere that you hired Tom Kailath at JPL.

VITERBI: No, I didn’t hire him because at the time he was hired I wasn’t group supervisor but he wound up being in my group in '61 or so, or '62.

WEST: I have those tapes. I was actually looking at the JPL phonebooks yesterday.

VITERBI: I think he was hired in '60 because that is when he got his PhD.

WEST: What was the name of the group that you headed?

VITERBI: It was the Communications Research Group within the Communications Research Section.
WEST: So, there was a group called Communications Research?

VITERBI: So I recall.

WEST: Later on in ‘63 Bob McEliece has an org chart that shows you consulting to some group called I think Digital Communications, if I recall correctly. But that might have been later.

VITERBI: I don’t recall. I don’t know. It could have been.

WEST: I’m still trying to find an org chart after your promotion because I’ve seen org charts before your promotion.

VITERBI: What did it say—oh before my promotion it said Communications Research Group didn’t it?

WEST: I’m sorry I didn’t bring that one.

VITERBI: The group leader when I was hired I was hired effectively by Eb Rechtin who was the section chief then. The group leader was Stan Lorens, Charles S. Lorens, C. S. Lorens, L-o-r-e-n-s. He was the guy whose face was most visible on the Life magazine article, Life magazine cover after Sputnik. Well, somewhat after Sputnik when we launched Explorer I.

WEST: Is that the one that they put on cover of the Viterbi School magazine?

VITERBI: Yeah I think so. One of those. It was that series of photographs. I’m not sure that was the one that actually made it to Life or there was another one that made it to Life.

WEST: Yeah because I looked in the old issue of Life and I didn’t see the one of you holding the paper tape.
VITERBI: No, I think the one in Life you see the back of my head. They fudged it a little bit. They got it from the same source, the same photographer. But that is exactly right.

WEST: So, the question that I couldn’t answer was, you’re at MIT. Do you take any information theory courses at MIT?

VITERBI: I took a course which was based on Norbert Weiner's work by his disciple whose name was Yuk Wing Lee.

WEST: I think he was Jacob’s Masters advisor.

VITERBI: It’s possible. I don’t recall. Anyway it was a wonderful course. It was called Statistical Communication Theory, but it didn’t—it did a lot, it brought forth the theory of random processes which is central to all of this. It didn’t really get into entropy and things of that nature. I was only there for one-year past the Bachelors, so I didn’t get a chance to take the Fano course which was outstanding and very difficult because he was writing the book. He wrote a very important book in 1960. It published in 1960. But after I came to JPL, and at USC there really wasn’t any great strength in information theory, I studied that book very thoroughly and that is where I got my start really in understanding information theory and coding. So, basically I learned it on my own and had a lot of incentive and fun kinds of things I was doing.

WEST: How did you actually even know you were sitting here at USC and there are no advisors?

VITERBI: No, no Greg Young was not a bad guy. He understood random processes. He understood Markov processes and the so-called Fokker-Planck equation quite well. That was his thesis as I recall. The thing about Greg he was a bright guy he was disorganized. He spent three-days a week, he spent roughly half time, and he was roughly half-time at USC. He taught
four courses, something ridiculous like that, plus he liked to go play pool and have a beer. Half of the time I’d have to go with him to the beer joint on the edge of campus to explain to him what I was doing. He was bright enough. He did not influence my thesis at all. What I was doing at JPL influenced it a lot. And there are a couple of guys, and I would say primarily I would cite Lloyd Welch who is now a professor at USC as being a great supporter, a great mentor, a great guy I could go with a problem that was half baked and he would point me to the right mathematics and to some extent Sol Golomb he is a very close friend. But he was more into number theory and things like that, than signal processing.

WEST: You said one of them...

VITERBI: And then there was a couple of other colleagues that were quite good and also working in our group.

WEST: You said I think it was Welch that taught you the math that you needed.

VITERBI: Well, I took math courses at USC, but he was, he is a very bright mathematician.

WEST: You mentioned you had Fano as a mentor, but you didn’t actually have Fano for a class.

VITERBI: Yes, I did. I did as an undergraduate. I took Electromagnetic Theory, Electrostatics or whatever it was, a junior course from him. I knew him socially, not really socially but I mean he was from my same very narrow ethnic group so he had been to our home.

WEST: Jewish Italians from Boston.

VITERBI: Exactly. In fact not only Jewish Italian but his father who was a famous mathematician. I think his name was Ugo Fano, or maybe that was his brother, I don’t know. It’s a very distinguished family. The father was a mathematician in fact there is a Fano Theorem named for him at the University of Turin when my father was studying medicine
there at the turn of the century, literally the turn of the century, and he had two sons both of whom are, actually one just passed away, he was at the National Bureau of Standards, I think in Washington, the National Bureau of Science, and he was a Physicist, and Roberto, or Bob who was the younger son, but the most interesting thing was that both my father and I think Fano's father were actually born in Mantova [Mantua in English]. So, it was a small Jewish ghetto until 1848 I think. It spawned a lot of musicians, spawned a lot of very interesting people. But it so happened that both Fano, although he was born in Turin because his father by then was a professor of Mathematics at the University of Turin. But his roots are in Mantua as are mine.

**WEST:** Well, Bob Fano came actually was invited to your parent's house when you were at Boston Latin to give you advice on where you should go to college.

**VITERBI:** I'm sure they did that. I remember him coming several times. I don't remember the particular advice. But probably my mother in particular would have done that.

**WEST:** Why do you say that?

**VITERBI:** Mothers especially are always pushing.

**WEST:** But it sounds like from the stories that you were already set on MIT long before you met Bob Fano.

**VITERBI:** I think so yeah. By the time I was in Latin school yeah I think so.

**WEST:** How did you know Fano's book if you didn't take...?

**VITERBI:** Well, we were doing communications research and MIT was a bit of a mother church. As a matter of fact there were three books that came out that year in 1960, one was Peterson's coding Error Correcting Codes, one was Fano, and I'm trying to think what the
third one was. It was lesser interest to me obviously. I thought error correction and error bounds and that sort of thing was really fascinating. It’s gone somewhat out of style for a variety of reasons which you can go into. But it was a very elegant piece of applied mathematics. He had done a lot of things before that. Among them was the matched filter. He didn’t invent it, but he played a very important role. If it hadn’t been for Shannon, it would have been Fano Information Theory. Because he independently and almost at the same time came up with the source coding theories, theorems. In fact some people call it Shannon-Fano Coding. I think on the noisy coding which is the more difficult thing that was Shannon. But Fano’s [sequential decoding] algorithm was very-very elegant. It wasn’t the first one. The first one was Wozencraft. But he cleaned it up a lot. In fact it was funny, the way Irwin spoke, this was many years ago, coming from New England and all, and he pronounced Fano in a way that it sounded like final. So, some people thought it was the Final algorithm, the end all.

WEST: Well, the other thing is you mentioned today you called it the mother church. In an interview you called it the mother church. Why do you say the mother church and not the temple, not the shrine?

VITERBI: It’s the American terminology.

WEST: I thought it was because you lived in Back Bay next to Mary Baker Eddy’s Church.

VITERBI: Yeah, I was just there. I took my grandson to see the maparium. Do you know the maparium?

WEST: No.

VITERBI: Oh that is the real attraction of the Christian Scientist Monitor. There is this great cathedral on Massachusetts Avenue, the corner of Huntington. But there is the Christian Scientist Monitor Headquarters. I don’t know that they really do the editing there anymore.
But it's a very classical building. But you go in and there is a map of the world that you walk into. In other words you are looking at it from the inside. It was built in 1934 or so. And it's all glass, glass panels and you have all of the countries of the world. But rather than looking at it from the outside like you do a globe you are inside. It's called a maparium. It's still one of the attractions of Boston. If you pick-up any travel book you'll find it. Anyhow that is irrelevant to the...

WEST: To why you called it the mother church.

VITERBI: No, I use that term because that is sort of where it all began to a large extent. Shannon actually and Bell Labs did it first. But you could write several books and I'm sure they've been written about Shannon left in '56, maybe even '55, because I was standing in line to be inducted into Tau Beta Pi the engineering honor society and right in front of me was Claude Shannon. It was an honorary—he was being given an honorary Tau Beta Pi membership as a faculty member and he was just standing in line, and along came one of the club officers, society officers and said, “Professor Shannon you shouldn’t be standing here.” He’s so modest. I only saw Shannon twice once was in '56 and the other time was at the Information Theory Symposium in Brighton, England in 1985 when he was already starting to suffer from Alzheimer’s but was still very lucid yet. So, Bell Labs in some sense was the original but he had moved to MIT. There was Fano. There was Norbert Wiener. There was Yuk Wing Lee, lesser figure. There were a number of others Wozencraft, Elias, later Bob Gallager. So, really it was an era. It was a golden era.

WEST: Forney somewhere is quoted as saying that he arrived at MIT in the golden stage...

VITERBI: Exactly and Dave the two most brilliant graduate students there are Dave Forney and Elwyn Berlekamp. Elwyn was actually Shannon’s student I think. Where Dave was Bob Fano’s, was Gallager’s student. But Gallager’s book which is the classic today, even with a lot
of things going out of style but still his 1965 book I think. It started out being Fano and
Gallagher. It was a rewrite of Fano’s book but then Bob went so far beyond and I’m sure Bob
Fano was so gracious they agreed that he should be the sole author.

WEST: That is what Bob Fano said that in fact...

VITERBI: Fano is a remarkable guy, not because of the closeness. We are not really that
close. He's older. He is about 18 or 20-years older than I. Well, not quite 20. Well, I take it
back. He must be in his mid 80's so he is only about 15-years older than I. There is that, also
he was my professor, and also, and I was enough of a European and perhaps he was too that
we put professors on a pedestal.

WEST: Right.

VITERBI: But I know he has very fond—he's fond of me, and what I've accomplished. I have a
great deal of respect for him. As I say he's very modest. He did not get all of the credit he
deserved. Have I drawn you off?

WEST: Probably.

VITERBI: Sorry about that.

WEST: Sort of going back to this issue of self-taught information theory, so I've read your...

VITERBI: In Gallager’s paper of 1965 before the book came out, I had it in note form probably
in ’64 when I was teaching the Information Theory course for the first time. That gave me a
real boost because he had a much more elegant way of presenting the fundamental theorem
then either Shannon or Fano. Shannon never really went all of the way. He guided you. He
had existence proves and things like that. Elias had put some more bones on it, flesh on the
bones.
WEST: Elias or...?

VITERBI: Elias, Peter Elias and Fano even more so. And then Gallager came along and Gallager had the most elegant presentation. So, that really gave me a boost and I was teaching that when I started playing with the algorithm. I was also trying to teach sequential decoding, both Wozencraft and Fano decoding. And it was difficult to teach. So, then I started playing with these other ideas. I came up with this—the algorithm was nothing more than a step in the proof.

WEST: Now when you say teach was that 286B?

VITERBI: Yes.

WEST: Not the undergraduate course?

VITERBI: No. I taught 186B. I taught that out of Abramson's book which was a neat little book. It's out of print which is a shame. It had all of the source coding or noiseless coding nicely done. Then it had a very nice undergraduate presentation not the full story but the full flavor of noisy coding. So, I taught that in 186B and in 286B I went into Fano and then into Gallager and then beyond.

WEST: Was 286B what you wrote your textbook for?

VITERBI: I would say yes. Then I continued it—very funny I taught it for about eight or ten-years at UCLA and then I taught the same course for about 19-years at UCSD but if morphed. It went from being purely theoretical to the CDMA book. I didn't give up any of the rigor but it was much more applied. And by the time I taught that I stopped teaching the proof of the Shannon Theory.
WEST: Was that because people didn’t want to hear it or because you thought there was more stuff that you wanted to cover instead?

VITERBI: More stuff that I wanted to cover instead, and people probably didn’t want to hear it. They wanted to hear all about wireless and how you do it for cellular phones.

WEST: So, I’m reading your work, your early JPL work, your orthogonal coding stuff. Other than quoting Shannon I don’t really see a lot—I don’t see a lot of quotes of the MIT School really until your Viterbi Decoding paper. You know in your ’67 paper you quote Elias, Fano, Wozencraft and Gallager.

VITERBI: Yeah, but that first paper at JPL the orthogonal coding was written probably in 1960 and I didn’t know that much information theory at the time. I knew enough to talk about entropy and things like that, and capacity of course but I didn’t have the full flavor of it all. As it turned out, there were people even in my group that said well, it’s just a limiting case and so forth. But it was sort of the first time that it had been applied in a somewhat practical way. In fact it became a mainstay not in the first spacecraft but in the second generation.

WEST: I have the dates on all of that. But I guess that was what I was trying to get at...

VITERBI: The term bio-orthogonal that I coined. It just seemed like a natural, it was an obvious thing.

WEST: But it was essentially a flavor of Reed Mueller coding.

VITERBI: As it turned out yeah, that’s correct.

WEST: I guess the point I was trying to get at is in reading your work, I haven’t looked at ’65 and ’66 stuff, but certainly in the JPL stuff before you graduate you are not really quoting, citing, immersing yourself in the MIT stuff, it doesn’t seem to come until...
VITERBI: No, I was doing mostly phase lock loops. I was doing communication circuits. It's the first book essentially.

WEST: Right.

VITERBI: One-way of putting it in 1960 there was a huge gap between theory and practice. Practice was filled, not vacuum tubes but it was plain old analog radios and very more than that. We were just scratching the surface of digital and even the digital engineers didn't understand channel capacity, and now it's in every system. It took a long time. It took over four-years. Well, not quite. That was part of my education, and my growing up. Another thing that I often cite is that the Gaussian Channel was almost ignored. There was some interest. The MIT, I'm not talking about the information theory crowd so much but more generally people like Jerry Wiesner who later became president was in the earlier days was head of RLE. They believe that just plain old Gaussian noise was not enough to describe this very messy channel. They talked about the fading channels and they really didn't understand fading channels like we do today. Even there there was a dichotomy. They didn't feel that information theory could work in the very messy channels. They were doing tropospheric prorogation ionospheric and so forth.

WEST: Well, a number of people remarked that it is fortunate that space so naturally...

VITERBI: Exactly, that is exactly the point that I was going to make. You've heard it before then by others as well is that the space channel was perfect as a Gaussian noise Channel. In fact we were getting these big antennas and lots of equipment we were able to get the thermal noise temperature down so that was all there was and it was a perfect Gaussian Channel so we were able to push the theory that already established into this channel and now even though there are is multi-path and all of that it all comes down ultimately once you clean up the first stages of the equalization and so forth it comes down to the Gaussian Channel. There was
space then that really made us aware that was the last frontier if you will, the one where the
theory would actually apply. We were able to get planetary ranges doubled by using this.

WEST: Well, I know you are tight for time, if you don’t mind there were a couple of
ambiguities in sort of your early biography that I was trying to get at. Bob Fano said I could
just read your biography not realizing that most people don’t read Italian.

VITERBI: It’s an Italian biography. So he read it.

WEST: I actually typed in sentences in on Google Translator.

VITERBI: That went way beyond. This is the original.

WEST: This is you meeting your wife.

VITERBI: Well this fellow he is very flowery. He writes for Italians. It’s all accurate. Do you
want me to translate it for you?

WEST: No, no just to clarify. Who is the cousin that is mentioned?

VITERBI: His name is Alberto Finzi. On a Saturday morning a cousin, Alberto Finzi invites
him to the temple or a synagogue for the Bar Mitzvah of a 13-year-old Italian boy.

WEST: Yes, I got that. But is Finzi on your mother’s side then?

VITERBI: It’s on my mother’s side yeah except for my mother’s is a Luria, back to my third
cousin which is Salvador Luria whom I never met. The Luria family was a Piedmontese Jewish
family, it goes way back, but is unrelated to other very famous Luria families that are Eastern
European, and even there was a very famous rabbi in the 15th century, unrelated. So, my
mother was a Luria and her sister Laura Luria married Flavio Finzi who was a chemist and
miller. He owned mills around Rome and had two sons Alberto and Franco. So, Alberto was my first cousin. It was the first one of our family who came to the United States.

WEST: When did you come?

VITERBI: About six-months before we did in early ’39.

WEST: And so did the rest of the Finzi’s come?

VITERBI: No, no his brother came just before the war, and that was it, and his mother, my aunt Laura.

WEST: So, is this a big factor in why you end up in LA rather than San Francisco?

VITERBI: Yeah it was a significant factor. I thought LA had more opportunities frankly. I interviewed with Lockheed in San Francisco was not at all impressed, I mean a big aerospace. The only ones that impressed me were Hughes, TRW and JPL and I picked the right one because it was more research even than the others. I was very naïve as one would normally be at 22.

WEST: So you are coming out in this story...

VITERBI: This was the year before we came out to just get the lay of the land.

WEST: So you weren’t actually job interviewing at that time?

VITERBI: I did briefly, I did actually made contact with TRW but I wasn’t serious. It wasn’t until the following February that I came out and interviewed with all three I think. So, we came out just to see what it was like.

WEST: We being your whole family.
VITERBI: My parents and I, and my father was pushing almost 75. My mother was in her early 60's. It was time for them to get out of the cold and ice. So, I met my wife there. The fact that her name was Finci, but had not been Finci really for, it was a mixed up thing. They obviously had gone through Italy, probably Padua in coming out of Spain in 1492, probably been there a few generations enough to pick-up the name obviously, and then they went to Sarajevo. In Sarajevo there is this mix between Latin and Cyrillic alphabets. So, when the Austrians came I would I imagine Finci was spelled with a Z but going back to the Turkish Empire it was with a C and after it was Yugoslavian it was with a C. The only reason—it's just a shaggy dog tale really but, but really quite a coincidence, the only reason that my cousins found them was that my cousin Alberto he is still alive at 96, believe it or not but he was looking for Finzi in the phonebook and they at that time was spelled with Z because when they came to LA there was an uncle who had come here back in the 20's I think and had spelled his name with a Z. So, first they say, well we shouldn't be in the same family you spelled with a Z. But then they changed it actually it was her brother when he got drafted into the Korean War. He went in and spelled it with a C. So, they became Finci with a C. But during that one-year or two in the phonebook they were listed Finzi with a Z and that is how my cousin found them.

WEST: How did he find them?

VITERBI: He was looking in the phone book and he saw this Finzi...

WEST: He called them up.

VITERBI: He didn't even do that. He went to their house. And he said, “Are you Italians?” They said, “No we aren’t but we spent a lot of time in Italy.” They had practically grown up in Italy and then they become friends. They said, “Come visit us anytime,” and they did. He was living actually in a trailer in Pacific Palisades.
WEST: Did he know Erna before you...?

VITERBI: Yes, so they had become friends actually both brothers and their families, their wives especially had become friends of Erna's mother and Erna, and so they had known each probably a couple of years maybe more when I came out.

WEST: So, you saw Erna for the first time...

VITERBI: In synagogue yeah.

WEST: And then you start dating.

VITERBI: We dated after I came out permanently. Well actually went out with my cousins and they said, “Wouldn't you like the girl along.” I said, “Well, if you can get her yes.” So, this was when I was interviewing in February. Then I came out in June and within a few weeks we were dating, and within three-months we were engaged. So, that is the history.

WEST: That is roughly what I gathered.

VITERBI: And that is what is all in there.

WEST: Yes, so when did you get married.

VITERBI: In June of ’58. A year after I got here.

WEST: And when you came out, you came out with your parents in a car.

VITERBI: Yes, we drove across in seven-days. And the cousins were very worried that my parents, my father especially that it was too rough on him.

WEST: When did your parents die?
VITERBI: My father in ’66, so he was here nine years before he passed away, Hodgkin’s
disease. My mother lasted another 20 years, well she was younger. But she passed away
in ’86.

WEST: So, she actually relocated down here with you?

VITERBI: Yeah she came down to San Diego, under protest. She thought it was crazy. Erna
took it well. We had reasons. She understood it quite well. But my mother didn’t like it at all.

WEST: What giving up the professor or moving to San Diego?

VITERBI: I don’t know, the fact that we moved down here. Well, she was by this time, this
was ’73, she was born in ’94. She was almost 80. She enjoyed it much more here. It was much
nicer than LA. Although we were on the west side it wasn’t all that bad. We found her a lot of
Italian friends so her last years were much brightened by the friendships she made. My wife
is still very friendly with all of the—they were much younger women than her [my mother],
especially one who was from her town in Piedmont. It was a very small town.

WEST: Her town being your mom or your wife’s town?

VITERBI: My mom’s town, actually the town next, but within three kilometers.

WEST: Now there is a suggestion in your biography that there is some financial pressure on
you both at MIT and USC, that some of your education choices were because of finances.

VITERBI: Oh sure absolutely. My father was an ophthalmologist. He was very comfortable,
never rich but very comfortable.

WEST: In Italy.
VITERBI: Yes. Being white collar in the 1920’s and 30’s it meant an awful lot. We had maids, and I had a nanny and all that sort of thing. We came to the United States with just barely enough money to get—well a Visa was a story itself. I won’t bore you with the details, but we had just enough money. You had to have $5,000 per person, which at that time was a lot more than it is today. So we just barely scraped it together and got in. It took him a couple of years to get his, he was 60-years-old he had to get his license by taking all of his medical boards again. He passed them in Massachusetts very much to my good fortune and we moved there in ’41. His practice was mediocre, I mean financially very mediocre but it provided sustenance during the war years largely because a lot of the young doctors had left to go into the Army. He had mostly an Italian clientele on Commonwealth Avenue in the best part of the professional area. In fact we lived about a block away because we never had a car. That was not because of finances as much as that we never a car because in those days you didn’t in Italy. Then after ’51 the practice had really diminished. It was not unusual to have your office in your home so we got a slightly bigger apartment a little further west, still Boston but almost on the Brookline border if you know that area, and he had his office in the home but the practice was very limited. So yes it was—and when we came out—so that is why I didn’t go for a PhD. There was not the means. I was a co-op student which helped a little bit.

WEST: Didn’t help much.

VITERBI: Well, it helped. I put the money into the family. But after we came out I still was helping my parents, and then I got married, and then we had two kids so obviously while I was going to USC I couldn’t go full-time. Otherwise I would have gone to Cal Tech, but Cal Tech would not take a part-time student at that time, or even today I think. So, USC was very convenient for me and it gave me the union card to go be an academic. You know about that.

WEST: Right.
VITERBI: That is what I wanted to do. That was my dream is to become a professor. I had a very high respect for my teachers not only Bob Fano but Ernst Guillemin and Frank my Physics teacher and on-on-on, Sam Mason. I don't want to get nostalgic here. That was my goal to be like them. That is what I did for ten years. Then the entrepreneurial bug and some colleagues and it wasn't just Irwin, it was a guy named Len Kleinrock, you probably know him.

WEST: Yes.

VITERBI: Some consider him, he himself also, considers himself a father of the Internet, a very bright kid. Kid he's older than I am actually, but very productive, very capable. But we started and he got involved in the DARPANET which later became the Internet, morphed ultimately into the Internet.

WEST: So, you knew Len better than Irwin did?

VITERBI: Oh yes much better. Well, except they had been at MIT together. But Len and I started at UCLA the same year in '63. He had just come out from MIT. So, we socialized. I think I had known him a little better, maybe but he had known him back at MIT.

WEST: You cite him in your Viterbi Algorithm papers as having read it and giving feedback.

VITERBI: Yeah, that is correct. He had listened to me anyway.

WEST: Was there a cultural thing here? Here we've got three Jewish boys from the northeast who went through MIT, all of whom start a company.

VITERBI: Is that unusual today? It would be three Chinese kids from Tsinghua University.

WEST: Or Berkeley.

VITERBI: Or Berkeley.
WEST: There was one other question were you born Andrea or Andrea Giacomo?

VITERBI: Andrea Giacomo that’s right. Giacomo was my grandfather who had passed away my maternal grandfather who had passed away recently. We had a funny, never mind its trivia, is how I chose James. Initially I thought for Giacomo a better translation was Jack, but then in the Latin school catalog that year it wasn’t even official yet because I didn’t have citizen papers until 1948, although my parents, I was derivative but I didn’t need citizenship papers until I got a passport. I needed a passport to go to Italy in ’48. So, we put down Andrew Jack and it came out Andrew Jackson. I said, “Well, I respect the President but I don’t want to be Andrew Jackson,” so we decided to make it James.

WEST: So you actually are not Andrew until ’48.

VITERBI: Officially, well yes and no. My parents had the good sense when they put me in kindergarten in New York to put it in as Andrew. I don’t think they even listed a middle name, Andrea could you imagine especially in those times. So, on school records I was Andrew well before there were any official government records. The first official government records were my citizenship papers, and the citizenship was granted to me, I actually went before a commissioner, not a judge but a commissioner who had me swear even though I was 13-years-old had me swear allegiance, and it even says on the paper no longer any allegiance to a foreign government etcetera. So, at that point it was listed as Andrew James. I always took that as my official paper which it is.

WEST: And your kids were ’59, ’61, ’71?

VITERBI: Correct.

WEST: So, Audrey must have been quite a prodigy then if she graduated...
VITERBI: She graduated with two degrees at age 19. Well, she had finished high school at age 16. Her Bachelor's in EE and Math was in ’79.

WEST: Did she take classes at UCSD when she was at...?

VITERBI: Yeah she was taking them in high school already. Her last year at La Jolla High I think three of her courses were on campus at UCSD. So, she came in with a big head start. She got admitted to Cal Tech and MIT. But she didn't like Cal Tech. I don't blame her. It's smoggy.

WEST: Why do you say that?

VITERBI: It's smoggy and also it had a bad reputation of the kids working all of the time. We would have gone along with Cal Tech. MIT was too far away and she was 16-years-old. So, she ultimately went to Berkeley at 19 which was okay.

END INTERVIEW
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The San Diego Technology Archive (SDTA), an initiative of the UC San Diego Library, documents the history, formation, and evolution of the companies that formed the San Diego region’s high-tech cluster, beginning in 1965. The SDTA captures the vision, strategic thinking, and recollections of key technology and business founders, entrepreneurs, academics, venture capitalists, early employees, and service providers, many of whom figured prominently in the development of San Diego’s dynamic technology cluster. As these individuals articulate and comment on their contributions, innovations, and entrepreneurial trajectories, a rich living history emerges about the extraordinarily synergistic academic and commercial collaborations that distinguish the San Diego technology community.