JEFF HAWKINS
ORAL HISTORY

COMPUTERWORLD HONORS PROGRAM
INTERNATIONAL ARCHIVES

Transcript of a Video History Interview with
Jeff Hawkins
Founder, Chairman and Chief Product Officer
Handspring

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Executive Director, Computerworld Honors Program

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Early Inventiveness

DSM: Tell us a little bit about your parents and family.

JH: I was born in Huntington, N.Y., which is on the north shore of Long Island in June 1, 1957. Grew up right at the border of three towns: Centerport, Northport, and Greenlawn. If you find the intersections of those three towns, that's where my house was. My mother was from German-born immigrants. She was born in the States, but her parents were born in Germany. She was a single child. My father was also a single child, raised by a single mother, which was very unusual in those days. She was a professional librarian, a medical librarian in New York City. My grandmother, that is. My father and mother were single children, and they had three sons. I'm the youngest of three sons.

DSM: You knew all of your grandparents?

JH: Actually, I didn't. I didn't know my grandfather on my father's side. He was alive much through my early years, but she totally erased him from her life. So really there was almost no mention, record, anything of him in my upbringing.

DSM: Other relatives or members of the family?

JH: It was a very small family, since I had no aunts or uncles. It was a pretty insular family. I have a fair number of cousins on my father's side, going way back to pre-Revolutionary War days, from upstate New York and lower Vermont. We'd go to family reunions up there. The Rudd family. There's a huge genealogy of the Rudd family going way back to the 1700s. So they're the only extended family I have. On my mother's side, there were relatives in Germany, but we rarely saw them.

DSM: What is the first place that you really remember as home?

JH: As home? Well, I grew up in the same house all my years and it was what I viewed as home. It was a very old home. Basically, it was a 1860s house that, although my parents had done a lot of work on it, I don't think it really was at all modernized. We had almost no heat in the house. There was a steam furnace, but it barely worked. I think my parents were the only ones who ever bought one. It stopped working right after they bought it and the company went out of business. So whenever we wanted heat, we had to take this vacuum cleaner and put it over these little vents and get these things to spin around and try to get the heat to come out.

It didn't work, so generally the house stayed about fifty-degrees in the winter. We would warm it with the fireplace, and we had very little hot water. Seemed like a great home as a kid; you don't really notice these things, right? It was a very small house and generally needed this repair most of the time.

DSM: So three brothers all in the same place?

JH: Three brothers, all in the same place.

DSM: All in the same room?

JH: Well, not quite! It was a very small house, as I mentioned. My father converted the attic, but it really wasn't big enough to convert. So we had three semi-rooms in the attic, but they were so small that I had no windows in my room. I didn't have a door either. My room was, basically, double the size of a twin bed. That was the entire size of the room. It was three of us packed up there, in a fairly hot attic in close quarters. But I had a great childhood. It was fun. That's just the way it was.

DSM: One of the things we like to ask about childhoods, are there any stories families like to tell about early signs of things to come?

JH: Do you mean about my future career?

DSM: Well, early influences for your future career, seems that you had many, with a grandmother who is a librarian and a Dad who is a scientist…

JH: We can talk about my father, if you want, because definitely we lived in a house that reminded me of the movie and the play, *You Can't Take It With You*. I don't know if you know the story. It's a crazy house and all; they have explosions going on in the basement and people running around all the time. That was my house. I recognize that.

My father was a consummate inventor, so he always had projects going on. To give you an example, he built a garage next to the house. The garage was nicer and warmer than the house, literally. So we would all be in the garage all the time, working on his projects, if you wanted to stay warm. That was how it was. We had a basement, too. Literally, we had all these chemicals, and machines, and tools and as a child, I grew up in an environment where we were always building things and taking things apart, and building machines, a lot of mechanical stuff, not much in the computer and electronics areas.

DSM: I was going to ask you, was it chemistry?

JH: It was a bit of everything. I was one of those kids who was very curious about everything. So I wanted the chemistry set; I wanted the trains. But we had a lot of machines around the house. One time I counted seven cars there. So we were always taking them apart, rebuilding engines, making go carts, and things like that.

There's a theme of boats in our family, so we could get into that, if you want. We started building floating things, so we had all sorts of floating stuff. I spent a lot of time working on an industrial sewing machine when I was a kid, because we had to build these big, rubber fabric skirts for these air-cushioned craft. So I got very good at sewing. And we had a lot of chemicals. We used a lot of polyurethane foam, which is a two-part foam, and I don't want to get into it too much. But when you mix it together, it gets very hot and expands and gives off poisonous gases. So we did a lot of this. We had a fifty-five gallon drum of this stuff in the basement. It was leaking down there, really awful probably from your health point of view. I can't remember what the actual poisonous gas that it gives off-hydrochloric fumes, or something. One night we were having dinner and everyone started to feel woozy and smelled a strange odor. We went downstairs and the foam was going crazy in the basement. I'm not sure that this foretold what my future career was going to be like, but that's sort of what it was like at home.

DSM: You were never at a loss for things to use for the science project.

JH: No, I guess not, although we never really did do science projects. It was more that we worked on whatever my father was working on. It was almost like a job.

Modeling the World

DSM: Tell me about starting school. How old were you when you started school?

JH: I was typical. I went to preschool. It's strange; I just communicated with the people who ran the preschool. They remembered my parents and me very well and it's funny that they do. Nothing unusual there. I started kindergarten at age five. I went through the normal number of years. I went to a public school, sort of a middle/lower class public school.

DSM: Did you know how to read before you went to school?

JH: Yes, I was a pretty early reader.

DSM: Did you learn from your grandmother?

JH: My mother was a teacher. She taught before she had children, then she taught again after she had children. While she was raising us, she was a substitute teacher. I'm sure a lot of it had to do with my mother teaching us to read. But I read at a very early age.

DSM: When you were a little kid, did you have child fictional heroes or role models?

JH: Not too many. For some reason I wanted to be a physicist, even before I knew what the word was. I'm not sure how that happened, but I have a very distinct memory when I was very young, "Boy, I want to be a physicist!" And I really didn't understand what physicists did, but I must have had some inkling about people who did physics that that was a cool thing to be. I think it's all about figuring out how the world works.

At a very young age, I became very interested in all aspects of understanding how the world works. I wouldn't take what anyone said. I would listen to what anyone said, but I formed my own opinion. This was a problem when I was growing up. It was all a matter of: "I'm going to figure this out. I can't trust everyone. I can read everything I can, but…." My brain was such that it would just strive to model the world and understand it.

I'll tell you a little story about this. My mother thought I had hearing problems. Several times she took me to the hearing doctor to check my hearing because she would say something and I would hear something completely different. Literally, I would hear something different. I understand it now better as an adult because I had my own internal expectations of what she was supposed to say. What she should be saying; what the world should be like. I'm modeling the world, the world is supposed to behave this way; therefore you should be saying this now. And I would actually hear what I expected to hear, and not what she would say. So this is sort of a theme in my life as a child: very curious, always wanting to see the world, always modeling it in my own way, and not necessarily listening to other people.

DSM: So the intuitive patterns….

JH: Exactly. Figuring out how does the world work, intuitive patterns and generally ignoring a lot of what people said, because at a very early age, I remember even before kindergarten, I formed very strong opinions about religion, and about a lot of things in the world which just seemed illogical. To give you an example, people used to say: "Well religion…." And I was brought up in an a-religious house; religion wasn't a part of our life.

But I would listen to people's different stories about their different religions. I quickly surmised, if all of these people disagree, well either all of them are wrong, or one of them is right and the rest of them are wrong if they can't agree about things. So I immediately said, "This is a suspect area. I should be careful before I tread into this area. Maybe just being agnostic about it all is the right thing to do." I remember having that discussion in the preschool grounds. People couldn't believe it. Kids would say, "You must be some religion!" I said, "No, I don't think so." They said, "You must be something!" You know, these are little kids talking.

DSM: Any best friends before you started high school that made a difference?

JH: I have had a very, very close friend at different stages in my life, very few, though. Generally, I got along well with everybody and everyone generally liked me, but I did not come close to many people. I had a very close friend from Kindergarten through fourth grade. I had a very close friend from there through eighth grade. Then I had a smaller group of friends through high school.

DSM: You talked about being in touch with preschool folks, but were there some teachers that really made a difference early in your life?

JH: No, not early in my life. I thought about that question. I couldn't really think of any teachers that made a difference early in my life. There were a few in high school that left really strong impressions upon me.

DSM: You started high school in a pretty interesting time: 1973, 1974?

JH: Yes. I'd have to think about that. That's probably about right.

DSM: The Vietnam War, Nixon…

JH: I was sort of at the tail end. My older brother was the radical in the family. He published a newspaper called *Dog Breath*.

DSM: How much older was he?

JH: We're each two years apart. My middle brother, Jim, is two years older than me and my eldest brother, Robert, is two years older than him. Robert was the radical, the one always getting into trouble. He published an underground newspaper called *Dog Breath*, which was published throughout Long Island. He kept getting expelled from school because of that. He was a character. He and the principal at my high school really didn't get along well at all, and mostly because of this newspaper he kept publishing, which basically promoted information about sex, contraceptives, and about political things. Things that today would not be considered radical.

DSM: Today he'd get a medal.

JH: Maybe, but back in those days this was really something else. But I didn't participate in any of that stuff. So we were sort of on the end of the seventies, the radical sixties/seventies thing. That was him. I sort of just slid through without participating in all that.

"The Weirdest Thing You'd Ever Seen"

DSM: You did have some adventures in high school. Couldn't pass up you telling that story about the hovercraft.

JH: This is a big thing in our life. Starting about 1962 or 1963, my father built this large air cushion craft. It wasn't a hovercraft to be technically correct, because it didn't push water off from underneath it, but it floated on this bubble of air. It was the weirdest thing you'd ever seen. Very strange. It looked like an outer space craft. It was round, it had these eight legs that dropped down, you could bring it onshore on this bubble of air. You'd drop the legs down, lock them and then you'd take the air out of the skirt and then it would be standing above the high water mark and you could bring it up on any beach. You would have this drawbridge that would go down, and so on. My dad built this kind of on a whim. He had justifications for it, of course. And he was trying to sell the idea to the Navy, and he thought he could do everything. But basically he took the family's savings, and everyone else's savings he could find and he built this thing. It was built in a shipyard on Long Island in Oyster Bay, called Jacobson Shipyard. Every weekend we'd be down there, playing around this big old shipyard and we'd be building this thing.

Later on, we sold it to numerous people, but eventually it got sold to an orchestra, the American Wind Symphony Orchestra out of Pittsburgh. They basically had concerts on the water. So they had a barge on the rivers near Pittsburgh and they wanted something for New York. The whole family and other workers converted this thing into a stage. This was a fifty-piece orchestra! It was great! It was a huge endeavor--the whole thing. The boat was not that big; it was fifty feet in diameter, but it was impressive. When you got this orchestra up there, there was great music and we had another boat that we usually shot fireworks off of and we'd tour. Every two nights we'd give these free concerts. We'd tour around Manhattan and up the river all the way to Albany. And it was on the Connecticut shore and it was just a gas.

I worked one summer on it sort of as the first mate crew type of thing because they needed someone who knew how to use this boat. We had a professional captain. We got into trouble, so maybe the story you're alluding to is…we got into lots of trouble. But the one story you're talking about, we were coming down the Hudson towards the Town of Manhattan; the East River joins it, right? The current's going down. You can go down the west side of Manhattan on the Hudson, or you can go down the east side on the East River. The East River flows backwards, so when the Hudson's going out, the East River's going up. The Captain turned this corner and I don't know what he was doing, but he just got it wrong. He ran into this railroad bridge right at the tip of Manhattan. We didn't damage the railroad bridge, but we really whacked it, and so they had to inspect it. So they had to stop the traffic on that railroad bridge, which was commuter traffic. They stopped the traffic for a number of hours while they inspected it. The Captain threw a fit and there were all these stories like that. It just went on and on and on.

DSM: One of the questions I was going to ask was, it sounds like it was very exciting growing up with two brothers and all of the stuff going on in the basement. But as a teenager at the time, was it as much fun as it really sounds like?

JH: No, well, no as a teenager…First of all, I think as children growing up you don't really have any perspective to view your life. You don't have a perspective of understanding what place you have in society. You don't have a perspective of what other people's lives are like. I didn't view it as a lot of fun all the time; it was a lot of work. And when things went bad and the boats crashed, it was like "Oh no, here we go. We've got to work on this again. Oh man, I can't believe this is happening." Business is like this, too, you know. In the middle of it, business can be a pain. It's always problems, problems, problems. Ten years you look back on it and it seems like, "Weren't those great days." Right? But when you live in them, it's hard. So as I child, I didn't view my childhood as anything great. It was like, "Gee, we have all these problems and issues. Why can't I have a normal life?" But in hindsight you can see how it influenced you and how unique it was.

Receiving the First BRA Award

DSM: In high school, you were going to talk about some teachers that really made a difference.

JH: You were going to ask about them, so I can tell you, and there's a few. Generally, though, the teachers in my high school were not really inspiring. Again, that's not something you really know until you get back and see it later and you say, "Gee, maybe I was smarter than they were."

There were a couple that I really did enjoy. One was my Advanced Physics teacher named Mr. Harrigan. This was when I was a senior in high school. I immediately understood the material. He looked at me and he said, "You don't need to be in this class. Why don't you just go do these projects? " And he just gave me projects to work on and people to tutor, and so on. And I thought, "Really? I never even thought about doing something like that." He immediately said, "You don't need to be sitting through this."

DSM: So you didn't follow the textbooks chapter by chapter.

JH: He was a fun teacher, but he just felt I didn't need to be sitting through it. So I enjoyed that because he gave me fun things to work on. He'd say, "I have this machine and I haven't been able to figure out how to make it work yet. Why don't you go figure out what to do with this thing." So I would go do that, or I would teach some other students, which I enjoyed. I would have enjoyed sitting through his class, too, but the fact that he was the first guy, it was the first time in my life where someone said, "Hey, you know what? You don't need to do this. You can do what you want." It was like, "Gee, I never thought about that before." That was fun.

DSM: And you could get credit to do it, too.

JH: Yes, sure! When I graduated from high school, you know, they give these awards to people. And I got a bunch of awards, some math awards, whatever. All the science teachers got together. I wasn't the best of anything. But I was sort of this all around guy. So they made up this thing that was very humorous. They made up the BRA award, which was the Biophysics Research Associates award. And they had funny commentary to go with the award, for uplifting support, and other chest and bra analogies. This was pretty radical back in those days. The teachers put this thing together. I thought it was very funny. Basically they said I was a fun guy and knew a lot of science and that they liked me.

Going with The Flow into Electrical Engineering

DSM: Tell me about choosing Cornell.

JH: Again, not a lot of foresight in my early life here. I kind of went with the flow; I didn't plan anything out. I was a happy-go-lucky kid.

DSM: Had your Dad gone to school there?

JH: No, he hadn't gone to school there. Essentially, I went to a New York school because I had a New York scholarship. Money was tight, and that helped. I considered going to MIT, but I had a couple of criteria. One criteria was I was going to study engineering only because that's what my father studied and we had been doing engineering.

I hadn't thought about it much. A New York school was best. I also wanted one where I could study music theory, because that's the thing I wanted to do.

DSM: Did you play?

JH: Yes, I played and sung. I was sort of a Jack-of-all-trades, not really great at anything. I'm still like that.

DSM: What did you play?

JH: Back then I played various things. In high school I played trombone, a little bit of tenor sax in the jazz band, and then I played baritone horn in the orchestra and then I sang in four different musical groups. I was in between tenor and bass, so I would make it up as I went along.

DSM: Do you have tapes?

JH: Of me personally? Oh, I don't know. Maybe there's some someplace, I don't know. I loved music, but I wasn't really that good at it. I wasn't one of these people who studied carefully and really worked at it. I just liked it and I wanted to play.

That was my other favorite teacher in high school, Mr. Simeon, who was the choir teacher and he played one hell of a piano. I just loved that guy. He was so much fun to hang around with. Going to his class was like going to a nightclub or something. You just listened to someone play music all of the time. What was the question we were talking about?

DSM: You were talking about why you chose Cornell.

JH: Oh yes, "Why Cornell?" It was a New York School. I wanted a fairly big school, which gave me a variety of things. I wanted music theory especially. I looked at New York schools and that seemed like one of the best. I didn't want to be in the city.

DSM: You went to public high schools. Cornell was a big change?

JH: You know a lot of people hit a wall when they go to college. They were really great in high school, but they struggled in college. In fact, my roommates were two other high school people that I knew. It was another guy's idea that we room together, and I said, "Sure, why not," so the three of us were roommates together. One of these guys had better grades in high school than I did, but he hit the wall when he got there. He almost flunked out. He dropped his engineering curriculum.

I just kept going with the flow. It didn't really stop me at all. I never had any problems at school; I never had to work hard at it. I never really worked at it at all. I'd do my homework; I'd do this and that. The same with college. I did well. I got good grades, generally very good grades, but it wasn't like I was obsessed about them. I wasn't really concerned about them. I just did what was fun and tried to meet the requirements.

DSM: It sounds like you were more interested in the subject matter itself.

JH: In all honesty, at that time I was, and I think Cornell is different now, at that time the engineering school really wasn't that good. I had very poor coaching and they really didn't make it very interesting at all. I ended up gravitating to all these other things. My favorite classes with agricultural engineering, organic farming, you know. I had a terrible experience in the music school, there. Just awful.

I met my wife there-my then to be wife-right in freshman orientation. We did a lot of fun things together. So I loved to go around and sample all the different colleges at Cornell and do the different things. The engineering work was actually pretty boring and I didn't think it was very inspiring at all.

GSM: So you never considered graduate school at all?

JH: No, mostly because being brought up in a, well I wouldn't say we were a poor family because we had a lot of rich experiences, but we never had any money. The idea of continuing on in college, which was very expensive, it didn't seem like it was the right thing to do. I might have done it if I felt that the financial issues weren't important at all, but I felt they were somewhat important. I worked through college to pay for my college, but my parents chipped in a lot, too, and I knew it was hard.

DSM: You got out of Cornell in 1979 with a B.S.

JH: A B.S., in electrical engineering, and I figured I guess I have to get a job, right? So I interviewed at HP, TI and Intel. A little story you didn't ask, but I'll tell you anyway, why did you get into electrical engineering? I actually wanted to study alternative energy sources. I said, "That's an interesting field. I think we're going to have an energy problem here in the future." My father didn't discourage me. My father didn't give me much advice in life. Occasionally he said things and one time he said to me, "You know what? This microelectronics stuff, that looks like it's very interesting. It's the wave of the future. Why don't you go learn something about that?" So I said, "OK, I'll take some classes. I'll do electrical engineering." Of course when I got to Cornell electrical engineering, they really didn't really have a big electronics thing. There was still a lot of old electrical engineering, like power systems, power plants, and all this kind of stuff. I was in the last class that went through the old way of teaching electrical engineering.

How did I pick Intel? It seemed like a fun place. It was in Oregon, it seemed like it was more computing microelectronics, and I said, "These guys have just invented the microprocessor." The 8080 was still fairly new. I said, "Yeah, that sounds kind of fun. I'll get to go to Oregon, that will be fun." So I went there.

An Explosive First Impression at Intel

DSM: Who hired you?

JH: A guy named Juris Brempelis. He was a Latvian. He's wild; he's crazy! I like Juris, so it's all right. I remember when I went out to Oregon to look for a place to live, I was with my wife, Janet. She and I lived together during college. We didn't get married until a number of years later. She wasn't moving with me because she lived in Cincinnati at the time, but we were still together. So anyway, she went on this trip. It's the first time she meets Juris. I wanted to find a place where I could take the bus to work. So Juris says, "Wait a second! Wait a second! You don't want to stay…. This is Oregon! You can't take the bus to work. You've got to get a pickup truck, you've got to get a gun rack, and you have to be into wife beating." I couldn't tell if he was serious or not. He was a character, though and he had said it all in jest. He was a wild guy. I think he just liked me and was saying, "Why don't you come here and do something."

DSM: Had you and Janet ever been to Oregon before?

JH: No. This was our first time. I went there for an interview, but this is the first time we went there together. The first day we got there, Juris meets us. We get off the plane and this is like the first thing he says to Janet, about the wife beating. And we're thinking, "Okay……."

DSM: What did you work on?

JH: I was in the division that was doing the single board computers. We'd sell these to factory control systems and so on. Actually, I wasn't doing engineering; I was supporting field engineers. Intel had these field application engineers and I produced a little newsletter. I worked on problems. The very first thing I did, the very first hour I was on the job, I blew up a bunch of expensive equipment. They had these flash memories, which at that time were very expensive. They were this new invention. Chips were expensive; they were about $70 each, which was a lot of money back then. I was supposed to program these things. The very first hour, I put a bunch of these things in and turned the switch. I had them all in backwards. So it blew up. Juris comes back and says, "Oh. Not a very good start to your day, is it?" The first day of the job and I blow up several hundreds of dollars worth of chips and they're hard to come by.

DSM: Was your Dad really pleased that you were going to work for Intel?

JH: I don't think he cared. My father was not a mentoring father. He didn't really follow too much.

DSM: How did you get back to Boston?

JH: I met my wife the first day of freshman orientation before school started at Cornell. We lived together throughout our years at Cornell. She was an industrious eager beaver, so she got through high school in three years. She graduated college in three years, too. We lived together, but she left a year earlier than I did. She went to Cincinnati to work for Proctor & Gamble, but we kept our relationship going.

The next year I went to Oregon. So for two years we were separated. Then she wanted to go to business school at Harvard. I said, maybe I can go work for Intel in Boston. That was what I did. I told Intel,"I'm moving to Boston, do you want to give me a job there?" I got a job in Boston doing training, which is like a backwater, not really a great career choice. But I loved it because we were teaching classes. I was teaching weeklong classes about how to design microprocessors, how to do design microprocessor-based systems, and most of the people doing it were career educators. This is all they're going to do in life and this is what they did. I didn't want to do that. There were twenty different classes-these were weeklong classes. As long as I wanted to, I could teach another class.

So basically for about two years, I just kept teaching new classes each time. Some I repeated over and over again but this was a great education. Instead of getting bored, I said, "OK, I'll teach the next one, a different one." Provided I'd done it right, I taught everything, once or a couple times. Some of them were really hard, so they would then give me the really hard ones to work on.

DSM: Wasn't it like teaching when you were in high school? You never thought about being a teacher?

JH: No. It isn't that I like teaching; I like the learning. What was great about that job, was that it taught me how to get up in front of a group of people, who were sometimes hostile, and deal with it. So it was a great education.

I had to give a class once on a processor called the 432, which was a failed really high-end experiment that Intel did. This was a really unbelievable computer science experiment that they did. It was extremely complex forward-thinking design; it was unlike anything that anyone had ever done before. I volunteered to teach it. I said, "Great. It's impossible to learn how to teach this thing."

Then the first class was bought out by the digital equipment Vax design team. So I had a class of twenty Vax designers-these were the senior designers at DEC-who came to learn what Intel was doing. And I was supposed to teach them as our customers. But they were totally hostile to me. They were basically ready to rip this thing to shreds. I was twenty-four years old, right? And I was trying to present this stuff, which is really complex. Really, this was almost beyond my ability. And I'm learning and as I'm teaching it, they're ripping it apart, and I'm trying to teach them the Intel line and why this is designed this way and they're saying "This is a bunch of baloney," and "It can't work."

So through this process I really learned how to control the crowd and how to talk. And to this day, I do a fairly good job of public speaking. And I think I learned this in that job. I also learned a hell of a lot of computer science because I just studied it. I'd read all the books and I'd read all the manuals. I would pour through them and then teach the class. To teach something, you've got to learn it. That was my computer education. I didn't get it at Cornell. I got it in those two years in Intel in Boston.

Off to California

DSM: Now that you describe why you were back in Boston, the timing of that shift of GRiD makes sense, was there a conjunction between your wife pursuing her MBA?

JH: Yes there was. So my wife is at Harvard Business School. She's doing very well there, but she doesn't really like it. She's not the type. She just doesn't like the whole corporate, this greedy cultural thing, which she felt was going on there. Towards the end, she decides to take an interview at this video game company, Atari, out here on the west coast. I said, "Oh it's California. Who wants to move to California? I like it in Boston." So she says, "I'll just take the interview."

She goes on this interview in Boston and says, "I loved it. If I get to interview in California, I'm going to go." Oh man, I didn't really want to live in California. But I said, "All right. Well look, if you're going to do that, I'll call my friend Juris," who's the guy who hired me at Intel. He's now working in California at this point in time. I'll call up Juris; he's at this start-up company called GRiD, and ask him what he thinks about working in California. This is sometime in March. I call up Juris and he says: "We need someone just like you right now. You have to take the job now. You have to be here in two weeks." And I say, "Whoa, whoa, whoa, whoa, wait!" He convinces me this is the job for me. And my wife thinks she may want to move to California anyway, so I have to leave early if I want the job. I have to leave, literally, March 21, 1982. My wife's still in business school.

DSM: Did you actually work for Juris?

JH: Yes, in the beginning there.

DSM: And what were you doing?

JH: Again, I was in the marketing department, believe it or not. I was doing similar type of stuff that I did at Intel early on. I was teaching people. GRiD invented the laptop. They created the first thing that you would consider a laptop. It even had a patent on the screen covering the display. This was really heavy stuff back in those days, 1982. And I was in charge of basically putting training materials for it. Not a technical position at all. It was teaching people how to use it, and creating course work, and so on. That was my first job.

DSM: Being able to talk about it so other people could understand it.

JH: I just went with the flow, too. Again, I hadn't really thought about my career too much at this point in time. I said, "This will be fun. I'll learn about this. This is a cool looking machine. Go to California. What the hell, you know?" But I very quickly fell into the engineering side of things there.

DSM: You were there for four years.

JH: I was actually there for ten years with two years off in between.

"Nobody is Doing What You Want to Do"

DSM: That's what I'm getting to, this decision in 1986. The legend has it that you have this day job but you also become passionately engaged in neuroscience research.

JH: The truth is when I got out of college in 1979, I fell in love with neuroscience. Mainly it can be traced back to a special edition of *Scientific American*, which I read religiously throughout my childhood. Always in September, they have a special issue dedicated to a single topic. And they had one on the brain. It was a classic, probably the best one they've ever done. They had all these stories about the brain and I said, "This is cool." What I really felt like was, there was a mystery here. The last story in that article was written by Francis Crick, who I have now gotten to know. Francis basically wrote a piece saying: "You know what? Despite all this data, all this information we have, we have no idea how this thing works." I said, "Wow! What a great problem." I thought, "That's a problem I make a difference on. I'm going to work on this problem. I know I can make a difference."

When I was in Boston, I tried to get into MIT. I was going to give up my career. This was the time of AI Lab-the Artificial Intelligence Lab. I went in there and said, "Look, this is what I want to do. I want to study brains and figure out how they work." And they said, "We don't believe you need to know anything about brains. It's a waste of time." We have some nice programs in computers." And I said, "No, you're wrong. You need to know how brains work." I said, "It can't hurt to know how brains work." And they just didn't believe it.

DSM: You were twenty, thirty years ahead of time.

JH: Well, maybe. I don't know. They said to just forget it, and I said, "Well, I'm not going here." So I was really disappointed about that. I was very just bummed out. When I was in California, it just never left me. In the evenings, I would study; I'd read. It got to the point in 1984/1985 when I just said, "I have to do this! I have to spend some time on this." It was compelling.

DSM: Were there other people you were talking to about this that aided and abetted your research?

JH: No, not really. I was basically doing independent study. I was reading veraciously.

DSM: Keeping notebooks?

JH: Yes, some. I kept notes. Basically, I'd read all these journal articles, I'd write notes on them and I'd read books and write notes on them. I felt that-I was pretty arrogant-I felt that almost everything being done, not in the field of neurobiology, but in the field of cognitive theory, was wrong. So you had the whole AI field that was totally wrong. You had the neural network crowd, which I thought was totally wrong. What I really felt you needed to do was study neurobiology and apply information theory to it. That was not a widely held view; almost nobody had that view back in those days. I'm sure there were a few, but very rare.

DSM: Why do you think that approach wasn't accepted?

JH: It was just internally obvious to me.

DSM: Why was it unpopular? What was the disconnect among the people you were trying to sell this to?

JH: Why do people do things that don't work out? This goes back to the very early experiences where I model the world and I don't listen to what other people say. I have my own model of the world, right? So everyone was saying programming and computers, Turing, the AI Labs, all this stuff. There were thousands of people working in this field and I just didn't buy any of it. I said, "Look, it's clear. This is the wrong approach." It was a difference of opinion.

I was young and I wasn't going to tell them they were wrong to their face. I just kept these opinions to myself. I said, "Gee, that seems stupid." What I've learned now is that science, like a lot of things, is a lot of promotion. There were some great people promoting who they were. They were just really smart people and they had great things and they had cool demos and they convinced a lot of people that this was the way to go. And they got all this government funding and all these university labs were created. Not for a minute did I believe that any of this was going to work out. I just said, "This is a waste. They'll see." I didn't have any animosity toward them. I just thought, "This is too bad."

DSM: And you didn't explore this at insignificant places. You went to Stanford. You tried to do this at Stanford.

JH: Yeah, we can talk to the history timeline. I talked to the guys at the MIT AI Lab, and they said, "You're wasting your time. This is not what we do." Then in the mid-1980s I was living here in Mountain View, California and I wanted to spend time on this. I was going to quit my job and study full time. Then I said, "If I'm going to study, I'm going to need access to a library," because you didn't have the Internet in those days. And I thought, "If I'm going to have access to a library, I'm probably going to have to enroll someplace and I might as well be part of a program. It will make it more legit and maybe I'll get some good advisors." I could talk to other people. This would be the legit thing to do.

But I did not want to go back to school. That wasn't what I wanted to do. I wanted to study. And I knew what I wanted to study. So I looked at Stanford, which is right in my backyard, and unfortunately Stanford had almost nothing in this area. At this time, they had almost nothing. They had a bunch of neurobiology, but no theory, no even biophysics. It was purely a void. They had three people in biophysics and it was all clinically related.

With Berkeley, it was very "loosey goosey." They had all kinds of crazy things going on there and lots of different departments. And I decided, "All right. I'll go to Berkeley," even though it was an hour's drive from home. So I got myself enrolled in a PhD program in biophysics.

All of a sudden, I had to take all the biology GREs etc. I had to basically do all this new stuff. I had been a computer scientist, you know. I just applied myself, did it, got in and started there. But it didn't turn out like I expected it to.

DSM: Tell us.

JH: First of all, how did it go wrong? I got in there, the first thing they did, and they wanted me to start taking a bunch of classes, which I had no interest in. They wanted me to take an organic chemistry lab. I was thinking, "I don't want to do that, I want to study neuroanatomy, neurophysiology. I want to take certain kinds of mathematics classes." And they said, "No, no, you have to get your language requirement done first, in French. Then you have to take your organic chemistry lab." And I'm saying, "Oh my goodness, this is not what I want to do."

So I had this little run in with the department there, about how can I study what I want to study? They ended up letting me do an independent study. I had to take organic chemistry, but I didn't have to do the lab. I tried to get my language requirement, but I failed.

Essentially, I hung out at the library. I took a great neuroanatomy class and I started hanging out with some neuro people. And basically I did this independent study. It was also pretty miserable because they didn't treat you like a human being. I had been working; I had a good career. I was well respected. And by this time, I had been doing good things at GRiD. I was a senior person there. Now at Berkeley, I had no place to park, they wouldn't keep appointments. You'd call in advance and say, "I'm going to meet you professor. Are you going to be there?" "Yes, I'm going to be there." You would show up and they weren't there. There was no place to make phone calls. You couldn't make photocopies. Then I met graduate students who were begging me to take their jobs so they could get out of there. It was like, whoa, this is really awful.

For my independent study I wrote a thesis proposal. I wrote a paper. In the process of doing that, I had some really great insights, really tremendous things, I think. I presented this to the chairman of the graduate group in neurobiology, and he thought they were pretty cool, but he had no idea of what to make of it. He just said, "This is really interesting. You really ought to do this, but you can't." He said, "You have to work for a professor and you can't do what you want to do. What you're going to have to do is work for four years, get your degree, and then spend two years as a post-doc, then maybe you'll get to study what you want." And I thought, "Oh, no, I'm not going to do this."

DSM: Nobody suggested that you could go someplace else? Like Cambridge, where it was a little more liberal?

JH: At this point in time, the advice I got was that there was nobody doing what I wanted to do. Now I'm sure there must have been somebody someplace, but he didn't know about it and I didn't know about it. They just didn't know what to do with me. So I said fine. I basically took a leave of absence, which allowed me a continuing access at the library.

So I took two years off, total-beginning to end-and in those two years I continued. In the first year, I spent a lot of time doing the "academic" thing, but the second year was spent doing independent study, on my own. I went to the library and studied. I felt I was making great progress, but I didn't know what to do with it. I just didn't know what to do with it. I felt I had discovered some really significant things, but I didn't know what to do with it. So I said to myself: "Look, it's not clear that people are appreciating what I'm doing or make sense. Maybe I'm wrong, I don't know. Why don't I go back to work for a few years? " I was starting to have a family. And if I make enough money I can afford to be a researcher again. Maybe I'll make a name for myself, because if I make a name for myself than perhaps I'll have some people listen to me a little bit more. I will definitely mature and maybe the field of neuroscience will mature a little bit. It will progress, because I assumed that it was inevitable that it would come around to these ideas I'm thinking like. So if I wait a few years, it probably will progress a bit more. I thought it'd be four years. It turned out to be like fifteen. Oh well.

Building a Reputation at GRiD

DSM: Your first daughter is being born now.

JH: Yes, 1988. She was born in 1988. That's right when I went back to work at GRiD.

DSM: Was Juris still there?

JH: No, I don't know if Juris was still there, because I wasn't working there.

DSM: Tell me about the transition…

JH: …at GRiD. Before I left there, I had transitioned to engineering. I did a lot of soft engineering work. I invented this programming language called GRiDTask, which was actually quite successful in a limited way that GRiD was successful. But it kept GRiD alive. It was sort of a third generation programming language.

We had all these people writing applications for it. I created this as a marketing tool and all of a sudden the sales guys were saying, "Wait a second! That's not a marketing tool; that's a product!" So it turned into a product, and I said, "All right, I guess it's mine."

DSM: This is the first time that this had happened, that a tool becomes a product.

JH: I don't know if it's the first time it happened.

DSM: For you.

JH: Yes, for me. Remember I wasn't trying to presuppose. I wasn't trying to do anything. I was this happy-go-lucky kid. I was doing this great tool-I felt like it was a great tool-and all of a sudden, they said: "That's important. We need to have it in engineering." And the marketing guys are saying: "No. You can't leave." And I said: "Well, I'm going to engineering."

Anyway, I had done this stuff and it was pretty important at GRiD. When I went back to GRiD, I came back to do a specific proposal, which was the GRiDPad. I decided I wanted to do a tablet-based computer with a handwriting mechanism and a pen. I did this while I was on a leave of absence from GRiD, when I wasn't there-when I was at Berkeley. I came back to them and said: "Look. This is the product I want to build." There's a story behind that, too. "It's a product I want to build. If you bring me on here, I want to be in charge of it. This is the relationship I want to have and I'll do it here."

DSM: I'd really like to talk about that because you were tasked to do hardware and the software side of this.

JH: Remember, I'm a "double E", right? Not a practicing "double E", and I know a lot of physics, so I can speak the "double E" stuff and I understood it. I was in charge of everything. I was in charge of plastics, the whole project, right? But I knew about plastics, and I know about glues and screws and I just know stuff. I just know a lot of things. People who meet me are surprised at how much I know a lot about a lot of things. And that's, perhaps, really unique.

I'll tell you the story-it's interesting. I was at Berkeley and this was the time that neuro network started becoming hot. And there were a couple companies formed to do these neural networks. One was Nestor. And they were trying to sell this handwriting mechanism engine for a million dollars. I thought, "What? A million dollars for this thing that I don't think is even very useful? I can do that." So I went home that night and created my own handwriting mechanism software. I said, "If they can sell it for a million dollars, I can do it better."

So I did it without using neural networks, using some of the math I was doing for the brain stuff. And I said: "Hey why don't we go with a tablet computer with handwriting recognition. That would be cool." And I could start seeing how people in the future would want to have more portable devices and I just started gelling it a little bit there. So that's when I went back to GRiD, saying: "Hey. I've got a handwriting mechanism engine. Why don't we put it in a product with a stylus? I'll build the whole thing."

DSM: They said OK.

JH: They were a little nervous about it, but I had a good track record there. It was really an unusual situation. I actually had a royalty agreement with them. I licensed the handwriting mechanism software, then I took a job, which was very unusual.

DSM: Were you looking at this primarily as a way to get back to doing brain research?

JH: It was. It was absolutely that. Remember I said I wanted to do something for four years that made some money, that got me a reputation as a well-known guy, that I got into a position where I learned more. I was going to learn a hell of a lot by building a product line. I was going to make some money off this royalty thing. I was going to do this; hopefully I'd be successful and make a name for myself. I was kind of lining up the ducks. And I thought it'd be four years.

I'll tell you another story that relates to the reaction to the product. When I was thinking about going back to GRiD-to the tablet computer-someone told me about this start-up company called GO. And they said, they were doing something like this, too. So I went and spoke to the GO folks: Jerry Kaplan and Robert Carr. They had just formed this company. They had five employees and I knew a few of them. And I said, "You guys are doing the same thing I'm doing. Great, I'll work here." It's a start-up company; I'll make some money as a start-up company, right? I interviewed there and they said: "Oh, we really think you're really a smart guy. But do you know what? We just want you on the marketing side of things. We're not interested in your handwriting mechanism software and we don't think you're really a good product designer. You can help out developers write software for this thing." I said, "I can certainly do that, but I think I am better than that." And I looked at their situation and I said this is going to fail. The first day I said, "You guys are going to fail." I didn't tell them this.

DSM: What was it that you saw?

JH: I saw a lot of hubris and a lot of inflated expectations. "We're going to change the world. We're going to defeat Microsoft. We have the best people in the world working on the handwriting stuff. We don't need your thoughts in this." And I would ask them, "Where's your business plan," and "How are you going to market this thing?" And they hadn't given thought to any of this stuff. Nothing! There was a vision but no meat to it. You've got to have vision, but you've got to have the block and tackle, too. They had none of that. I thought, "These guys aren't doing this." They're raising all this money, and they don't have the management team in place to do this. They're going to fail. I just said right then, they're going to fail. I'm not going to do this here.

DSM: Did you wife being in Harvard Business School have any effect on the business side? Or does this all stem from your Dad?

JH: Oh no. A friend of mine, Jack, gave me this advice very early in my career when I worked at Intel. He said: "You know, you really want to know about business, read a business magazine every week." He read business magazines. So I read business magazines; still do them every week. I learned stuff-you pick up patterns like company fails, company fails, company succeeds. Stupid thing, good thing. You just pick this stuff up. I don't know, it just becomes intuitive to you after awhile. It's like modeling the world; you just pick it up. You just watch what is going on, and I just watched GRiD struggling for all those years. I saw Intel struggling. So I just kind of picked up what made sense and what didn't make sense. Whatever, I picked up a sense of business.

DSM: What did your dad do before he did his boat thing?

JH: He was at Sperry Gyroscope and he invented a bunch of stuff. One of them was a thing called the Sceptron, which is another great story. The Sceptron was a pattern classifier. It was really cool. One of the things they did with it, they were using it to try and speak to dolphins. When I was in third grade, my father on the cover of *The Weekly Reader* with this microphone talking to a dolphin. This is my Dad, you know. So he invented this Sceptron thing, which got all this publicity. Then he quit his job and basically started spending all of his savings very quickly on these crazy things.

My wife said: "Hmm, maybe there's a pattern here. He's got a good job; he's quitting it." So that's another reason why I went back to work. I kind of had to prove it to her that I could make a living, too. Two years was running long on the lack of income. So I decided not to go to GO. I said, "This is going to fail." I said, "I'll do this at GRiD. I'm going to compete with GO, basically. And I'm going to do my own thing." And we did that.

It turned out that GO had all the splash and all the money and all the hoopla, but GRiD was successful. We were the only guys who ever sold any of this stuff and we beat them to market. It was really mundane. I said we're going to target vertical markets; we're going to do enterprise stuff; we're not going to try and tackle the world-very low key, mundane things. This was a very heavy time because a lot of people were talking about the future of computing and pen computing, and there were all these panels, and I gave all these talks. We were like the boring, practical folks. All of the other companies went out of business, though.

DSM: And you were doing usually GRiD editing?

JH: Pretty mundane things.

DSM: Pretty far from a personal, digital…

JH: Yes. You couldn't even buy one. If you wanted a GRiD computer, we wouldn't sell you one. If you had a business application, if you might need thirty or a hundred, well then we'd talk to you. There was nothing you could do with it as an individual. What I found out along the way is the people who were using it really were intrigued by it. People who got into it were totally enamored. And some of them said: "You know what? Could you make a smaller one that would be cheaper? Maybe you could make your own personal thing." I heard this enough that, I said: "You know what?" It clicked in my head that portable computing was the future of computing, and that maybe doing a small device would be the right thing to do. It wasn't necessary that it was a pen or handwriting mechanism device, but the idea that you would build a small, easier to use personal device that got me started when I was still at GRiD in 1990/1991-that's when I started thinking doing the consumer products.

A Crazy Ride to the Palm Pilot

DSM: The legend here is that in January 1992, Palm was started with no financing.

JH: We had financing. Here's the story. I wanted to build this thing, it's something I want to do and then I say what are the means to accomplish the goal? I never look at the means and say, what can I do with it? Never do that. So in this case, I started saying I want to build a consumer product that's a small handheld device. Can I do it at GRiD? That's the easiest thing to do. I've got a department; I've got people working for me. No, I can't do it at GRiD, because GRiD was focused on enterprise markets and it just wasn't structured properly. They wanted me to do this at GRiD and I said: "No. It's not going to work here. If we do it here, and it's a consumer product, it will fail."

Then I started. I would just talk to anyone about it. I wasn't being secretive about it. Anyone who wanted to talk to me, I would talk to them about it. I ended up talking to some people who had heard about this, and one of them-started to talk to a company called GEOWorks and one of their board members heard about this. He was a venture capitalist. Bruce Dunlevie. He brought me in and he said, "What are you working on?" I said, "I want to build this computer, but I really don't know how to do it." So he says, "How about you start a company and we finance it." And I go, "Well, I don't know. Starting a company sounds like an awful lot of work. People always get divorces when they do this. This seems really risky." He says: "No, it's really not so bad." So I said, "I'll think about it."

Another VC heard about this because I was brought in as an expert witness for a friend who wanted to start a company. This was Sutter Hill. My friend Chuck, who used to work at GRiD, was trying to start a new company. He said, "Would you come in and be a technical reference." So Chuck was trying to pitch him on this company and it becomes clear very quickly that they only wanted to talk to me. They said "No' to Chuck and said "You come back in." Sutter Hill said, "We want to fund your thing, too." And I said, "Well, I don't know." Most people are begging to get VC money and I'm sitting there going "Well, I don't know," which is the right approach to take by the way. It's successful in romance; it's successful in business, too. They were kind of convincing me to start this company, and I said, "All right, maybe we'll do it." I really wanted to do it at this point. I felt it was the right thing to do. We started it. I didn't have a business plan. But I did have $1.3 million in financing arranged by the time we opened the doors.

DSM: Who is with you at this time? You hadn't hired Donna.

JH: No.

DSM: Did you even know her?

JH: No, I didn't know her. I had two engineers. One was an old friend of mine, Art Lamb, who worked at GRiD. The other one was this young guy, who had worked at GRiD during the summer. He was still a student at UC Santa Cruz and I really liked him. His name was Ian McKendrick. I thought, "There's no way in the world that Ian is going to quit school." But I called him because maybe he has some friends who are just like him and he's really great, and if he knows somebody who just graduated, maybe I can hire that person. So I called Ian, and I said: "Ian, look, I'm not trying to recruit you. I mean, you're in school. You've got to stay in school, but do you know anyone?" And he goes, "Yeah, I couldn't do this. Well, I'll think about it." The next day he calls me back and says, "Well, I really thought about it and I talked to my parents. I can take a year off. I want to work there." He took a leave of absence from UC Santa Cruz. And I said, "All right."

So the very first time Ian comes, I say: “Ian, we’re going to get together with Art. The three of us are going to get together and talk about what we can do with the Palm.” Ian comes knocking on my door. I open the door and there’s Ian and right behind him is his father, like this. “Who is taking my kid out of college?” you know. “I want to know who you are!” It was like going on a date and there was Dad checking me out. It turned out that Ian joined us.

My plan was that I was going to hire a real CEO. Once I really needed one, I would be able to attract one. The VCs wanted me to get one earlier. I said: “Look. I’ll get one; it’s too early now. I want to get something going.” They didn’t believe me. They thought that I didn’t really want one and I wanted to prove it to them that I was going to run it. I really wanted to wait until I could attract the right person. About six or seven months into, I searched for a CEO. There was a bunch of people I interviewed that all came from my board members. But I found Donna through a different means.

DSM: How did you find her?

JH: There’s contention to this story. Three people have three different stories of this.

DSM: I hope to get an oral history with Donna

JH: Maybe. She’ll tell you a different story. My recollection is there was a guy that I interviewed for VP of engineering, who I didn’t hire, and I mentioned that I was looking for a CEO. He said, "I know this woman you ought to talk to." Donna, apparently, had talked independently to Bruce Dunlevie through a mutual friend Bill Campbell. So Bruce knew about Donna, and I think Bruce thinks that he had introduced her. And Donna, I can’t remember what she thinks. She thinks something else happened.

Doesn’t matter. We ended up, everyone sort of knew each other and I ended up getting introduced to her. I immediately liked her and immediately felt this was great. I also thought that hiring a woman would be fantastic. I have a personal thing about sexism and I just felt that if I could hire a great woman CEO, that would just make me happy. But she was the best candidate. She was, by far, she was the best candidate. I’ve no doubt about it! There was a glass ceiling thing in this thing too. Donna gave me a list of references. They were just stellar, just unbelievable. But when I talked to people, one or two of them said: “You know what? She’s really fantastic. I can’t think of anyone better. But you may not want to hire her.” I said, “Why is that?” “I think she’s great, but you know, she’s a woman and you might have some problems. You’re going to be dealing with the Japanese. You’re going to be dealing with Casio. Just be very careful about that.” And I said, “Bullshit. I’m going to hire her anyway.”

DSM: That's right, because by that time GRiD was Tandy by that time.

JH: GRiD was owned by Tandy. I was leaving GRiD and one of the things Tandy had bought was me. I was one of their stars, right? So one of the star things they acquired was me, and now I'm leaving. They're really nervous about this. They didn't want me to go and they tried to convince me not to do this. John Roach, the CEO of Tandy, tried to convince me not to start Palm, to do it as a pseudo-division of Tandy. But it wasn't right, and I just left and I said I had to do it independently. But Tandy invested in Palm and that was the way of assuaging the whole thing. That was Bruce's suggestion. He said: "You know, why don't you offer to let them invest? Therefore they feel they have participation and it's not an acrimonious relationship."

DSM: Tell me the story of getting to-let's say you left in June 1993-when you announce the Zoomer in October.

JH: I don't want to talk forever about this stuff. It's just a crazy ride. We're doing this thing, this handheld computer, and we're struggling with it, because we're struggling working with Casio and Tandy. We're doing this as a consortium. We can't get anything accomplished. We can't agree to anything. It was our idea, but now Casio's in charge and they're telling us what to do. Along comes Apple and invents the Newton. The Newton's just like the Zoomer, almost identical. Independently! It's total circumstance. So Apple's this great show and they corner the term PDA and they're getting all this publicity and John Scully's talking about the trillion dollar markets. And we're this clunker of a little consortium working with the loser companies, you know? And Apple is going to ship ahead of us. Everything is falling apart! No matter what happened, we would have failed. The Zoomer was a terrible product. If it was promoted correctly and it was un-hyped, it would have probably done okay and we would have done the second version.

DSM: What's bad about a $700 product that was selling at Radio Shack in 1993?

JH: It was all a matter of expectations. Everything is a matter of expectations. If your expectations are all right, you're starting slow, you're going to sell 30,000 of them, then you're going to do a twist and then do another one, that would be fine. The problem occurred was this whole category got so hyped and expectations were set so high, mostly by Apple. We never claimed that this thing was going to change your life, the Newton Intelligence; it was going to recognize your handwriting, all this stuff. Everything we disagreed with. Everything. Anyway, they set the whole field up for failure. We might have gotten swept under with it.

The Zoomer had its problems; it would never have been a hit product. It was too slow. It was too cumbersome. It had some real problems with it but we knew how to fix them. We knew how to fix them. We said: "All right, we're going to fix it." That would have been sort of like the PalmPilot if you will. But we never got the chance to fix it because the whole category just fell apart. Newton was a total fiasco-it was the Edsel of our times. It was a terrible product. They over-promised on it. You know, the whole thing, it was just all this stuff that happened. They were the cool guys; we were not. Casio and Tandy were not up on the list there.

DSM: But all the flack got directed at…

JH: All of the flack got directed at Apple, but we were worse even than Apple! There was no way to win. Once this story started unfolding in that summer before the product shipped, I just saw the whole thing unraveling. One time I even went to Donna and I said: "Donna, do you think we're going to sell any of this?"

DSM: But you did sell some.

JH: We sold some.

"Go Do It"

DSM: And an interesting group of people used them. What I'm getting to is this survey you guys did in the spring of 1994.

JH: A survey that no one else did. Tandy didn't do it, Casio didn't do it. We don't think Apple did it. We're the only ones-little Palm with our twenty-five people-we're the only ones that went out there and said, "Well OK, let's not give up on this." Everyone else gave up. Well, Apple did another spin, but Casio said, "We're out of here". Tandy said, "We're out of here." Everyone said this is a dog-product category. No one can be successful here. No one wanted to invest in it. Nothing. I didn't give up. Basically I said, "This is still a category. We just didn't get the first product quite right. Let's go." Ed Colligan, our VP of marketing said, "Let's go find out what they like." It was a brilliant idea. It was so easy and it just told us exactly what to do.

DSM: And that was…

JH: First of all people said: "I don't want a complex thing. I was just trying to figure out a way to get my life organized. Today I use paper, and I'm always trying to coordinate with my assistant. And we can never keep calendars. We're always printing things out. I'm just trying to get my life organized. All I really care about is calendars and address book and trying to coordinate with my secretary. All this other stuff? I don't need all this other stuff. Just solve my basic organizational problem."

So we realized that we were competing against paper, not against computers. The paper was our model-the paper calendar. We also knew that synchronization to the PC was not an aftermarket opportunity; it was integral to the product. That was how we were going to make money at Palm, by selling synchronization software. Walt Mossberg of the *Wall Street Journal* said to me: "Everyone has to buy it." I said, "Yeah, that's great. We're going to sell out of this." And he says, "What do you mean? If everyone has to buy it, it ought to be included in the product." I said, "Hmm, you're right! Absolutely right. That's our business." We basically backed into the idea that we had to do the whole thing. We had to integrate synchronization. We had to focus in on the personal information manager things. We had to make it better than paper. That was the genesis.

DSM: There are a couple of things that come up. What were the key points? Was it realizing that simple handwriting was critical or size? You also use an open software operating system.

JH: Remember I said earlier, we started with a product then we backed into on how to make it. I envisioned the product. In fact, the day that Bruce Dunlevie-there's this famous meeting (it seems famous now, but I'm not sure it was famous at the time). Donna and I were sitting with Bruce in his office and we were saying no one wants to build PDAs, no one is going to work with us, we can't get any partners. He said, "Stop griping. Do you know what to do?" And I said, "Yeah." He says, "If you know what to do, go do it." I said, "OK". Now that means that I have permission to do everything. Go do it.

Before that, I felt constrained. I felt my job was to write software. Palm Computer was a software company that was hot and doing hardware was not. Now one of my board members said "You can go do hardware." I said "Great, I'll do hardware."

That night I went home and I made this model. Literally, that night I made this wooden model. I made the cradle. I had thought through the basics of it. I had already defined the Graffiti. So I said to myself, "Put Graffiti here, make the writing area, make the product about this big to fit in the shirt pocket, add a cradle, a button to synchronize. I did that all in one night. It had all been percolating around . We'd been working on these pieces for years. Now, basically in one day someone says: "What would you do if you did the whole thing?" Oh that's easy. Bingo! There it was. That model-everything backed off of that. Now we needed the software. We had to create an operating system. How do we make it all work? And what processor do we pick? All these things we had to come back to later; we had to fill in the pieces. I had the product; I was pretending to use it. Now it was a matter of making it.

DSM: But you didn't go out and build factories.

JH: No, we couldn't. We had twenty-seven people. We had $3 million. We weren't going to get another penny from anybody. That was it. Basically we said: "What can we do for $3 million? We don't have time to hire people. What can we do? We do the software." We hired two guys to do the electrical engineering work. We needed a mechanical engineering firm. I knew a bunch of them, but they were too expensive. So Ed got the Yellow Pages out and he looked up "Industrial design" and we found Palo Alto Design. And we called them up.

DSM: Ed Colligan? Literally, this is the story of how you found them?

JH: Yes. I knew IDEO and the predecessors of IDEO, but they were really expensive and we couldn't afford them. Basically, we had to find a cheaper place to get this thing designed. He literally got out the Yellow Pages and I said, "You've got to be joking. Here's one!" And we called them up and that was the first one. So when you have no options-we had no money and we weren't getting any more-we didn't go out of business, you're forced to be creative.

DSM: Then there comes a question of; "OK, Bruce just told us to 'just do it yourself.'"

JH: Bruce said it. The other board members thought it was crazy. They thought we'd lost it. When we told this to the board, Dave Anderson from Sutter Hill is like: "What? You're doing that?" Because everyone else who is doing business has gone out of business. The whole plan was that we were not going to do hardware. GO went out of business, and EO and General Magic was going to fail. And they're like "What? Argh!"

DSM: The market was terrible or non-existent?

JH: It was non-existent. Everyone had written off PDAs. Remember it was a failed concept-we are in the wrong business. It's no business, go away.

DSM: Ed Colligan is faced with a little "How are we going to market this?"

JH: The PalmPilot? So now we develop the PalmPilot. We have the model; we go ahead and build it. We patch together a team of outside software, hardware, electrical engineers. We do it all on a shoestring budget. Donna is trying to raise money furiously for a year. Ed is trying to figure out how we're going to keep the team together and market this thing. And I'm trying to get the product done. Pretty much we all do everything, but that's the division of labor.

There's an interesting story here about raising money. We had gotten Ericsson, the phone company, to agree to invest, if we had another investor. Only a million dollars, though. I flew to Sweden and basically got these guys to agree, verbally, to do this. But we had to get a lead investor. We weren't going to get any venture capitalists-they were just not even talking to us, only standard investors. We were working on Compaq. Compaq was very interested and they were "in", but they were just trying to rake us over the coals. These negotiations went on for six months. They were just trying to own everything, kill us, take everything. We were just being beaten to a pulp by these guys. If we had done the deal with them, we would have raised $2 million-one from Ericsson and one from Compaq -it would have been not enough money to do anything. And we would have basically sold the entire assets to the company Compaq. So we were really frustrated.

And along comes US Robotics, which no one had even heard of, perhaps, a modem company. We talked to them because we thought maybe they could do a modem for the PalmPilot. And they come in and they say: "We love this thing." They were in Chicago and we thought maybe they didn't know about PDAs. They didn't know that we were in a failed business category. They missed it, you see. They were just oblivious to it. They were really excited. They came along and said, "We'd like to buy the whole company."

It wasn't our intention, but we really didn't have too many options. We also felt that it was a good thing for the product because now we would have the funding essentially to bring the thing to the market, and that's what we wanted to do. It was all about the product. It wasn't about becoming wealthy or being independent. It was about building this product and making it happen. That's what our mission was. So selling it to US Robotics allowed us to keep our independence in some sense, because we were still here. We didn't have to merge with any other division, and we were going to have the funding to bring it to market.

DSM: There seems to be a pattern here as well. There's GRiD and Tandy and there's Palm and US Robotics. First Palm ships in Spring 1996, in April, and about a year later 3Com…

JH: …buys US Robotics.

DSM: So now you're a division of…

JH: …3Com. They did no diligence in doing this on Palm. When 3Com bought US Robotics, they didn't even consider us as part of the acquisition.

DSM: Do you know who was the driving force at 3Com?

JH: It was amazing. They didn't come look at us. They didn't know anything about us. We learned that they didn't care about us. We were just like this noise, right? Turns out that we were the only thing of any value that they bought. They spent $8 billion to buy US Robotics, and they bought a sham basically. They bought a fake set of goods that totally disappeared overnight; literally overnight. This thing just sort of fell apart and the only thing left standing was little old Palm and we became the fastest growing and the only profitable division of 3Com.

The Recurrent Theme: Beautiful, Portable, Affordable & Connected

DSM: I'd like to talk about Palm, the magnificent success at 3Com, and in January 1998 the announcement by Microsoft that they're going to get into the Palm PC business.

JH: I don't remember all the chronology because I've been competing with Microsoft almost since 1988 because they were competing in the tablet business. They had Windows for Pen computing. They were going to put us out of business. Then when we did the PalmPilot, they were doing WinCE things, these little keyboard things. So I was competing with them right along.

They got serious about us, I guess, in 1988. I don't remember the exact date. They basically said, "We're going after you." They had a sales conference where they had a big target and in the center of the target was "Palm." They got up on the stage and they said, "We are going to crush and kill these guys." I was getting condolence letters, people saying "Sorry Jeff. Too bad." I refused to believe it. Again, I don't believe what people tell me. I looked at it and I said, "I think they're going to fail here. I don't see why they're going to succeed." Everyone says, "They always win. You can't compete."

But I said: "Look, here's the reasons why we can be successful." I basically put in a plan and said, "Look. Here's what we're going to do. Microsoft, they don't get this. They really don't. They don't understand why we are successful." They didn't and I still don't think they do. What they have is a lot of money, and a lot of resources, and just unbelievable power. They can just keep going after it. I said, "Let's do something they can't do. We build the whole product." They don't build products; they only make the software. And they partner with these guys-they just aren't very creative hardware guys. I said, "Let's focus on what we do best."

It was a lot of internal things, people saying we had to add a lot of features that Microsoft added. And I said, "No, we're not going to add any features. Nothing. We're going to make a beautiful product. They can't make a beautiful product because they don't make products. They just make software." And if I tried to catch up to them on features, the reviews are going to be: "Palm tries to catch Microsoft features. Doesn't do it" If I don't do any new software and I just make a beautiful piece of hardware, the reviews are going to be: "Palm does beautiful piece of hardware. Microsoft hardware looks ugly!" We had this big battle internally where I basically said: "We're not going to chase after Microsoft on features."

And there were people who disagreed with the strategy. "We're not going to do it. We're going to focus on industrial design," and that was the Palm 5. And I said: "We're just going to catch them with the Palm 5 because they can't do the Palm 5. They can't make that product because they don't make the hardware." People thought I was nuts about that, but it turned out to be very successful. We turned it into a personal artifact, or a personal piece of jewelry or something and they couldn't compete with that.

DSM: One of the things that, doing my homework for this, interesting about beautiful design and competing on that basis, both your first personal computer and Donna's, I gather, were Macintoshes. Is there any connection there?

JH: I don't think there's any connection, well, maybe, perhaps. I was definitely attracted to the Macintosh because having studied a lot of computer architecture when I was at Intel, I just knew it was a smarter design, and I was attracted to that.

When Macintosh first came out, I bought the *Inside Mac* books. I read them from cover to cover because I learned a lot. This is the right education for graphic UI design and so on. And they did a great job about presenting it, teaching about it, but I don't have a religious thing about Macs versus PCs. I have a Mac at home and a PC at home.

I really dislike Windows software. I really think it's a disservice in many ways; the way the industry's turned out is unfortunate. And there's a theme in my life, by the way, which I really want to correct this. I want to correct-underlying a lot of this, besides the brain work, another theme (maybe this is one of the questions we get to at the end here) is really how do you make personal computers that are better and useful for a larger audience.

DSM: Why don't we talk about that now?

JH: Sure. This is a very sincere, deep-down desire. I look at personal computers, particularly Windows, but even Macintoshes and I say--first of all I believe that there are societal benefits to them. There are personal benefits and societal benefits. I believe that they are good for people; that they are related to freedom and the freedom of education, knowledge and expression and communications. I inherently believe those are good things.

I look at the tools that we have today-the desktop and the laptop computer-and I say this is an untenable situation for a population of six billion people on this planet. They are very expensive; they're very complex. If you try and put more than five or six together you need an IT professional to make them work. They are unreliable, complex and hard to learn to use. They take up too power. They take too much physical material to build them. Even back at the beginning of Palm I said, "Look, if you're going to try to do this-the world is naturally going to migrate toward the personal computer that is smaller, cheaper, more reliable, easier to use. It's just going to have to happen. And I don't know when it's going to happen, but maybe we can accelerate it."

It will happen, and my role and the role of the people who work with me, is maybe to accelerate that to some extent, because it's going to happen eventually. Maybe it will take ten years; maybe it will take thirty years, maybe fifty years. I don't know. That's our underlying theme here.

I'm really am frustrated with PCs. Every time mine has to be rebooted, and I have a brand new one with XP in it, which reboots all the time. I sit there and I go, "OK, that's three minutes out of my life." I do that about every two days. You add this up. You add the time the number of PCs, you raise the number of lifetimes that are being spent every year waiting for their thing to boot, right? It's incredible. It's a waste of humanity. I don't want to overdo it, but there's some truth to that. Also, people can't afford them. It's going to be portable, it's going to be mobile, it's going to be easier to use. Now what's happened---what's surprising to me that's happened-is that the cell phone has actually taken that mantle. I didn't anticipate that. But the cell phone came along. That's it.

DSM: I was going to ask you, when we were talking about Ericsson with the deal that fell through. Would life have been really different if that deal that had gone through?

JH: Oh sure. I could play it a lot of ways. I think in the end, I would be doing similar things, but maybe under different circumstances. I feel there's destiny in the world in some of these things. It's like a chaotic theory. There's attractors: it's going to move generally in a certain direction, but you can't tell exactly how it's going to get there. These things are inevitable. It can't be that it's going to turn out differently somehow in the end. So, I would be doing the same thing under different circumstances.

We Resigned Today: Handspring is Born

DSM: Within this context, when you were still with Eric Benhamou, you went to him to propose maybe spinning off…

JH: Donna convinced me-she was right. She said: "Look, we're up against huge competition, Microsoft and other people. And we were being asked, as part of 3Com, to be very profitable because we were the only people that were showing high margins. They were using us to shore up the financial difficulties at 3Com. As an independent business, Palm would not try to be as profitable.

We didn't try to be profitable at all. When you're growing, you need to invest in your business. You don't need to milk it; you need to invest it. In a growing market that's getting established against big competition, you need to invest as long as you continue to grow. We felt, basically, that the requirements of 3Com were going to force us not to invest in the business. We couldn't invest in it. Therefore we were going to lose. We were going just to diminish as a division of an ailing networking company. Donna was right about that.

She went to Eric and said, "The only way that this really makes sense is for you to separate Palm from 3Com. First of all, the shareholders of 3Com are giving no credit for Palm, so they're getting no shareholder value from it because they're valuing it is as a networking company. They don't even know what we're doing, so this will be good for the shareholders of Palm. And it would allow Palm to be successful. She was right. She was absolutely right.

We spent months and months and months working on this. We had all kinds of opinion about it. And in the end it was Eric's call and he just refused to do it. He said, "I'm not going to do it now." Donna came back and said, "What about two years from now? Can you at least agree to put a process in place-we called it the "Claris Solution," because it was something she did at Claris, with Apple-and he said: "No, I'm never going to do it. Never."

So at that point, Donna basically said, "Well I guess there's no use of us staying here. We're not going to stay around here and watch this die." She resigned. She also resigned for me, which I didn't know. We had talked about this a little bit, but she came to my office one day and said: "Guess what. We resigned today." And I said, "What, 'we' resigned today?" And she said, "Yes". I wasn't happy with her then. It wasn't like I wouldn't agree to it, but I thought she should have asked me in advance.

DSM: Well, these were the two people who at their first "evaluation", had met and had written…

JH: Donna and myself?

DSM: So I guess she was feeling pretty confident.

JH: We're very good friends, we like each other a lot, and we get along well. We had discussed this. It was just a slight matter of protocol and timing, perhaps.

DSM: And this is when you started Handspring?

JH: Well, yes. Let me tell you a story because I think this is important if you want to know my history. I didn't really want to start Handspring. I didn't really want to start Palm. Remember, it took me awhile to get into that.

I didn't want to start Handspring because I wanted to work on brain stuff. While we were in this time frame, I was working part-time at Palm and part-time on my brain stuff. Starting Handspring meant that I couldn't work part-time on my brain stuff. I was really frustrated because if Palm were an independent company and doing well, I could be the founder and a board member and the Chief Product Officer part-time and I could have the associations with success that Palm brought me that would help me in my brain work. So I needed both. It was that association, that image of success that really helps me.

If we stayed at 3Com then that would be failure, that would be the opposite. I would now be the failed thing at 3Com. I am the Chief Technology Officer of the division that's failing. It's never going to work. But starting Handspring meant that I had to commit to full-time again. So I was very frustrated by this.

When we started Handspring, I told Donna: "You need me to commit full time. The VCs are going to require it full-time, but for two years. We'll do it full-time for two years." Then we had to raise money and we said, "Let's pick the two VCs that we want." We picked Bruce Dunlevie and John Doerr. We pitched them on the business, and we managed to negotiate a deal, and we were up and running.

DSM: Was this in June 1998?

JH: Donna and I left in July 1998. We really didn't get Handspring started with other employees and financing until around October 1998.

DSM: The Redwood Neuroscience Institute (RNI) was officially institutionally established…

JH: …this summer, 2002.

DSM: So where are you in this…

JH: I am still at Handspring part-time. I'm fully engaged there, but physically, I'm in this office part-time. I'm doing both Handspring and RNI. I'm trying to do two things at once. Steve Jobs does two jobs at once, so why can't I? And Donna has been very supportive of me on this. Everyone I've worked with has known that I want to work on the brain stuff. The Redwood Neuroscience Institute was a fairly recent idea. But I want to spend time on this. It's very important that I have time to do this before I get too old.

DSM: Let's finish the Handspring story because I really want to have some time to talk about the Institute. Let's finish the Handspring story by having you do some speculation on where this technology is going. Is it going to be phone?

JH: The phone, as I said earlier, that is the platform for future personal computing as far as I'm concerned. A billion people in the world use it today; it will be several billion in the future. The appliances are small, but portable, it's communications, it's great. The work I did at Palm and early on at Handspring really is subservient to that. And I realized this early on that it wasn't going to be the leader in this valley. I said: "The handheld computing business is going to go away. It's going to become part of the cell phone business."

Almost in the beginning of Handspring, I recognized this. Actually from the very founding, I recognized this. We said we were going to have to move in this direction. We said we were adding value to the cell phone business. We have a plan to do that and we were following that plan, which was: starting out with organizers to build a scale of business; doing modular radios; then doing integrated products. It worked out that way.

We built the Treo and the Treo is a great product. It's my favorite thing I've ever built. It's got its blemishes, but this is the best thing I've ever done. Oh yeah, I can fix a lot, we're going to do that. It's a first generation product. I'm proud of it. It's a combination of a handheld computer and a cell phone, and email and web browsing. This is really like, for me, a turning point. It reminds me of the very first laptop that GRiD did. It was successful to some extent, but not wildly successful. But it was the right thing, and that's what we're doing here.

DSM: What were the biggest obstacles?

JH: The biggest obstacles for us right now are business and political obstacles. When I was at Palm and, early on, Handspring, we could do anything we wanted. That meeting with Bruce Dunlevie, I could design whatever I want, right? Whatever I want. Do it! Then it's done; it's yours.

Today, we can't do that. In the communicator business, which is what we call something like the Treo, you can't get a business, you can't do anything unless you have the carrier-the wireless operator's-approval. They sell the products, they approve the products, and you can't do just what you want. You have to do what they want. And they're not even sure if they want you to add value.

DSM: And they're having tough times.

JH: And those companies are all in terrible shape. They're not going to go out of business because the networks are going to stick around. They're all going to get consolidated and they're all going to lose the money, and they're all going to go bankrupt. It's just going to be a bloodbath. It's going to happen. We're trying to deal with these guys with a very sophisticated product which takes forward thinking and that's the hard part. When you get the Treo in someone's hand, you get it configured right, and get them using it right, people love it. But there's so many obstacles to getting there, and many of them relate to the carriers and their networks and so on. It's a very challenging environment for us. But, it's just a challenge and you take it one at a time.

So it reminds me of when we were at Palm and we were on the verge of great success, but everyone thought we were on the verge of being completely useless and valueless. The day we were about to ship one of the most successful products in creative history is the day that everyone said, "You're history! Forget it. You're not worth anything." I feel a little bit like that today. I feel like we're on the verge of great success at Handspring. You can't worry about it too much.

The Inevitable Elegance of Innovation

DSM: You also formally entered into your pursuit of your study of the brain at a time when everyone was questioning the validity of the approach and the importance of the subject as well.

JH: When you say "formally" that was back then. That's not true today.

DSM: That was what I was saying. When you started in 1986, there was not home. What's the environment now?

JH: It's changed a lot. First of all, in the 1990s a lot of people got into neuroscience. There's tens of thousands of people in neuroscience. There have been specific initiatives to bring in people like physicists and mathematicians and computer scientists into neuroscience. The old paradigms of neural networks and AI generally perceived as failures, like I thought they would be. Now, when I go around and start talking to neuroscientists, some percentage of them basically say, "That's not theoretical at all, that's mainstream." I tell them that I had these ideas in 1986 and they say, "Hmm, that's pretty impressive."

DSM: The legend is that after you finished your association with Berkeley, you came out with a moral certainty that you truly understood the nature of intelligence and how the brain understood. Or had a good idea of how to articulate a model of it. Has your own thinking changed over that time?

JH: Somewhat. What I had then, I didn't understand how brains worked. I overcame a major stumbling block. I don't like talking about this too much, but I will anyway because I don't know any other way to describing it. Brain science is what they call pre-paradigming, in the words of Thomas Kuhn. It hasn't gelled yet. When you have a pre-paradigm science-basically people have no idea what's going on-there's a huge amount of unexplained data. There's a huge amount of differing opinion of how to interpret this. There are people saying, "You'll never figure this out." What causes it to happen, what causes the paradigm to establish, is there are usually a few intuitive things that are wrong, and when you change those intuitive things, then it also falls together.

I'll give you several examples. Take Copernicus with the heliocentric solar system. Everyone thought that the earth was at the center of the solar system. That was obvious. It's intuitive. The earth doesn't feel like it's moving. If you said that the earth is hurling through space, spinning like a top, they'd think you're nuts! It's not like they were stupid; it sounds stupid. But that was the obvious but incorrect assumption. As soon as you take a different perspective, then things start to fall into place.

Copernicus, he got all the details wrong. It turns out he really didn't know how the solar system worked, but he had that one sort of intuitive insight. Then it took many years later before people like, I think Kepler and so on, who actually figured out what was going on.

The same thing is true if you look at evolution. There was this natural idea that species were separate and they don't really change. It seems crazy that one species turns into another species. There's no evidence for that whatsoever when you just think about what's on the surface. But once you start thinking about it, it was like that intuitive thing that "Oh well, if that's true, then it also falls together." Tectonic plates are another example like that. All this confusing data that no one understood-the idea that continents actually move, it doesn't seem right. How can that happen? They're frozen on the surface, right? No, wrong.

So what I had in 1986 was one of those pieces. It's not that I knew how brains worked, but I saw the change of perspective that was clouding everyone's vision. The details about how it actually worked, I really didn't know. I've got more of the details now. So now I know a lot more about how it actually works. I am far more intelligent in talking about that, even though I haven't figured it all out. There's a ton more stuff left to do, but I have a lot more pieces. What I had in 1986 was that change in perspective that which once you get it, you say, "Yeah, that's it. That's right. Now we can work on the problem."

DSM: I've always been a great fan of Kuhn and that's one of the questions I was going to ask you. Where do you think innovation comes from?

JH: Now that you've asked me about innovation I have to be really careful because I actually I think I understand the neural mechanism for innovation. We don't have time to go into all of it, but I'll give you a taste. It turns out that brains deal with the environment, but they really don't deal with the environment. They deal with an abstraction of the environment. And the abstraction of the environment is the patterns that occur on the neurofibers coming into the brain.

These things really exist. You exist, these lights exist, that cameras exists. But the brain really doesn't know that. All the brain has is these bundles of nerve fibers coming in that are firing or not firing. That's it. There's nothing else. There is no light going into the brain, no sound going into the brain and this creation-the thing that you and everyone else in this room feels-is a construction from those patterns.

DSM: The forms don't really exist.

JH: They don't exist. All you have is patterns. That's it. Electrical patterns, that's all there is. I'm not saying that this stuff isn't real. It is real, but the brain doesn't know that. It knows the patterns. And it creates this model of the world that we perceive as our perception. It turns out that the brain is an organ that deals with patterns-there are spatial patterns and temporal patterns. All of life, all of intelligence is extracting out consistencies in those patterns and acting upon them. It's finding the things that are consistent.

So, there's patterns relating to a coffee cup and coffee cups behave the same way and they're consistent. I know that if I squeeze this coffee cup, it will crush. I know that if I pull this thing, it will come off. I also know that if you had liquid in it, it would be heavier than it is without it. Anyway, there are these patterns and creativity at its lowest form, is essentially making predictions about the environmental patterns from analogy to pre-existing patterns experienced.

So you've experienced some patterns in the past. You've built up an internal model about how these patterns behave. And now you're exposed to some new pattern, which you've never been exposed to before, but you see an analogy between this pattern and the old pattern and therefore you're able to make new predictions about the new pattern that, even though you've never experienced this before, you say. "I think I know what the outcome's going to be here."

Creativity is essentially-you never make anything out of whole cloth. It's always by analogy to things you've done in the past. They can be distant analogies. They don't have to be close analogies. I can see an analogy between a rose and a computer. It may tell me: "Oh, I should design computers this way because beauty is an aesthetic quality that people value" and whatever. You know what I'm saying? There's this neuro-mechanism that I think I understand, that shows you how you do that analogy prediction thing.

Some people ask me how do I know these brain theories are right. And I say: "It's elegance which is the most attractive thing about it." Why did Kepler work on Copernicus' problem? Because he felt it had elegance to it. It just seemed right.

This goes back to my childhood. Remember, in my childhood, I modeled the world. It was more about what seemed to be right, than what I saw. It's like, this is what ought to be happening and my brain is good at predictions. I'm better at it in some categories than some other people are. I'm good at seeing these patterns. I'm good at saying, "Aha! I can succeed here. I can beat Microsoft despite what they say. I can figure out how brains work despite what they say. I can do things because there's an inevitable elegance to certain solutions that you see are going to happen."

Brains are like that. Once this gets under your skin, you say brains can't work any other way. This is how it has to work. It may take me a decade or so to convince people, but maybe I won't be able to. Maybe I'm wrong! But it has this elegance to it that you can't deny. It's just too powerful and great science generally has that to it. It generally does. That's the main attraction to it.

DSM: The other side of that coin, is you're quick to recognize flaws?

JH: Well, yes. Essentially, the stronger predictions you can make about things, whether they're very low level predictions like the coffee cup or your face, or something like that or they're very high level things. Then you see when your predictions don't match. When things don't match, you know it.

If you looked at my face, for example now, and there was something wrong with it. Say I had two noses or I had a nose above my eyes. You'd look at it and your eyes would be scanning it and saying wrong, wrong, wrong. You couldn't take your eyes off of it. There's this huge misprediction, which is going on. That's not normal. I'm supposed to see something different here. The brain, when something is mispredicted, it wants to figure it out.

That's why we look at accidents, that's why we look at people with deformities, that's why when we see something is different, we immediately go "what's wrong here?" It doesn't look right. It doesn't sound right. It doesn't feel right. But the stronger the prediction, the more you do notice these incongruities in the world and that's what leads you to some new theories, right? You say: "Aha, this is not working the way I thought it was going to work Something's different about this pattern, and therefore I need to come up with another model. Or I need to get used to it. If you had two noses and I saw you everyday, after awhile I wouldn't notice it at all. I'd just think you're normal. But the fact that I've never seen anyone with two noses means that when I see one, it would be a pretty big misprediction.

DSM: So, there's some sort of genius in recognizing flaws in the paradigms and another kind in taking joy in the new…

JH: I like to define intelligence-I'm not sure what genius is-but I like to define intelligence (we're all intelligent) as the ability to make predictions about these complex spatial/temporal patterns. And the more complex the pattern is-how it extends over time, or how it extends over space, or cross dimensions-the complex the patterns you can eek out and make predictions about, the smarter you are. All science is about making predictions, which is just pattern completion. It's like saying, "If I understand everything correctly, this should be the next thing." Our intelligence tests do this, too. How do we test intelligence? They say: "What's the next number in this sequence?" "This word is to this word, as this word is to what?" All analogies. "If you see these three faces of an object, what does the next face look like?" These are all sort of pattern completion problems.

We don't think of them that way. I think of them that way, because that's what they are.

Understanding the Nature of Everything

DSM: I want to ask you about some things that are going on in the world now. I want to talk about integrity and honor in general and in business. It's very interesting again to go back to your childhood. Some people say that honor and integrity are spiritual settings routed in religion. Others say it is routed in the people that you grew up with, standards that your parents set. Where do you think your own sense of honesty and integrity come from?

JH: OK, you used three words there. You use honor, honesty and integrity. Honor is one I really have nothing to say about. But honesty and integrity I can talk about. Those are words I relate to very clearly. I'm an atheist. I'm not militant about it or anything like that, but I don't think you need religion to be a good guy, to be a smart guy, to do good or to be kind and caring or anything like that. It amazes me that people say if you don't have strong religious beliefs, why aren't you a criminal? What are they talking about? I just don't get it. And then I look at a lot of religious people and they do a lot of stupid things. I don't think it comes from that. I'm not sure where it comes from. It wasn't something that was a big theme in my family's upbringing. It wasn't taught openly like we have to establish integrity and honesty in our family or something like that.

I would like to think that I have reasonably high integrity. We have tried to establish a culture at both Handspring and Palm, where we talked about this openly. It's one of the things Donna and I really like about each other. Just be upfront about everything, tell everyone everything you can, don't hold your punches, don't hide anything, have open communications, and I think we've done a very good job of that. I challenge anyone to find otherwise. I don't know why most people aren't like that.

I know it's an important part of my life. It's an important part of how I treat my family, my wife, my kids; it's an important part of how I treat my employees. It's just in my nature. It maybe came out of something in my upbringing, I don't know. To me it comes out of just being honest about the world. This is the way it really works and there's a right thing to do in all cases. And you ought to figure it out.

DSM: That's a pretty good answer. I also want to talk about some changes in the world. When you were just beginning to develop some successful products-a pioneer product-the world was at a point in which the Berlin Wall came down in 1989. The Cold War was ending. It reminds me nothing so much as the end of the First World War-opportunity. And the enthusiasm about this industry and what it could do for the world was just extraordinary. Has your view of this changed, given what's happened around September 11 and the dot-com collapse?

JH: Not because of those instances. I was very concerned about nuclear war when I was a kid. I think society had concerns, to have this clock approaching midnight. Unfortunately, I'm not very optimistic about this still. The Cold War's over, but I've felt my whole life that, unfortunately, I don't think we're going to get serious about moving the threat of nuclear terrorists or non-terrorists, or basically bad nuclear things happening until it actually happens. I don't think there'll be enough concerted effort for people to really get rid of nuclear weapons and these things that really do terrible things.

You know, even today, we don't want Iraq to have this stuff, but we still have it. Russia still has it. The Pakistanis have it. Indians have it. I see it as almost inevitable that unfortunately we are going to have some major calamity sometime in the future that will be the first time that we will actually get serious about getting rid of this stuff. I hope I'm wrong, but unfortunately, I see that as the case.

I also felt my whole life that the most dangerous things in the world are political and religious things-the fanaticism that comes out of, whether you could say, whether it's strong political feelings that happened in World War II, or strong religious feelings that you're seeing today. People just can't think in a worldview and unfortunately human nature says that most people can't be broad thinking about it. So there's always going to be some side of the population that is going to resort to things that are terrible.

DSM: Huge populations of very young people with no access to…

JH: Yes. What if you create opportunity for everybody--we should strive for this. There will always be some segment that is unhappy or unsatisfied. It's just too complex a world. I guess I'm not very optimistic about it. I wish I was, but I'm not.

DSM: How about the technology? Optimistic about its impact on the world?

JH: I'm optimistic about the positive effects of the impact. As I said earlier, there are real benefits-society and human benefits-to communication and access information. You can't deny that. I can't deny that. And so I think these are great things. If you look at people who are using cell phones in third world countries to make businesses, and all of sudden open up their markets to the outside world for the community, I think that is great. This stuff is wonderful.

It doesn't change the other side of the coin. There are still bad things that are going to happen. I don't think technology can stop that. I had an email today from my friend who writes a column for *USA Today*. And he was asking me this question just today. He said, "Do you think technology can really help in this area?" I said: "Yes, it can help, but it can't stop it." There's always going to be problems. The world's always had problems: there's always been fighting; there's always been someone trying to kill somebody, unfortunately.

DSM: I don't know if I sent you this question to think about beforehand. I'll only ask two more questions. One is the "Dinner at Monticello" question. We've gathered a bunch of people together at Jefferson's Table at Monticello just to talk about their revolution.

JH: You didn't ask me this question, but I can try winging it.

DSM: It's a great opportunity to bring a lot of people together to talk about some interesting things. But if you could put together a small dinner party…

JH: Living or deceased?

DSM: Let's say people you can't get.

JH: There's people I want to meet, but I've never tried to approach them.

DSM: Let's do one dinner for folks who are alive.

JH: It would be really good if I could prep this. People who aren't alive: I would take Albert Einstein. I would take Franklin Roosevelt. I would probably take Thomas Jefferson and maybe Huxley. I'd have to think about that one. I'm not certain about that.

DSM: How about the guys who are alive? Who would you take?

JH: Living today. It's funny because I could probably call many of these people and they'd meet with me, which is probably true, but I never feel that way. I always feel, "Oh I don't want to bother you." To this day, when people tell me I'm well known or something, I say, "Really? I can't believe that." I have trouble believing that. I don't feel like it. Let's see, some of the real people I really like. Richard Dawkins, I read his book, *The Selfish Gene*, which is brilliant. Bloody brilliant. He's one guy I would really like to meet today whom I really admire. I'd have to think more about it. That's one guy I'd really like to have a conversation with.

I'd also love to have some deep conversations with some cosmologists, but I'm not sure who the best ones are. I have some ideas about cosmology, the nature of space and time. It's another area like brains where I think it's really ripe for a paradigm shift. And people are struggling with string theory and various expansion theories, but I don't think they've got it right. I don't think I've got it right either, but I've got some insights. They're not elegant. They don't gel enough; they haven't come together.

Every once in awhile my father would say something poignant thingto me. Like the electrical engineering thing, like "Go into electronics." And I would say, "I can do that." But here's another one. He once told me--I remember this and I don't remember too many things that he told me-- , "You know there might be a day when we really understand fundamentally, in an easy way, the nature of everything." He said, "I'm not sure if that will really be a good day or not, because we might be really bored at that point, and there might not be much left to really keep us puzzled by." He's not saying that you won't. He's actually speculating that there will be a day.

I'm actually with him on that one. I think there will be a day when we won't know everything, but we'll have that gelling theory about everything. It may not be deterministic. It may have some aspects of what people call religion today. But that doesn't really matter. It will gel. And you won't be sitting here saying, "Gee, I don't understand the nature of space and time and I don't understand how this all happened." You can say, "Here's how it happened. I get it. This is why we're here." I'd love to read that book.

The mathematician, Erdós, talks about "the book", which contains all the theorems of proofs of all the mathematical theorems. The "book" exists-as a mathematician, what you're trying to do is read part of the book. Your life is trying to read part of "the book", and turning a few pages and read some of this book. The book is out there, and it exists-not in a real way-but mathematical proofs exist and it is our job to figure them out. I kind of view that everything is like that. Brain science-I want to read "the book." Cosmology-I want to read "the book." It's not complex, it's not too hard, read "the book". How does it work? What's it all about? That's sort of life's goal, and I certainly won't see them achieve it all in my lifetime. But it might happen sometime.

DSM: That's a great way to end this interview. Thank you.