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Allan E. Alcorn

Transcript of an interview
conducted by

Christopher Weaver

at

Computer History Museum
Mountain View, California, USA

on

16 March 2018

with subsequent additions and corrections

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Abstract

Allan Alcorn begins the oral history by discussing his early family life and education prior to recounting his job at AMPEX and meeting Nolan Bushnell and Ted Dabney. He follows with the establishment of Syzygy, Atari, and the development of *Pong*. Alcorn's narrative describes his perspective of creative and business trajectory of Atari, including Kee Games, Project Stella, and the Atari 400/800 computers prior to leaving the company. Alcorn next discusses his personal viewpoint of Bushnell's Catalyst ventures and his own post-Atari career, including Apple and Interval Research. He concludes by discussing his reflections on game development and industry, past and present.

About the Interviewer

Christopher Weaver is a Distinguished Research Scholar at the Smithsonian's Lemelson Center for the Study of Invention and Innovation, Distinguished Professor of Computational Media at Wesleyan University and Director of Interactive Simulation for MIT's AIM Photonics Academy. He has contributed to over twenty-five books and publications and holds patents in telecommunications, software methods, device security, and 3D graphics. The former Director of Technology Forecasting for ABC and Chief Engineer to the Subcommittee on Communications for the US Congress, he also founded the video game company Bethesda Softworks. Weaver is co-director of the Videogame Pioneers Initiative at the National Museum of American History, recording oral histories and developing new applications for interactive media and public education.

About the Editor

Justin S. Barber provided transcript audit-editing, emendations, and supplementary footnotes to this oral history as part of his broader work into video game history and digital museology.

Table of Contents

16 March 2016

Early years: Family and Education	1
Ampex, Meeting Nolan Bushnell and Ted Dabney	4
Syzygy, Developing Pong, Early days of Atari	8
Atari Reorganization, Grass Valley, Kee Games	25
Atari Research and Development Division, Sears, and Pinball	32
Project Stella, Steve Jobs and Steve Wozniak	40
Atari 800/400, Project Cosmos, Leaving Atari	55
Bushnell's Catalyst ventures; Kadabrascope, Etak, ByVideo, Cumma	61
Working at Apple; Advanced Technologies Group, QuickTime, FireWire	70
Silicon Gaming, Interval Research, and Zowie	81
Ethnographic questions, reflections on game development and industry	88

Video Game Pioneers Oral History Collection

Interviewee: Allan E. Alcorn

Interviewer: Christopher Weaver

Date: 16 March 2018

Location: Computer History Museum, Mountain View, California, USA

Weaver: Good morning. Would you please state for the record your full name?

Alcorn: Allan Edwin Alcorn.

Weaver: And what's today? Today's the 16th of March 2018.

Alcorn: 16th of March 2018. Yeah.

Weaver: Good. Al, you were both what I would consider a jock and a nerd in high school. I believe you played All-State football?

Alcorn: Well, I was All-City, and I was selected to be on the All-State football team, but that was just an honorary thing. I was a football jock, and I actually tackled O.J. Simpson a few times.

Weaver: A lot of people would probably support that now.

Alcorn: Yeah. And it was a mixed life in high school. I went to Lowell High School, which is an academic public school. Many times, I was in a class where the teacher once said, "Oh, some dumb bunny on the football wouldn't get that." It was a substitute teacher. Everybody in the room laughed but him, because I was the dumb bunny on the football team.

Weaver: [Laughs.] Was there ever a time when you were considering an alternate path where you might have considered a football career?

Alcorn: Yeah. I managed to get into University of California, Berkeley because of football. I wasn't given a scholarship, but basically they wanted me on the team. And back then, tuition was pretty inexpensive. I managed to get on the Cal football freshman team and played a few practice sessions. I had to make a decision really quick, "Do I want to be a football player or does my future lie in

electronics?” I tossed the coin and electronics won, so I quit the football and went full nerd.

Weaver: Around this time, analog circuits really drew you into engineering, didn't they?

Alcorn: Yeah. In my youth, I was always curious about how televisions and radios worked. My neighbor across the street, very important, had a television repair shop. My mother and father were divorced. My father was a Merchant Marine and was never around. [My neighbor] sort of mentored me from the time I was in junior high school, let me work in his TV shop after school. I got quite good at fixing radios and televisions, which wound up paying my way through Cal.

Weaver: In fact, you took a correspondence course in TV repair, didn't you?

Alcorn: Yeah. My dad knew I was interested in electronics and somehow signed me up for an RCA correspondence course in radio and television repair. I was the youngest person ever to take this course. Combining that with my work at the S&M Television Shop in San Francisco gave me an [advantage]. By the time I got to Cal, I was a journeyman TV repairman.

Weaver: During your schooldays, did you ever think about going beyond TV repair and into actual TV design and modification?

Alcorn: Yeah. TV repair was kind of a dead-end thing, but what I really wanted to do was understand analog electronics. I wanted to understand how these circuits worked and how you designed them. I said, “Well, I guess an electrical engineer does that.” And that's why I picked that career at Cal. Yeah, I absolutely wanted to do that. I thought my future might lie in television and radio design but wound up Cal was pretty advanced. They forced me to take digital electronics, some of it, so I learned that part too.

Weaver: Didn't Cal also force you to take early programming?

Alcorn: Yeah. The E-1, everybody in engineering of any kind had to take this course on programming. It was Fortran and then ALGOL.¹ It used the campus computer, of course. The big 7090, 7094 IBM computer with punch cards and the whole thing. I was dragged screaming and kicking into the future there.

Weaver: You grew up in the Haight-Ashbury area. Given the kind of tempestuous times, how did the hippie and student protest movement of the sixties affect your personal outlook and philosophy?

Alcorn: Wow. Ooh, that's a big question. The sixties were a very turbulent time. A lot of it was caused by the war in Vietnam. My father was a Merchant Marine, and

¹ Fortran [Formula Translation] and ALGOL [Algorithmic Language] are computer programming languages developed in the 1950s.

at the time, he was, among other things, shipping napalm to Vietnam. My brother was a police officer in Concord. And I'm a student on campus at Cal, which got busy really protesting, so I became anti-war. My father and brother were kind of pro-war, but we got along as a family just fine. The whole experience taught us not to trust government. We learned that they were lying to us and we needed to act out on our own. I think none of that would have happened at Cal if the war in Vietnam wasn't on. It forced you to really consider it. My brother's brother-in-law did go to Vietnam and was killed within three months. That was a very, very strong time. It was, in retrospect, a great time to be at Cal and not only hear about history but begin to make some [sense] of it and see the conflicts right then.

Weaver: How did you get into photography?

Alcorn: I got into photography because of my curiosity. I wanted to know how televisions worked, color television. I had that pretty well scoped out. I thought, "Well, I wonder how photography works, literally." And I went to a little camera store that had a Kodak Tricam pack. I managed to develop negatives in my bathroom and printed things. And, wow, so then I had to take pictures to get fodder for my darkroom. I kind of backed into it from the chemistry of it into cameras and enjoyed documenting things, taking pictures. It became a nice hobby.

Weaver: Why did you document People's Park?

Alcorn: Well, I mean, here we are at Berkeley. We had just undergone an aerial gas attack from the National Guard dropping tear gas on campus. I ran home from my job at the TV repair shop, got my camera, and just started photographing all this stuff because it was very visually compelling. I wanted to document—watched a kid get shot, and, jeez, you know. That was all part of it.

Weaver: Do you think that background sort of caused you to challenge authority or think twice before you just accepted things?

Alcorn: Yeah, the whole background at Cal and the ongoing protest movement, you learned not to trust authority. And one of the great quotes from that era was "If you don't like the news, go out and make some of your own."

Weaver: At Berkeley, you changed your focus more towards computers and digital engineering?

Alcorn: Not really. No, I was solid analog and they made me take these courses, goddamn it. I persisted and went to Ampex. Tried to do that, did some of that.

Weaver: Talking about Ampex, can you describe your early experiences at Ampex, especially the video file project there?

Alcorn: Yeah. Cal is a very high-pressure institution, very big, very huge, not very supportive. Let's say that if you didn't want to be there, fine. There were ten guys waiting for your spot. When I was at Cal my sophomore year I saw this work-study program that allowed you to work in industry for six months and then go to school for six months. I said, "Hey, I'll do that. As a side benefit, I'll get paid to do this and I can pay my way through Cal doing that." That was the incentive. I put my resumé out to all the companies that were advertising and I didn't get any response.

Turned out my mother was working for an insurance company in San Francisco and her boss knew Roberts, the president of Ampex. At first she said, "I can get you in there."

I said, "No, I don't want your help. I can do this on my own." Eventually, I came back and said, "I need your help."

I got interviewed at Ampex, and, boom, I was hired. Yeah, that was a great, fortunate step.

Weaver: As a temporary junior engineer at Ampex, did you have a chance to interact with many other engineers on the project? Was this when you first sort of met or interacted with Ted Dabney and Nolan Bushnell?

Alcorn: Ampex was a great experience. I got to learn what engineers really did. It was an A-team of pro, seasoned engineers. I was mentored there. I got to meet many of the key people: Nolan Bushnell, Ted Dabney, Steve Bristow, Larry Emmons, Steve Mayer. A lot of the people that formed that whole thing. I remember a gentleman, John Watney, was a key engineer there working on future stuff. One time he came out with a printout, the old-fashioned big computer fanfold printout, and it was video. He had digitized video, which video was the essence of analog. It was like, "Wow!" That just kind of blew my mind to see that. Just the perception that this could be digital, you know. Because those are two different worlds, in my understanding, at that time.

Weaver: When you talk about "at that time," can you just briefly provide a context in terms of there were no digital frame grabbers? In other words, try and put this within the context of the engineering at that time.

Alcorn: Yeah. Ampex was the leader in videotape and, hence, video engineering, storage, and retrieval. I worked at this division called Video File that stored documents on a high-resolution video format. It was all analog. They would store all these documents on videotape, two-inch-wide videotape. It reads one frame of it, then if you wanted to print, they would put it on a big disk, hard recording disk. This disk was three feet in diameter, and it would store it as an analog signal. To print, they would queue up a bunch of images and then slow the disk down to run them through a separate printer. It was all analog. I remember, even then, they had a sync generator, a synchronizing system, for television, NTSC, in the

building. It was a different format than normal television, but it's the same thing. There was a reset pulse for the bottom of the picture frame, but they could never tell it was there because the oscilloscopes wouldn't see that little pulse once every sixty seconds. All of a sudden, a new scope came out and they could see the pulse. They knew it was working, but they couldn't see it. It was changing very slowly.

Weaver: To the best of your recollection, when did you first meet Ted Dabney and when did you first meet Nolan Bushnell?

Alcorn: Well, Ted and Nolan, that would have been in 1968 when I first went there. They were in that department working under Kurt Wallace. I met all of them there, and they were part of the team.

Weaver: Did you actually work with them as part of the team or did you not have direct work with them?

Alcorn: I was not directly working for Nolan or Ted at that time. I was working right adjacent to them. Again, Kurt was the boss of the area, so I was a fellow employee with Nolan in that regard. We talked. It was a small department. I remember Nolan was not noted for great engineering as much as he was noted for entrepreneurship. He put a little, stock-purchasing club together to buy stock, which was kind of weird. Stock buying back in the sixties was not something normal people did. Only rich people did that. There was no Charles Schwab or any of that. Nolan actually—this group would form, and they could pool enough money together to buy some stock. That's what he was more noted for than his engineering.

Weaver: Nolan contacted you very early in Atari's life, and in the interim, when he left Ampex, did you stay in close touch with him?

Alcorn: Not really. I worked at Ampex two six-month sessions, basically. He was there when I was there the first time. I went back to school and I got back in there in like 1971 and Nolan was gone. He was doing this crazy, insane thing. He was going to build—pardon the expression—a digital video game. Like, "Okay." And he and Ted went off and they were working for this little company Nutting Associates. One time, he invited his old friends from the group over to Nutting one day at lunchtime to see what he was doing. It was like, "Wow! This is really interesting, a digital circuit generating a television signal. Far out!"

Weaver: What did you think of the video control circuit trick that allowed them to make a spot appear and basically control it without a frame buffer or memory map?

Alcorn: Yeah, that was a very clever trick. People today just can't conceive—they want to know what the program was for *Pong* or this, and, no, it was none of that. The memory didn't exist, so Ted and Nolan figured this out. It was brilliant. You had the ability, with basically less than twenty chips, to generate a sync signal and put

a spot on the television screen. Now, you didn't know where the spot was going to be, but wherever it was, you could move it up or down, right or left until you hit something or whatever. You'd get control of it. Yeah, it was a pretty clever thing. People ask how much memory. I say, "None." [Laughs.] It was pretty clever.

Weaver: In terms of the cleverness of the trick, just to sort of make sure that people understand, what was the basic trick? How were they doing it?

Alcorn: Ooh. I don't want to get too technical here, but the trick was basically generating synchronizing pulses; that is, the horizontal pulses at 15,000 hertz and vertical pulses at 60 hertz that synchronized the television vertical and horizontal. Okay. If you've got that, you can do that with about six or seven chips. If you built another sync generator and powered it up, you could make a spot somewhere on that television screen. If you changed the counts of the second generator compared to the first one, it would move up or down or stationary or right or left. Like, "Wow. That's really clever, what it can do."

Weaver: In the game *Computer Space*, diodes were used instead of digital logic. What did you think of that approach, and who created it?

Alcorn: *Computer Space* had to have an image of a spaceship on there and flying saucers. That was created with a little diode array that on the circuit board looked like the drawing of the spaceship. That was a fairly clever—not terribly clever, but a cute way to make [it work]—there was no other choice. ROMs didn't exist, and so that's what it was. It was just handmade with diodes. I did the same thing on *Space Race*.

Weaver: Do you know who made that? In other words, do you know who actually made that circuit board or made the schematics for the circuit board?

Alcorn: For?

Weaver: For *Computer Space*.

Alcorn: No, I did not. I don't know who—I mean, the design was done by Nolan and Ted. Who laid that circuit board out, I do not know.

Weaver: Did you ever see *Spacewar!*?

Alcorn: The *Spacewar!* game running on a PDP-1?

Weaver: Yes.

Alcorn: No, I never physically saw it. I'd heard about it, but, no, I did not.

Weaver: Did you see or were you familiar with the approach taken by Bill Pitts and Hugh Tuck in their *Galaxy Game* at Stanford?

Alcorn: Yes, I've seen the Bill Pitts game. That's a funny story. Shall I tell that story?

Weaver: Absolutely.

Alcorn: We got *Pong* up and running, and one of the things that we had at Atari that we didn't have at the Syzygy company was much money. But we had this contract from Bally that gave us some money. Nolan had a bunch of pinball machines that we put around in the area, so we had a small route of games, mostly pinballs and driving games. Once *Pong* had a cabinet, one of our first locations was the Student Union at Stanford. There was another machine in there and it was Bill Pitts' *Spacewar!* game. He'd basically taken the PDP-1 program and run it on a minicomputer with an XY display very similar to [*Spacewar!*]. The whole setup was similar to the one in the PDP-1 except it was cheaper.

But he's there. I remember going in there to scoop money out of the *Pong* machine, probably the dumbest game ever made, and he's sitting there at the teletype reprogramming this thing. We were both going for a quarter a play. Nolan said, "He's probably losing a dollar every time you put a quarter in doing that." I thought it was particularly ironic that I'm scooping quarters out of this stupid, simple *Pong* machine and he's working hard on those things. God bless him. But Nolan knew right off the bat that that was not going to work. He tried to do that, but it didn't make any economic sense. That's how he and Ted came up with the Bushnell motion circuit.

Weaver: You mentioned that both your game and the *Galaxy Game* were a quarter a play. Now, if memory serves correctly, I think most plays at that time were a dime, weren't they?

Alcorn: That's right. Most pinballs were basically a dime or three plays for a quarter, yeah.

Weaver: So, who came up with that leap of marketing faith that people would pay a quarter?

Alcorn: Oh, that was Nolan. I mean, that was Nolan all the way. It was there in *Computer Space*, so we did it [with *Pong*]. That's probably one of the many reasons why *Pong* was a big success, because given the same number of plays, we made two and a half times the money.

Weaver: You clearly have an affection and respect for Nolan, as evidenced by what you've told us. What about Nolan and Atari made you take a pay cut from Ampex to be part of this new firm?

Alcorn: I'm working at Ampex in the video file group. Nolan and Ted are off doing this crazy thing with Nutting Associates. One day, Nolan says, "Hey, let's go have lunch." He and Ted come by and take me to lunch in this turquoise blue station wagon, new, and it's a company car.

I go, "Wow. That's cool. Free driving."

They basically offered me a job in the Syzygy company. They were going to quit working at Nutting Associates and start a new company. They offered me a salary of \$1,000 a month and 10 percent of the stock. Now, I was making \$1,200 a month at Ampex. He didn't realize that. But Ampex, I could see, was in trouble. It was *not* the future. It was not as much fun as it was the first time I was there. I was young, you know, no overhead. I didn't think the stock would ever amount to anything. I didn't even know what a stock option or stocks were fundamentally. \$1,000 a month was enough to keep me alive, and it was going to be a hell of a lot more fun. I figured it would fail like most little companies did and I go back to Ampex after that. That was my plan.

Weaver: Had you seen other people leave Ampex and come back, and did they end up benefiting from going away from Ampex, in your mind?

Alcorn: I actually didn't see anyone, to my recollection, that ever quit and came back, but I'd heard stories about it. As far as career advice, you know, that was still the day when you worked at Ampex and you stayed there your life, you retired, got the gold watch, and a hearty handshake. So, yeah, that was sort of my plan. But when we left, Charlie Steinberg, who was the head of the group and the division, sat down with Nolan and told him, "You're making a big mistake, son. You're throwing away a career for this startup. Most of them fail, and you're really risking your career." [Laughs.]

Years later, Nolan and I had lunch with him, and he said, "God, I wish you'd taken me away."

But the other side of that was Kurt Wallace, who was Nolan's boss. When Nolan resigned, Kurt wrote on Nolan's exit interview that, "Someday I'll be working for this man either as president of Ampex or president of a company that's bigger than Ampex." He was the only one that got that one right. He saw something. Saw more than I saw.

Weaver: Just to put it into perspective, what number Atari employee were you?

Alcorn: I was employee number three. Nolan was number one, Ted was number two. I think there were maybe, you could say, six or seven or eight people in the next month or two.

Weaver: Let me ask you a question about that in terms of the earliest time of Atari. I have it on different authority that the receptionist...

Alcorn: Cynthia Villanueva.

Weaver: Cynthia Villanueva was actually employee number one and you were employee number two, because they were not yet other employees of the company. Is that true?

Alcorn: No. Nolan was number one, I was number three, and Cynthia wasn't—she was just Nolan's babysitter. She was too young to really be hired, I think. She came in after school and answered the phones, and she could type. She was a sweetheart and helped me organize my little lab. I don't know what number she was. I know eventually—she was certainly among the first five or six.

Weaver: Why did you believe that Nolan had a contract from General Electric for *Pong*?

Alcorn: Nolan told me he had a contract from General Electric to build a home video game. Why should I doubt him? [Laughs.] Sounded [good so] “Sure. Why not?” I knew he had something going on with Bally, and it kind of inspired me to go build the home game.

It was unfortunate, because it was during the whole development of *Pong*. It was a little depressing. I was failing. I could see I was failing. This was going to be digital TTL [transistor-transistor logic], off-the-shelf circuitry and it was going to cost way too much for a home game. I told this to Nolan, and he didn't seem to mind. “Oh, okay. I'll keep going. We'll see where it takes us.”

Weaver: Al, you've said in other interviews that Nolan described his schematics for *Computer Space* to you. Were you able to create similar circuitry based on his descriptions to use in *Pong*?

Alcorn: I was able to take advantage of his motion circuit. I really could not understand his schematics. It didn't seem to me worth the trouble to try to decode them. He had a funny way of drawing schematics, but he could verbally describe what I'd said earlier about how the motion circuit would work.

I sat down and constructed it. I just looked at schematics of *Computer Space* and got, “Ick. I don't get this.” I mean, it just wasn't worth [learning] a different language.

Weaver: Do you have any knowledge of where the idea for *Pong* came from?

Alcorn: Knowledge. Well, it certainly was, for me, Nolan's idea. I'd heard about this Magnavox Odyssey game, and I think Nolan mentioned it. Nolan was *not* impressed with the game at all. You'd have to ask Nolan, but from my understanding, I mean, *Pong*, to this day, is the simplest video game ever conceived of that was a video game. I think that's what he wanted. He wanted to, allegedly, get me up to speed on the circuitry, on the technique, and get my hands dirty building the simplest thing ever. Then we'd throw it away and build

the driving game, which he thought was going to be the winner. The more complex game. That, I think, was the motivation.

Weaver: If I understand correctly, you were working on *Pong*. What were Nolan and Ted doing?

Alcorn: In the early days, again, we had this route, so Ted and Nolan were putting pinball machines in local bars and taking care of that business. Nolan trying to get some revenue because we had no venture capitalists invested in this thing. We couldn't get a bank to give us a loan, so there was a lot of hustling to keep the doors open to keep the place alive. I was back in the corner, head down, making this simple game, trying to make it sort of fun to play.

Weaver: Al, did you interact with anybody on the operating side in the early days? If so, what was your sense of the coin-operated game industry?

Alcorn: The coin-operated game industry; this was all really important and great, because we did not create a new market. We just created a new technology for an existing market. This is the coin-operated business, and the coin-operated business works like this. Manufacturers like Bally, Midway, Williams, and Gottlieb would create products to sell to a distributor in a city. Typically, every city had two or three distributors, and they would sell to operators. Operators were the people that placed the machine in a bar or an arcade and then would collect the money from the machine. Typically, they would split the money 50-50. The operator would keep 50 percent and the location would keep the other half of the money. That was the ecology of that industry. That is really important, because it [already] existed. It was a coin-operated entertainment business.

The main distributor up in San Francisco was a company called Advanced Automatic. They must have had 100 or so operators as customers. Every year, I guess they had a dinner for their customers; you know, a "thank you" dinner. We were new on the market. I guess this had to be early 1973. We had some *Pong* machines out on location. Nolan said, "Hey, I'm [invited] to go to this dinner. I can't go. You go, Al. Get a free meal with your wife. Get dressed up and go to this dinner up in this city."

And I go, "No, I don't want to do [that]."

He badgered me into doing it. We go up there and we're sitting down at a table with another older couple. I was like twenty-four, twenty-five. [Laughs.] I introduced myself, and this older gentleman and his wife sit down, and they go, "Oh, you're from Atari." He reaches in his pocket, pulls out a little pistol, and puts it on the table. He says, "You know, you're operating in my area."

I said, "We'll stop that right away." [Laughs.]

I went back the next day and I told Nolan, “I’m not ever doing this again. Goddamn it, the guy pulled a gun on me.”

“Oh, he was just kidding.”

I say, “*You* go to these things from now on.”

Yeah, we were not—any new operator was not appreciated. We were sniping in his territory, I guess.

Weaver: Were you tasked just to design the circuit board or were you also responsible for sourcing the other components? Connectors, wiring harnesses, controls, power supply, things like that?

Alcorn: Well, yeah. I mean, I was the project—I was *the* engineer. Part of the job of engineering is to select components. That was a challenge. One of the things Nolan had to do was convince the suppliers that we were real. It was a lot of work. Getting a cabinet made, that was another huge thing. The original *Computer Space* was in a fiberglass cabinet. We were going to try to do that with *Pong*. I went over [to the prospective manufacturer] and we viewed the place. We damn near passed out from the fumes. Nightmare. Well, fortunately, there was a big cabinet manufacturing shop that didn’t have enough customers and they helped us design that.

Nolan had to convince the electronic component suppliers—and this is *very* critical—to take our account and give us essentially credit. Again, we didn’t have loans from the bank or anything. We were running on very, very thin money. One of the big breakthroughs was getting Kramer Electronics to give us like ninety-day credit for the parts. From the component’s standpoint, the big distributors were really our first investors. They were more willing to give credit to us.

The design, the product was so simple. When we started building the *Pong* machines, we could take the parts and turn them into finished games in like two weeks. And we sold them. They were so popular, we sold them for cash up front. All of a sudden, we were making profit, and we had hardly any overhead. There was nobody there, so we became profitable from the get-go. I didn’t really understand much about the business side at the time, but since then, I have learned.

Weaver: How did you work to improve your sourcing of parts and reliability that would stand up to the abuse that patrons would put on your machines?

Alcorn: Nolan and Ted had designed *Computer Space* in a more traditional way. You were supposed to do electronics in those days with three or four little circuit boards going into a card cage and then having a back plane. A lot of connectors and a lot of wiring. I became aware of a new trend. A different way of looking at

the whole thing would be you don't want to have those boards. You don't want to have all that because it's just trouble-prone. They also had a vacuum-tube television in there, which I thought was really a big mistake. But one of the main advantages of *Pong* was I was able to take a standard-size, printed circuit board material, copper-clad, about a foot by 18 inches, and put the whole circuit on one board. That was very, very critical. That was a very important thing, because now there was no power connectors or any of that stuff. The very, very simple interface.

One of the other big advantages was a new part had come out—I think it was Fairchild—with a 5-volt, three-terminal regulator on one part. One of the things that the *Computer Space* had to have was a 5-volt power supply. Back then you could buy, for about \$35, a little open-frame power supply that would take 110-line voltage in from the power line and make a 5-volt power. It was a normal kind of circuit with a few parts on it. It had a control to adjust the 5-volt power supply to get the voltage you wanted. That was a real failure-prone problem for me.

At the time, the field sales engineer for Fairchild was a gentleman named Jerry Lawson, a big black man with great stories.² He saw what we were doing, and he showed me this part. I go, “Wow. I've got to have that.” He also showed me a single-chip character generator for video that would work with a video digital circuit. It generated seven-segment numbers on the screen, or actually a five-by-seven array. A beautiful little part for five bucks apiece. I put both of those parts in the *Pong* machine. The first original *Pong* has that character generator part in it. Nolan said, “No, can't do that. It's too expensive. You've got to do it by hand.” [That meant] decoding all the segments, which he forced me to do.

But the 5-volt power supply, it was really critical to have that thing hooked on the board. You could not take it away. It saved a lot of money and made it much, much more reliable. The first fifty or so, maybe twenty, *Pong* machines had the external 5-volt power supply because we couldn't get the parts initially. They were so new. Those games all had to come back and get replaced because our lovely operators were used to working with things with relays that made sparks. They had big screwdrivers and stuff; they didn't have oscilloscopes. When it wasn't making enough money and the volume wasn't loud enough, they would turn the power supply up and blow the board out. [Laughs.]

Weaver: What do you recall about the first time that you saw *Pong* in the field?

Alcorn: Saw *Pong* in the field?

Weaver: In the field. In other words, when it was actually out there, what do you remember of the first time you saw it?

²Jerry Lawson [1940-2011] was known for his work in designing the Fairchild Channel F video game console (1976) as well as pioneering the commercial video game cartridge.

Alcorn: Oh, oh. Well, the first time I saw *Pong* in the field was the day after [its release]—it was a Monday or Tuesday. Ted Dabney had decided to put the *Pong* prototype in a cabinet; a very, very crude prototype, wire wrap. I went and got a little Hitachi black-and-white television from Walgreens for like 75 bucks, turned it into a monitor. Ted put the board and the monitor in a box, slapped on a pony-ride coin box mechanism on the side of the machine. We took it to our best location, Andy Capp's Tavern, one evening after work and put it on a barrel there next to a *Computer Space* that Nolan had in there. We got a beer, sat back, and watched the first guy to play the machine.

Now, I didn't think this was going to amount to much because, number one, *Pong*, the first machine just had the name "Pong" on it; no instructions, nothing. There'd never been a game like it. It required two people, not one person so it wasn't obvious it would get played. But they did, and I got to see it. It was an impressive, impressive opportunity.

Weaver: That reminds me of a story that I read. Didn't Nolan want instructions on *Pong*?

Alcorn: Well, yeah. Nolan said, "You've got to have instructions." When we did the production cabinet, it had to have instructions.

I argued with him. I said, "Nolan, if you have to read instructions to play an amusement game, we've lost. It has to be easy enough."

He says, "No, it's got to—."

I said, "Well, pinball machines don't have instructions."

He says, "Yes, they do."

Went in the back where we had some pinball machines, and, darn it, on the lower left corner there's a list of instructions about what the targets are. Wow. I'd never noticed that, but, "Okay."

I'm not sure who came up with them, but I think I did. It was "Step one: insert quarter. Step two: ball will serve automatically. Step three: avoid missing ball for high score." [Weaver laughs.] It seemed to work, if anybody ever read them, but there were the instructions.

Weaver: After you finished *Pong* initially, were you ever given any instructions on making the gameplay more complex? Or did Nolan and Ted just accept it as you presented it?

Alcorn: Oh. You're saying as I was finishing *Pong*?

Weaver: Right. As you were finishing *Pong* and showing them what you'd come up with.

Alcorn: Well, okay. The original request by definition was the paddles, a net, a score, and the ball bouncing back and forth. I got that to work, but that was not at all fun to play. Either if the ball was slow enough to get started, it would be way too boring. If I sped the ball up faster, you couldn't get started. I built a circuit that counted the number of hits off the paddle and upped the horizontal speed three steps. That made that more playable. To me, it seemed fun. I'm sure Nolan and Ted had their advice and their opinions.

Weaver: When you created *Pong* originally, did it have sound, or did you add sound later?

Alcorn: The original *Pong* had no sound in it. Again, I was kind of disappointed in what I had done because it never met the goal of being cheap enough for a consumer game for General Electric. In fact, nobody from General Electric ever came by or called or wrote us a letter. Never occurred to me that this might have been BS [bullshit]. But, okay.

Nolan said it had to have sound. I was still under the delusion we were going to sell it to General Electric. Nolan wanted the roar of a crowd of thousands. Ted wanted boos and hisses of defeat. I went back and said, "Okay, I'll look at it." I poked around the sync generator for some tones that were already there and gated them out, and hence the sounds on *Pong*.

Nolan was not thrilled. I said, "Nolan, if you want it—here's the wire wrap gun. You go design something. I have no idea how to begin to make the roar of a crowd of thousands from digital electronics like that."

Nolan [said], "Okay, we'll leave it that way."

Years later, I've seen articles about how wonderful the sound was, and I just giggle with that. Maybe [I should] send Nolan a copy. [Laughs.]

Weaver: Was the original idea to manufacture coin-op games or to just license the IP?

Alcorn: When Nolan hired me, the original goal for Syzygy was to be an engineering design company and sell the design. License the design to people like Bally, and we would get wealthy off of our royalty checks. That was the mission, but I think once Nolan started seeing the success of *Pong*, the real popularity, he decided that, "We're going to make more money if we build the machines ourselves."

I remember him coming back from a visit to Bally saying—we were sitting at the bar at Andy Capp's. Ted, Nolan, and I, and Nolan said, "We're going to get in the manufacturing business."

And Ted and I said, "No, no, no, no, no. That's not the plan."

We disagreed, but, of course, Nolan always won those arguments, so we were in the manufacturing business. “Okay. What do we know about manufacturing? We’re three electrical engineers. [Laughs.] Okay. How hard can that be?”

Weaver: I’ve heard many different interpretations of the story about Bally rejecting the game. In other words, to the best of your knowledge, how did you convince Bally to reject the game that you presented? Who came up with this “checkmate” idea?

Alcorn: Unfortunately, I was not in that meeting with Nolan. Now, remember, one of the things that we had at Syzygy company was a contract from Bally to design a video game, a pinball machine, and some big arcade attraction. For that, I think they gave us a few thousand dollars a month. Now, in retrospect, and what I’ve learned about business, it was a very, very smart move by Bally. One of the adages is “Keep your friends close and your enemies closer.” I’m sure the guys at Bally said, “What the hell is this *Computer Space* thing? It’s not a very good game, but it’s a whole new approach to designing coin-op stuff. It’s by this little company called Syzygy.”

And Bally was the God. Syzygy was the— “Someday we’ll be as big as Bally.” Yeah, right.

So, we had this contract with them. Nolan, at the same time, finished a design for a two-player *Computer Space*. I think there’s one here at the Computer History Museum, the prototype. He was doing that while I was doing *Pong*. I figured *Pong* would be the game he would give to Bally and we’d all be rich, cashing checks. Now, I don’t know. The story’s changed. My understanding at the time was Nolan realized how important this game was going to be and didn’t really want to give it to Bally. I think he went back and had a meeting with Midway, which was a division of Bally. He convinced Midway that they didn’t want it and then told Bally that, “Midway didn’t want it. Why would you guys want it?” And, you know, “We’ll build a better game.”

That’s when Nolan came back and told Ted and I that we had to be in the manufacturing business. We didn’t want to be in the manufacturing business, and I don’t know what the real perception of Bally was about *Pong*. I don’t understand. It’s kind of muddled in my mind. I’m not clear on that, but Nolan would probably know better.

Weaver: Now that you’re in the manufacturing business, who and where did you hire your factory workers?

Alcorn: Wow. How did we do that? Again, we got lucky at one point. Yeah, we had a little office on Scott Boulevard in what you’d call a little garage. [It was] a little entrepreneurial business area with small companies in there. We had no physical space to do much. Nolan rented the space next door to us and busted

a hole in the wall so we could, you know, expand our facility, but we had no assemblers, techs, none of that.

One day, we were getting board stuff at this operation that was electronic parts component manufacturer, a training school for people to send their children to learn how to be an assembler or work in a factory job, which was kind of BS. All you had to do was show up and breathe and any company would show you in a day how to build these things. Anybody could do it. But, nevertheless, this school apparently had these guys graduating. One day this guy shows up with his whole graduating class, about twelve kids, and basically said, "You need to hire these guys."

And Nolan and Ted and I went, "Huh?"

We went back in his office and realized that, "Yeah, why not. Let's do it." And we hired them.

I remember I took two of them away, Dan Corona and one other guy, and I want to make them technicians. [Teach them] how to read an oscilloscope and how to troubleshoot a board.

We then rented an old roller-skating rink up on Martin Avenue, up the street about a half a mile from our Syzygy world headquarters. Now it was called Atari. I remember when they rented this [thinking], "Wow. A roller-skating rink. It's *ours*."

I go in there, and this place had been empty for like a year. I was driving a Triumph 650 motorcycle at the time, and so I figured, "This'll be fun." I'll go in this big place, get my motorcycle in there, and start blasting around. Well, unfortunately, shellacked hardwood roller rink floors with dust on them are *not* the best thing for traction, so I realized. I didn't spill the bike, but I went, "Shit. I've got to get out of here."

Anyway, pretty soon, we were building stuff. I think we went down to the Unemployment Office and employed people. We just hired them. We got a very colorful cast of characters. It was pretty primitive. Again, none of us knew what we were doing in manufacturing, but how hard could it be? Since this factory, the original factory, only built one thing, *Pong*, basically the employees trained themselves on how to build *Pong*. We had no documentation or any of that fancy stuff. Eventually when we put another game into production, it kind of blew up and we had to get documentation and all that stuff. But it was very colorful. We hired some very interesting people that didn't always work out. We were victims of many thefts. If it hadn't been for the great success of *Pong* and all the money that it made, we would have failed.

One day, Nolan and I were sitting in the office after work and we were reading one of the trade rags and it told a story about Signetics and this component called

the 555 timer, which had just been invented by them. I used about four or five of those parts on the original *Pong*. We had a bunch of them. We were reading about the total manufacturing capacity of how many Signetics could make and we realized that we thought we had over half the world's production in our inventory. I said, "That can't be."

Nolan and I run go to the factory in the warehouse to count the parts. We didn't have any. [Laughs.] The bad guys we had hired—put, planted, or coopted one of the employees in the stockroom. We were buying the same parts three or four times, and like, "Uh-oh." We managed to survive that somehow, but, yeah, then a few other little incidents like that happened.

Weaver: You bring up an interesting point. How soon after *Pong* was released did you start getting ripped off by competitors?

Alcorn: Oh, man. Like I said, [*Pong*] was really simple. Anybody could essentially make a Xerox copy of the printed circuit boards, put the parts in, and you had a *Pong*. You didn't need to know how it really worked or anything, although we were open with the schematics. One service guy at Advanced Automatic told me that he had given the schematic to our competition. Worse yet, we had one supplier, whose name I'd prefer not to mention, making circuit boards for us and doing some assembly. We found out later that he was selling more boards to our competitors than we were. So, yeah, success has many fathers. Failure is an orphan. You know? Yeah, they copied it. I think we actually manufactured and sold three or four thousand *Pong* machines and there were like 12,000 [*Pong*-derivative] machines out in the world. Imitation is the sincerest form of flattery, but I prefer the money. That was a problem we suffered in our early days.

Atari became the advanced development for the entire coin-op industry. We would design something, and these guys had it down. They, within three months, would have a rip-off in the marketplace. Part of the problem was that in every major city, there were three operators or so. We basically could get one-third of the market and there were two other operators in the city that couldn't get *Pong* the way it was set up. We'd be happy to sell it to them, but it just didn't work that way. It was a problem in getting our market to grow.

Weaver: Given the nature of the ecosystem that you were operating in, what was the company's philosophy about IP protection? In other words, was it better to try and go heavy into protection or just outrun the bastards?

Alcorn: Nolan had filed for a patent on what was called the Bushnell motion circuit when he was at Nutting Associates, so we had that patent. We had a patent attorney, Baylor Riddell [phonetic], that was working with us. But we did not have the time or energy to actually sit down [to write a patent]. If you've ever written a patent, it's a difficult, time-consuming process for the engineer. We didn't feel that it made much sense. The kind of people in that industry that would rip us off, like Allied Leisure and stuff like that, if you did sue them, they would just go

away and reform as another company. You weren't going to win a suit. A suit would take two or three years to win and it just wasn't worth it. We felt that we had one thing that our competition did not have: we had the ability to build the next game. That was our strategy; just keep moving faster than they did. That sort of worked.

Weaver: About this time, I believe Ted Dabney left the company. Can you shed any light? What was your relationship with Ted at this point? To the best of your knowledge, what was the story behind Ted leaving or being forced out of Atari?

Alcorn: One day, I was working in my little office on Scott Boulevard and Nolan came in and closed the door and said, "I've got some bad news for you, and you're probably going to quit."

And I go, "What?"

He says, "I'm going to have to let Ted go."

Ted and I were good friends. I had a lot of respect for the man. I was stunned. My first instinct was not to leave, but I was like, "What the hell's going on?"

The problem was Ted had taken on the responsibility to run the manufacturing. Ted knew no more about it than Nolan or me, but Nolan said he wasn't doing it. "We've got to get somebody else in there or we're going to fail."

At about that time, Ted Dabney comes into the office. Kind of uninvited, but, hey, he's friends with me. No problem. He comes in and Nolan sits down. They talk, and Nolan asked Ted, "Hey, Ted, what's our manufacturing capacity? How many machines could we build?" He asked a few very fundamental questions, and Ted did not have an answer for those questions.

It was like, "Wow." I did not know this. I was disappointed, stunned, heartbroken. But that's what happened. Yeah, it was sad, sad for me.

Weaver: As a side question, did you maintain a relationship with Ted thereafter? Did that sort of survive time in terms of staying in touch or falling out of touch?

Alcorn: I didn't really have a big relationship with Ted after that. You know, Ted was very unhappy about being let go. He was bitter. So, no, I did not see much of Ted after that, no.

Weaver: Were you ever tasked with creating a hockey video game?

Alcorn: Hockey? No, no, no. After *Pong*, there were some new games, *Space Race* and *Gotcha*, that I designed, but the market wanted more ball-and-paddle games. By then, I actually hired some other digital hardware engineers in, so there were many variations of *Pong* that were created. There were soccer games. One of

the painful lessons we learned was that people just wanted the ball-and-paddle games. The soccer game was created, *World Cup Soccer*, by our customers in Europe saying, “This is what we want. *This* will sell great.” We created exactly what they wanted, and it was a dog. We learned that we can’t listen to the customer. It’s like what [Steve] Jobs used to say, you know, “They don’t know what they want. I know what they want.”

Weaver: You mentioned *Space Race*. I believe that was Atari’s second game.

Alcorn: I guess so, yeah, yeah, yeah.

Weaver: Where did that concept come from? Who helped you make it?

Alcorn: I went in the lab and designed it. I didn’t need a lot of help. I stole the idea for the mapping out the spaceship with the diodes from what I’d seen on *Computer Space*. Nolan described a game; we kind of brainstormed it together. The problem we had now, we were this little company and, all of a sudden, growing pretty fast. Again, we could make a *Pong* machine for about \$500, we could sell it for \$1,000, cash up front. We were making this as fast as we could. Meanwhile, I knew I had to have another game because the competition was eating us up with knockoffs of the *Pong* machine. It was really hard because I had to keep *Pong* in production, which is a production engineering task I didn’t really want, but I had to do this [other] machine. It was very, very difficult and hard to find the time to do both. I think [*Space Race*] was mostly my idea. I know the *Gotcha* game was inspired by a defective *Pong* board where the gate was bad. You’d see segments of the digits of the seven-segment generator thing all over the screen. I go, “Wow. I could just unleash that, make them move, and create a maze that would change.” That’s how that was inspired.

Weaver: At this point, who would you consider Atari’s chief game designer?

Alcorn: Okay. Define game design. If you’re talking about the concept, that would be Nolan. After that, any of the design of the circuitry or whatever was me. I was the sound engineer, the graphics designer. Somebody asked me, “Who did the graphics on *Pong*?” Me. “Who did the sound?” Me. I did everything. [Laughs.]

Weaver: What role, if any, did Grass Valley and any others play offloading some of these design responsibilities? When did that occur?

Alcorn: Yeah, Grass Valley was a brilliant move by Nolan. Two of the best engineers at Ampex, Steve Mayer and Larry Emmons, left Ampex before I did. They decided to move up to Grass Valley, Nevada City up in the Sierra foothills. There was a company up there called Arvin Systems that was building some kind of a military videotape recorder. They went up there to work on that company, find their fortune working as engineers there. That company failed. The two guys formed their own company called Cyan Engineering, named after the color cyan. They had a little office up in the Litton Building on a mountaintop in Grass

Valley. We had talked to them, because we were friends, associates at Ampex. Nolan says, “I want to hire these guys,” or their company, “make them a key advanced game development.”

Now, I was young. I was twenty-four when we started Atari. I’m thinking, “Wait a second. These guys—I mean, I’m the guy.” There was a rivalry there. I was a little bit innocent about this whole thing and didn’t understand the importance of this.

Nolan said, “They’re going to report to you.”

Part of me was a bit insulted because I thought *I* was the engineer, but these guys, they were friends. Both of them were just wonderful friends, so I went along with the gag. Thank goodness. They were able to put some real thought into advanced game design, and they were instrumental in making Atari the company that it became. The fact that they were up in Grass Valley with their own company, Cyan—it was small, maybe five or six people—was really brilliant. There were times when Atari was on credit hold and we couldn’t get parts, but they could because they had maintained better credit history than we did. They could keep in business. It became one of Nolan’s really brilliant ideas. That and Kee Games, which we’ll talk about, I’m sure.

Weaver: *Space Race* was one of the first games that utilized a joystick.

Alcorn: Yes.

Weaver: Was it difficult to source suitable controls that, again, would stand up to the abuse of patrons?

Alcorn: Controls. Let me talk about controls. If you’ve ever played *Computer Space*, it’s got four buttons: rotate right, rotate left, thrust, and fire. It is *really* difficult to play. It obviously needs a joystick. Indeed, people don’t realize that the first *Computer Space* had a joystick. I don’t know who over at Nutting designed it, but it was like a cast aluminum thing. One of the first locations they had was a big shopping center down in San Jose that had a Sears store nearby. Within a couple days of that first *Computer Space* with the joystick, somebody just ripped the joystick off. [Laughs.] They figured it probably had something to do with the fact that it was next to the tool department at Sears. They could just take a wrench and pull. That didn’t work. We knew that *Pong*, with just two potentiometers, and they had problems. The pots would wear out. The first pots would wear out in three weeks, so we had to get industrial-strength pots.

But the joystick we knew was a big problem. One of the [advantages] Grass Valley supplied, there was other companies in that Litton Engineering Building that we worked with. One of them was Jim Heb’s company that was a mechanical engineer out of Ampex. He designed, somehow got it tooled, and built this joystick made out of plastic with a stainless-steel bar in the center that Godzilla

could not bend. Yet it was cheap. In those days, you could buy joysticks. They were hundreds of dollars, if not thousands, in the military stuff and big computers. We had to get clever and design a consumer indestructible-grade joystick. They did it. It was really important.

Weaver: In 1973, the market was completely inundated with *Pong* clones, but Atari kept trying to release original concepts like *Space Race* and *Gotcha*. Where did Atari engineers look for inspiration for new games? Was it Cyan?

Alcorn: Well, it was primarily Nolan Bushnell's mind. I mean, Nolan's got a great new idea every month or two and about a hundred shitty ideas in between that. There were plenty of ideas. But I remember when it came time to do the driving game that became *Gran Trak*, Grass Valley was tasked with this. Nolan and I had a little airplane, and I'd fly up there a few times a month. Nolan and I were up there talking to them, and there was an article in *Scientific American* in Gardner's column on mathematical recreations. Great magazine. It talked about making a racing game, a car racing game using graph paper and incrementally moving it so much and how it was done. We said, "Hey, that's exactly how you could control a driving game." They went off and did that. That inspiration came from that. I remember that one.

Some of the ideas you could have were fairly obvious. It was just a trick of how you could manufacture them. The problem with the driving game was going to be the controls but thank God we had this relationship with Jim Heb up at Grass Valley then. He designed the steering wheel plastics, the gas pedal, and the gear shifter. Those were well engineered, thank God, because these machines take a beating. If that machine steals your quarter, the customer feels he has a right to destroy the machine.

Weaver: Al, *Gotcha* was released in a limited color monitor version. What do you remember about the development of that variant, and why was it not widely released?

Alcorn: I remember the color *Gotcha* was brought to my attention. I believe it was done well after the original run of the black and white, but I think one of the engineers wanted to build a color version. They got a color television set, turned it into a monitor, and basically drove the video grids directly: red, green, and blue. But it was just one of many tries and ideas that were a little bit before its time. I wasn't terribly involved with it at first. When I first recalled it a few weeks ago or months ago, I didn't recall it at all. I remember that now. I saw a schematic and, yep, we did it. But, hey, when you're being innovative, if you can't withstand a few failures, you're never going to succeed.

Weaver: Atari released a string of *Pong* variants as well starting with *Pong Doubles*. Why?

Alcorn: That's what the market wanted. That's what would sell. Anything that was a ball-and-paddle game would sell at that time, so we did *Pong Doubles*. I believe there

was a *Quadrapong*. There were many infinite versions of that. One of the colorful ones was a game called *Breakout*, but that has its own little story. Ball-and-paddle games seemed to be what people wanted, and so we did it. Although we kept Grass Valley out of that. Their goal was trying to come up with new technologies.

Weaver: How was the engineering department organized in the early days? When did you start running it?

Alcorn: I was twenty-four when we started Atari, twenty-five by 1973. I was very young. It just started organically, hiring in some other engineers—a team of two or three guys—to build other games. Plus, the Grass Valley group that was up there doing advanced research. They were really not good at production engineering. That wasn't their task at all. I wind up being, effectively, the vice president of engineering, managing some of these people like Larry Emmons that were older and more senior than myself. I felt a little uncomfortable with that.

But the other thing was I was now a manager, which is a lot different than being an engineer. I'm an engineer. I like to build things. I like to think. When you're the manager of the engineering department, you're not. You're more of a babysitter or psychologist, child welfare. You're dealing with all these problems and none of the fun of building anything new. Nolan had kept bugging me to do a home version of *Pong*. I wound up giving the whole thing away to Steve Bristow, who became, effectively, the VP of engineering for coin-up. I wound up working on the consumer stuff.

Weaver: Just to sort of get a proper sense of the relationship, what was the real relationship between Cyan and the Atari engineering department? In other words, did Atari engineers focus on putting products into production while Cyan did the R&D?

Alcorn: I would say that Cyan was more the advanced development stuff. They would create harder, bigger bites, like the driving game, and then the engineering department down in Los Gatos at the time would [put them into production]. We designed our own games, absolutely, and put them into production, but Grass Valley was doing the harder, longer-range stuff that would come down. Now, one of the things you have to be aware of, and it's true in *every* company, is that engineering doesn't get along with the research people. Nobody gets along with manufacturing; nobody likes the marketing. There are all these group rivalries, so I had to actually sit astride the advanced development group and the Atari engineers. There was some clash of that going on. But, yeah, I get bored easily.

Weaver: Did you collaborate on these games equally in the early days? Did most of the game ideas come out of Cyan? Or were they really effectuating the more advanced ideas that you were talking about?

Alcorn: Cyan was really doing the more advanced stuff. I would go up there and we'd have meetings. It really was a great group to work with. We could talk about these concepts and what was going forward, but I eventually wound up having a lot of respect for those guys. Meanwhile, I had my own little craziness going on down in Los Gatos with my team of strange people. People tend to hire in their own image, and that can be a little interesting when it's me. [Laughs.]

Weaver: I believe it was around this time that you took a leave of absence from the company when your mother was diagnosed with terminal cancer. Were you always planning to come back at the end of it?

Alcorn: That was a very difficult time. Nolan had read a book—he does that from time to time—and the book told him that in a company that's growing fast, you have to fire the engineers that got you to \$1 million and hire in a different team that knows how to make the company even bigger. Nolan decided to hire in a whole new crew mostly from Hewlett-Packard [HP], plus his wife's brother, John Wakefield, that was a psychiatrist or psychologist in Los Gatos. He was the president. It all didn't work out very well. It was a tragic mistake.

I was basically put on the beach and effectively went on a sabbatical, dealing with my mother's passing. That gave me the time to go do that. About the time that she did pass away, basically the shit hit the fan at Atari. The wheels were coming off the bus. I was asked to come back and resume my old position, which I did.

Weaver: Al, in terms of Nolan wanting to remake corporate management to theoretically grow to the next level, can you go into a little more specificity? I know that there was a time when Joe Keenan came into the picture, but before he came into the picture, when you talk about "wheels coming off the bus", can we be a little more granular about that in terms of what was going on?

Alcorn: Yeah, but it eventually would involve talking about Joe Keenan. We haven't really established that yet. But for right now, Nolan hired these people from Hewlett-Packard and Lloyd Warman, a manager at Ampex Videofile that we had worked with. Lloyd Warman replaced me. [Dick] Mobilio was the marketing-sales guy. [Les] Oliver was production engineering. They had a finance guy. These guys were supposedly pros.

It did not work out well at all. They really did not understand anything about an innovative company. This was the thing. There were not that many startups and things like Atari around at the time. When you brought in people that were lifers at HP, effectively B players or they wouldn't have left, they're trying to put in *their* knowledge of how things are done. It did not work in a fast-growing industry. At Hewlett-Packard, to design a product and release it to production was about a two-year process in almost anything. The idea that we could run things like [HP at] Atari, where from concept to actually in production was three to six months, [seemed improbable.] The game would be out of production in another three or four months and we had to feed it with another machine, so

that was a whole process. The innovative side, the coin-operated—they knew *nothing* about coin-operated business and were not very curious about it. They made a lot of bad mistakes. Even the finance guy had screwed up our relationships so much that the banks wouldn't give us credit anymore. It was a real disaster.

Lloyd Warman was friends with the guys up at Cyan because they had worked at Ampex, especially Larry Emmons. Again, there's always this competition. [Cyan basically said,] "Those production engineering guys in product development down at Los Gatos don't know what they're doing. We know more about it than they do."

Lloyd said, "Sure. Go ahead and productize."

The first driving games were productized by Grass Valley. We built about fifty of them. Eventually, we had to take them all back because they just wouldn't work the way it was built. It was just a nightmare. Eventually, we got it put back together.

Weaver: In terms of saving Atari from itself, what occurred? In other words, why was Kee Games created? Who was Joe Keenan? What ensued to try and salvage what was left of Atari?

Alcorn: All right. I'll tell you that story. Start with Joe Keenan. Before any of this craziness happened, we were constrained. In coin-op, we were only really able to get a third of the market because of the way the business was set up, as I described before. Nolan had understood the [advantages of splitting a company.] General Electric made appliances, but they had another company called GE Hotpoint, a separate company. It was the same product in a different brand. And so, "Oh, okay. So, we'll set up our own GE Hotpoint thing."

Nolan's neighbor was a gentleman named Joe Keenan, who was a sales guy at IBM at one time and was in the computer business. A very, very smart guy. Nolan said, "Hey, you be the president. We'll call it Kee Games."

We gave them Steve Bristow at the time to be their VP of engineering. A little bit of Atari went out and they split [into Kee Games] with the driving game. I think they had a tank game, but the first thing was to sell the driving game. It was wonderful. It was delicious. It was just pure Nolan, because at Kee Games, I was on the board. Nolan was on the board. It was us. But we told our distributors that, "Those bastards stole our games. They stole our best engineer. We hate them!" Of course, that inspired them to go off and now talk to them and give them all this business. That was delicious.

All the distributors, anybody could have looked up in the records of who was on the board and they could have seen it was the same company. But the customers wanted it, it was beautiful, and it worked. In fact, as Atari was now dying from all

these B players that Nolan put in: Joe Keenan and [Steve] Bristow. Those guys said, “Great. You go die and we’ll pick up the ball and run with it from here.”

And we said, “No, you’re not.” [Laughs.]

When we first started selling *Pongs*, Nolan wanted to sell them internationally, and he shipped some sample games over to Japan. Now, Nolan didn’t understand *anything* about this. We just shipped them over. “How hard could this be?” We had no export license. We had nothing. These machines got seized at the border in Tokyo, Japan, and [we] were stuck. We couldn’t sell anything. Anything we did, it was just a nightmare, international sales.

Nolan hired this gentleman—this guy was an ex-employee out of Muntz, Madman Muntz television. He sold that crap. This guy knew his business. He knew international sales. He had a huge percentage of international sales that was almost unfair, but [the situation] was a disaster. He did a good job for us and got us going again. He saw when this was happening, that we were dying, he saw his goose that was laying golden eggs for him going away. It was in his interest to get this thing going again. He came back and had the courage to get Nolan to fire all these people, get me to come back, talked to the banks, and got the money going again. That was very critical. It was probably him that said, “You get Keenan to merge that back in with Atari.” Now we had a sane president. Not to say that the psychologist was not sane, but he just didn’t know anything about running a company. [We] basically reformed the company. That’s why it happened.

Weaver: I was actually seeing if I could find out who it was, because I do remember reading that as well. We will look it up and we will come back to it..

Alcorn: Ron Gordon. He was international sales. Atari would have been dead if it was not for him. Very key guy in this whole thing. When Nolan went to Japan to try to negotiate with Mr. Nakamura on being our big distributor in Japan, he wanted to do business like he did in America. Nolan sat down with their boss and they worked something out, then the underlings would make it happen. That’s not how it works in Japan. The underlings do everything. The boss sits there on his throne, silent, and when the deal is ready to sign, they trot the bosses out. They come and they sign, but you cannot negotiate your own deal.

I was there one time on a trip to Japan. Nolan, and Ron Gordon, and myself. Nolan’s wearing a business suit made out of denim in Japan. [Laughs.] It was like, “Ah, you can’t do that.”

Nolan said, “Yes, I can.”

He wants to sit down and cut a deal. Ron said, “You stay in the hotel room. You just sit there.”

[Ron] and his team negotiated for a few days and then had the meeting. That's how the deal got done. But that's how we learned.

Ron was very, very important. He was not liked by Joe Keenan. When Joe Keenan came in, he saw this deal and he realized about sales and what the percentage should be. It was way high, because at the time, Nolan said—normally 2 or 3 percent or whatever, but we had nothing. Anything was better than nothing, and it was, in retrospect, a great deal for everybody.

Weaver: How did *Gran Trak 10* get so off track? How did you fix it?

Alcorn: *Gran Trak 10* was, again—John Wakefield had product development. The design and the final production engineering done by Grass Valley, so it had some innovative ideas in it. Instead of having a wiring harness that you would lay down and clicking everything together, there was the gear shift, gas pedal, steering wheels, and all that. Every peripheral had its own little harness that plugged into this board. The circuit board had a strip of connecting pins that ran for about a foot, Molex connector pins, and you could plug anything in anywhere you wanted. It was like, "What?" The odds of you getting it put together and working were very, very small. Plus, they had made a couple of fatal errors in the steering wheel harness, so the steering wheel wouldn't work right. We had to fix that.

But the biggest problem we had with the design was caused by National Semiconductor. People were copying our games all the time. One of the things I did was I hired a custom chip maker, an engineer that was a logic designer and could do custom chips, Harold Lee. He knew about chip design. I figured, "Oh, great, I'll have him do a game or two, a normal production game, and then I'll have him design a sync generator or some common component to all the games on a custom chip." That way, the copiers will be stopped. That didn't work out so well. Technology was changing very, very fast.

Grass Valley designed a thick-film hybrid circuit, kind of a weird way to do the audio, and gave the contract to National Semiconductor. By the time they're getting in production, it became two parts. Then it became three parts. It is taking more board space and costing more than just the discrete parts. Then because we had credit hold problems, National Semiconductor cuts us off. Now we had designed in a custom part that those guys wouldn't sell us. We were out of production, so one of the things I had to do was personally redesign that board to get rid of those connectors, put a harness in it, and design the discrete audio circuitry.

Another thing about the driving game, it had the car rotating, the pictures of the car, and rotating various angles. We couldn't do that with these little diode array things, so there was this new component called a ROM chip, read-only memory. It was made by Electronic Arrays, EA, a company that did not last very long. It was a custom part. They said, "Well, what's your part number?" [Laughs.]

And I said, “Part number?”

“Yeah, it’s a custom—you’ve got to give a part number.”

“Oh, yeah. Yeah, yeah, yeah, yeah.”

I basically said, “How about 6SN74181?” which was the part number for a Texas Instrument arithmetic logic unit that was in the same size package, TTL part. Only problem was that this MOS memory, the read-only memory, was a depletion enhancement mode. It had a plus-5, plus-12, and minus-5-volt supply. You plug a TTL part into that, “*el smoko*,” you know.

That was *fun*. It worked. *Nobody* copied the driving game, and a lot of customers said, “Hey, we’re having trouble getting that component.”

“Well, why do you want that component?” Because they were making copies of the things, you know.

“Oh, really? Why don’t you just buy them from us. We’ll sell them to you.”

Then they noticed the logo, the Electronic Arrays, so they go to Electronic Arrays. “That’s a custom part for Atari.” Now they’d tell us who was asking. It was delicious, I thought. One of my little “gotchas” to the copiers. That’s how that happened.

Weaver: Did you have to fix Kee Games’ version *Formula K*?

Alcorn: No. Well, I mean, that was derived from the production version of the driving game, so we just gave that over. Bristow’s a great engineer. He and Lyle Rains, they ran with it. Then they came out with *Tank*, which was superb, you know. We were very lucky we had good players. You know, this B-team stuff, you’ve heard Guy Kawasaki talk about the “bozo explosion.” Yeah? Well, when you hire A players, they want to hire more A players and learn from them. When you hire B players, they want to hire C and D players, so they’re not threatened. That’s called the bozo explosion. I’ve seen that happen time and time again in the Valley [Silicon Valley]. It’s pretty much irrecoverable when you do that. [Laughs.]

Weaver: It’s around 1975 and several Atari employees left Atari to form a new company called Fun Games. They stole Atari materials in the process. What do you remember about that situation?

Alcorn: Oh, that was ugly. People were trying to steal our stuff all the time. Before Fun Games, my secretary—I will not mention names here on that—came to me and said, “My dad is having open-heart surgery in Chicago. Can I get some time off?”

“Sure.”

What she did was “smart”. She stole the schematic of our next game, but instead of stealing a copy, she stole the original pencil hand drawing. You idiot. Well, “Where’s May, and where’s the schematic?” Anyway, I lost a not-so-good secretary at that point.

But what were you talking about?

Weaver: We were talking about Fun Games and the people involved.

Alcorn: It was kind of sad. There were engineers. There was so much money, I guess people saw this and really wanted to copy it. They pulled out a team and did it, but they did it in a very clumsy way. We had been involved with enough of this stuff in the past, and Joe Keenan was pretty savvy. We took some legal action and got them stopped pretty quickly. That wasn’t going to going anywhere, anyhow. Apparently, they couldn’t even get a copy of the—I believe they tried to steal the *Tank* game. That was a very, very difficult design. They never managed to pull it off, to my knowledge. They did show basically our *Tank*, our board, in their cabinet at trade shows, and that’s not kosher. Anyway, we got them. Yeah, it was kind of sad that people would do that, because we were moving so fast. I mean, boom, we come up with a consumer game pretty soon after that, and that, it was like, “Huh? Where’d they go?” [Laughs.]

Weaver: In terms of the people involved, was the main guy Larry Leppert? Do you remember?

Alcorn: Larry Leppert was one of the lead engineers. And Pat Carnes was the sales guy that left. Sad. When we sold Atari to Warner, the stock became worth a whole lot of money. Pat Carnes had a big hunk of stock options that all he had to do was walk in the office by a certain day, hand them a check, and it would have been worth a few million dollars to him. He never did that. We said, “Okay. He dropped that ball.” Sad, yeah.

Weaver: Were there any others? I have a name, Satish Bhutani.

Alcorn: Satish Bhutani, yes. One day, we were having complaints. Joe was getting complaints from the operators they weren’t getting their stuff. We traced it down to Satish. And so, Nolan and Joe go into his office and say, “Satish, why are you holding this stuff up?”

And he says, “Well, we’re a big company. We can’t act fast anymore.”

I think at that point, Joe or Nolan said, “Oh, yes, we can. You’re fired right now.” [Laughs.]

He may have gone off with them. I don’t know. It was end of a career.

Weaver: When you returned to Atari, in other words, you're in the new Keenan group, you actually now ran a new R&D division. Is that correct?

Alcorn: I didn't start at that, no. I started basically recovering—getting the driving game out of the ditch and get engineering back up and running like they should. That's around that time I hired this kid to help Don Lang, an engineer. They needed a tech, so I got this good deal on a hippie, eighteen-year-old hippie. Had to be cheap and got him a job there. Steve Jobs I think was his name.

Weaver: We'll get to Jobs in a little bit, but whose idea was it to start the R&D [Research and Development] division, and what was its mission?

Alcorn: You're talking about the consumer stuff or Grass Valley?

Weaver: Well, actually, I am talking about the consumer stuff, because this was about the time you moved out of coin-op, right?

Alcorn: Yeah. What happened was from day one, Nolan saw a bigger thing than just coin-op. Even though our initial mission was, "Gee, we'll be as big as Bally someday." Well, we got that in a year. There's that famous memo that's been around that I've got from Nolan. An exchange where there were these things that we had to do. Item six on that list was do a color-modulated home *Pong* game. Well, that's a whole new industry. [Laughs.] "Oh, sure."

As I said before, it was getting not fun running engineering. We had this division started, and, typical, we just did it. I actually have—Professor [Henry] Lowood over at Stanford has—I gave them the original business plan document that was handwritten. It had a foldout organization chart done with ruler and pencil. You see all the parts in the coin-op [department]. There's this thing on the right side that was consumer division and all blanks except for one name at the top: Al Alcorn. [Laughs.] How hard could it be?

I went off and did that. I was much happier. Now I get to do some engineering again. That was done with Harold Lee, this engineer that I'd hired to do a custom chip to make stuff hard to copy. He said, "Al, the technology is changing too fast. If I do any custom chip for your coin-op games, by the time you get into production, because it's going to take six months to a year, it'll be obsolete. But I think I can take the original *Pong* design and we can make a custom chip out of that."

[I thought,] "Ah, man, this is great. It solves two problems. I get item six off that list and I get to get out of management and can do some engineering."

First it was double [work shifts]. I would do it at home in the evenings. The process for doing that was Harold was a logic designer and he would make some circuitry, some schematic stuff. My wife was building the wire wrap prototype of this. and then I would debug it and fix the schematic, and so then it would go

back to Harold. And meanwhile, Harold was renting time on a computer-aided design terminal called an Applicon and making the chip. This was renting time at a semiconductor company office in the middle of the night. And, boom, the three of us—and then Bob Brown. Harold said, “Look. You may have a chip design, but it’s not producible unless you have a test program, automated high-speed test.”

They go, “Really?”

“Yeah. You’ve got to be able to test that chip at the die level in one second. If you don’t do that, it’ll never be in production.”

So, Bob Brown was writing a test program while Harold, my wife, and I were making the custom chip design at home.

Weaver: What companies were considered to manufacture the LSI [large scale integration] chip on the game? Why did you pick them?

Alcorn: Well, this was 1974, and the concept of ASIC [applied specific integrated circuit] did not exist. The way a chip was designed, it was the semiconductor company would design the chip. Kind of reading what customers wanted, they would go make the chip and sell it to everybody they could. If you wanted a truly custom chip, you really had to go to that semiconductor company and convince them. They’d charge you a lot of money to go design this thing. I can promise you it would only run in that factory, at the time. There weren’t a lot of places that—so at the time, the closest expression was something called customer-owned tooling. If I had the design for the chip, I could give it to them, but it had to be at the polygon level, not at a schematic level. We could do that. We could shop it around. Harold was very wise, and we had friends in other semiconductor companies, so we knew what the design rules were of all these different companies. We made it really loosey-goosey so it could run anywhere. AMI was selected, American Microsystems, to do the prototype. They built it.

One of the companies that I asked for the hell of it if they would build it for us was a little company called Intel. I don’t think anybody had ever asked them to build a chip for which the customer owned the tooling [aspect]. One day, I’m sitting there in the afternoon at Atari in Los Gatos, and guess who shows up? Bob Noyce, Andy Grove, Gordy Moore, up to the doorstep. “Oh, who are these guys?”

I give them a tour of Atari. [laughs] They are nothing at all like what they were back then. I remember this scene; we had a little break room with some coin-op machines on free play. These guys, Gordy Moore and Andy are playing this and I’m telling him, “Hey, Bob, get those guys back to work. You’re paying—.”

“Oh, let them have some fun.”

They declined to take our part. A very wise move on their part, actually. We were not paying a whole lot for this thing.

We get the chip fabricated at AMI, and I'd never done a chip before. I didn't think this was going to work, but, "Hey, we'll see how far we get."

We get the chip back and we plug it into the test fixture. Goddamn thing worked. It was a really the feeling of a dog chasing a car, because unlike what Nolan said, that we had some vast plan, we didn't have any plan at all. We had no customers lined up—nothing. No consumer electronics in this Valley. It was all rockets, semiconductors, and military stuff. Long story, but we managed to get into Sears. The funny part was once we get a contract, we're going to build this thing. We go to AMI and they're going, "Uh, we're not sure we want to sell this to you guys because your credit's so bad."

"We got that fixed. We got a contract from Sears and Roebuck."

Meanwhile, this other little company called Synertek was a scrappy startup in technology. They saw the potential of Atari as a customer, even though by their standard it was a poorly designed chip. We didn't care. "Build it." And they built it, so we had a second source.

Meanwhile, AMI is arguing if they want to sell it or not. Joe Keenan and I were over at the headquarters at AMI in a conference room with the sales guy, Terry Spicer, who saw this was a lot of big money coming in for the contract, and the VP of finance didn't want to sell us anything. Joe just said, "Well, guys, we have this debate going." And they're arguing. "Go off and argue amongst yourself. We'll sit here, and you tell us. You can build anything you want from zero to 100,000 chips. You just tell us. We'll be happy with it."

They come back and Terry's steaming, and they agree to some small amount. And so, "Okay. Fine. Thank you very much."

Then Synertek ran with it and we're in production. We've got a consumer chip. We don't have a product yet, but we've got a chip in production.

Weaver: You mentioned Sears. What was the story behind how Atari ended up selling home product through Sears?

Alcorn: Yeah. In fact, there's Nolan's story and there's my story. The stories, as I discovered, get better with age. I've got it vividly in my mind what happened, and I've learned that this isn't always [everyone's perspective]—but I'll tell you what my perception was. My perception was once they got the chip to work and it became obvious through the management team that we were really close, there was no politics. Gene Lipkin was the sales guy for coin-op, which is all we had, and I believe that Gene just got on the phone as there was nobody in the consumer electronics division to follow up and to do this. His logic is, "Sears,

they're a big consumer sales company. Yeah. And they've got that big building in Chicago. We'll make a cold call, Sears Tower in Chicago, and see if they want to buy it. Well, it's a big company. It's a big building."

My understanding was Gene got a hold of the receptionist on the phone and she was helpful. She looked through the catalog—we didn't have a Sears catalog—and finds that the Magnavox Odyssey was being sold at Sears. Like, "Oh." And that was in Department 606, sporting goods.

She patches us though, and the buyer, Tom Quinn, was in. He takes the call and Gene describes what we've got. We didn't know he had a history with the Magnavox Odyssey, and he heard about here we're the inventors of *Pong*. We have a custom chip and we'll sell it to anybody. This'll be great. Tom says, "Sounds good. The next time I'm out in California, I'll stop in and see you guys."

Well, within a week, he shows up on our doorstep at 8:00 o'clock in the morning in Los Gatos. None of us were there at 8:00 o'clock. Somebody was there to open the door. And he sits and cools his heels as all these crazy hippies keep walking through the company. We finally show up and show him the product, and he's a believer. And the rest was history. He was very, very helpful. It wouldn't have worked without him.

Part of the problem was, being a consumer product, it had to pass FCC rules about radiation. This device is something hooked to your television set, so that was called a type-one TV device and had special rules in Part 15 of the FCC rules. It was basically the limits of radiation that were set based on the Magnavox Odyssey games, near as I can tell, which was not digital. It was analog, primarily, and there was no high-speed digital circuitry. The *Pong* game had a 3-megahertz crystal clock in it that rang through TTL, which basically created interference out to over 100 megahertz. It was a nightmare. Anyway, we managed to overcome that obstacle.

And the other obstacle that we overcame that damn near killed us in that was the packaging, because I'm working on the custom chip. I mean, like, "My god. This is magic. We got *Pong* on a custom chip. We're done, and we're getting through the FCC."

I didn't realize the plastic case took longer to design and tool than the chip did, and we had no experience. We had our designer, George Faraco, excellent designer, did a lot of impact design. He's the guy that did the *Gotcha* panel with the boobs. Only made a couple of those, swear to god, but it was cute. Nolan said, "No, we can't do that." But George designed the case for the home version of *Pong*. It's a funny little plastic thing that sat on this little pedestal. He got it tooled by some guy in Southern California that was failing. It just didn't work. A whole shipment and we got nothing.

Fortunately, there was a big company here in the Valley called Class West that did tooling for the semiconductor industry. Those guys were down at the time. They had a lot of capacity, and somehow they heard about us. They got me to go fly down with them to visit our tooling guy in L.A., who had one bridgeport and a drill press. And he's going to make this. And I think, "Oh, Christ. We've got nothing." But they were able to take over [the job] and put the whole company into making the tooling for the game.

It was so close that Nolan caused a design to be made with a wooden case by the design department in case we couldn't get the plastic. I still have that prototype. I refused to work on it because I figured, "We've got to go with this, and I can't waste my time with this other stupid idea." Anyway, we got it done, and we managed to get past FCC. Wow.

Then we had this relationship with Sears that wound up being a great relationship.

Weaver: Let's go back just for a minute about the relationship with Sears, because if I understand correctly, Sears did a number of things for Atari that were nonstandard and that basically saved Atari's behind.

Alcorn: Oh, yes, a couple of things. One, as far as engineering and the FCC went, Meyer Marks was an old-time television engineer that worked for Starks Tarzan that made the tuners and stuff. He was an RF engineer. Nobody knew this. Sears had this huge testing lab in Chicago. Sears never talked about it. It was the only retailer that actually did testing on every product they sold to guarantee it was a good product. No other company did that. He was instrumental in getting me to get this thing to work to meet these impossible FCC rules.

He had to submit it personally to the FCC in Maryland. It was *one* lab they had to do the testing. I'd stopped at Sears on the way over with my prototype to be tested. He put it in the screen room there, because he had the screen room and everything, and it flunked. I went back and redesigned it. He really helped get that done.

Then the other thing that happened was Sears comes in to negotiate the contract. It's Joe Keenan, me, and Nolan, and the question is, "How much do they cost?"

Nolan, Ted, and I looked at each other and say, "Let's go have a meeting."

We went outside and had a powwow. I figured it cost us maybe \$50 to make one, maybe less. \$35 but I'd forgotten about the little thing called the factory. I'm thinking \$75 or something. Nolan comes out with a hundred-some-odd dollars. I'm going, "Holy shit."

And they take it. "Okay. Great. All right."

Then, “But how do we get funded? We don’t have the financial resources.”

To be in the consumer business, you sell everything in the last three months at the end of the year, but you’ve got to guess at the beginning of the year how many you’re going to sell. You’re either going to guess too many or not enough. That’s got its own set of challenges. And we can’t fund it. The Sears guy, Tom Quinn, says, “No, we can take care of that.” The Sears bank would fund it.

Nolan and Joe go back there and they’re meeting on that side of the table. I’m talking to the engineer, Meyer Marks. I’ll never forget, they came back—because Joe came to me right away. We’re sitting there in the fourth basement of this building at the Sears cafeteria area where all these guys are having lunch. They introduce Joe and Nolan to this guy at the table who is the traffic manager at Sears, who keeps track of all the stuff going by. He says, “Oh, you’re the Atari guys.” He says, “We’re holding the Christmas catalog for this product.” He says, “The last time we did that, it was for the Marvin Glass first slot car consumer thing. We sold 50,000 of them for Christmas and they didn’t work. You couldn’t get past the first turn. We had to buy all 50,000 back.”

Joe comes to me, he says, “Is this thing going to work?” [Laughs.]

“I guess. I mean, I’ve never done this before.”

He put the fear of God in me on that. And it worked, but a lot of it was, again, thanks to Sears.

Now we’ve got this big contract with Sears, but its sole contract is Sears. I think they said, “How many can you build?”

We said, “Like 50,000.”

They give us a contract for 150,000, and we’re going, “Holy moly. How are we going to do this?” We got the money from the Sears bank and we went off and did it. It was sole-sourced. Nolan said, “We’re going to sell this to other players, and we’re going to take it to the Toy Fair in New York,” in probably 1974 or 1975.

Tom said, “No, you don’t need to do that. We’re a great a customer. Don’t worry. What could go wrong?”

Nolan, Joe, myself, and my wife go back to the Toy Fair. We got a booth at the Toy Fair. We knew nothing about the toy business. We didn’t know that it really was kind of rigged, in a way, that all the business really happens at the toy building, which is the weirdest trade show I’ve ever seen. They only accept people who have been in the business. To see a product, you have to go to their suite. You can’t get in unless you’re an existing customer. How you get new customers, I have no idea. We didn’t have a suite.

We were at the secondary show, which was open to the public, and we're showing the home version of *Pong*. It's going to be the hit product of the decade, and *all* the buyers came by. We talked to the vice president at JC Penny's and at Macy's and showed how it worked. We did not sell one thing. *Zero*. Now, that could be depressing for most people, you know. You think you'd sell some stuff. We had a lot of faith in it, but we didn't realize how weird and bad the toy business is. Very, very difficult to break in. Now we're a little nervous. [Laughs.]

I remember Tom Quinn came by and asked, "How are you doing, guys?"

"Oh, we're doing great. We're doing great."

We'd go to these great restaurants in New York. Nobody bought us lunch, nobody took us to dinner, there were no follow-up meetings, nada. We're sole-sourced to Sears.

I remember when it started selling and I'm watching Monday Night Football. There's an ad on television for Atari *Pong* sold through Sears and Roebuck called the Tele-Games. I'm going, "Wow."

In retrospect, what I learned about that industry was the best thing that ever happened to us: these guys had no bad debt. They paid their bills. They were supportive. They did our advertising. We knew nothing about *any* of that stuff. We would have been clobbered. That was, again, one of the lucky things that happened with Atari.

Weaver: Why did Atari enter the pinball business?

Alcorn: Wow. That's a good question. It was Nolan. Remember in the beginning I said that we had a contract from Bally to design a pinball machine, a video game, and some arcade attraction. Nolan had this idea for a wide playfield. Again, he was really, at heart, a coin-operated guy. He felt he could make the first microprocessor-controlled pinball machine, but fundamentally the difference was a big wider playfield. We could build a better pinball machine. The industry just laughed at us. They never designed pinball machines west of the Mississippi, and, you know, "What do you guys know about this business?"

Among other things, we developed with Steve Ritchie, who is the best designer ever for pinball playfields. But it was something Nolan wanted to do. We didn't *need* the business, but he wanted to do this, so we did it. We never made any money in it. I remember I was down there reviewing a prototype and I heard complaints about things that were burning out that shouldn't. I just basically shorted out a coil on the flippers and played a game. Pretty soon, smoke is coming off the board. Literally fire. I really actually had to go and get the fire extinguisher off the wall and put it out. I remember calling up manufacturing and saying, "Shut the line down." That was a nightmare, and we finally shut it down. So, that's why.

But I'll tell another related story with Arnold Kamikow in it. I'm designing a custom chip. We had done the *Pong* chip. We now bought our own CAD [computer-aided design] computer, a Calma, which used a Tektronix phosphor storage scope, a minicomputer, and a big disk drive. It was really high-tech for designing chips. We had a big graphic table that would do polygons, and you'd see all the levels. It was really wonderful. We're having a distributor meeting at Atari. It was around April 1st. The day before, we're up at the Hyatt Hotel in San Francisco where we had everybody there, we're going to pitch to all our customers. We had a few drinks and it occurred to someone the next day was April 1st and we've got to have some fun with our customers. Nolan concocted this story about how we had this new supercomputer that would automatically percentage a playfield just like that. What we're going to do is take all our customers down to our facility in Los Gatos and show them a secret facility, which was our consumer chip design, with a digitized playfield that was under construction, under development. We could then give them a tour, sling some bullshit, and have fun with them.

I remember calling up the engineers that morning saying, "Okay. Stop work on the chip. Go to there, get the schematic, and you digitize the playfield. Put everything as an object."

"No," they said.

I said, "No, it's absolutely funny. You've got a day to do this."

"Okay." They begrudgingly did it.

We hired two or three buses. We brought them down and give them a tour. If you had the screen up, you could hit a certain number of keys, and they were called display status, it would tell you the number of lines, polygons and stuff like that. A lot of numbers on the screen. Nolan said, "Okay. Now show that and show that. Now go to the playfield. Now move the thumper bumper over."

He grabbed the object and moved it. This was like magic, because this was 1974 or 1975. And he would say, "Go to [the display screen]," when the numbers had changed. "See, the percentage is better."

It was complete horseshit. They all believed it and it was great. But one guy who wasn't on the trip was Arnold Kamikow. He considered himself a very smart man. He was kind of left out. He'd heard these stories, because we knew they'd go back, and report Atari has this new thing. This great computer that would do all this stuff. I personally recreated the thing for Arnie and gave him the tour and showed it to him.

Anyway, we did more things like that to our own customers. I guess I don't know if you're supposed to do that to your own customers, but we did not take ourselves that seriously. In general, that's the Silicon Valley way of doing things.

Weaver: How did the Stella project begin, and what was it?

Alcorn: What happened with the home version of *Pong* was kind of like what happened with the coin-op games in the beginning. To make another product, you had to design another chip, and that chip would *only* do that thing. There was a minor variation of a ball-and-paddle game. But it was really obvious that we needed to go with a cartridge-based microprocessor system. Jerry Lawson, who was, again, a good friend, was a sales engineer at Fairchild. He disappears. I don't see Jerry.

Jerry, it turns out, got a contract with Fairchild to design their own version. It was a pretty well-understood concept. He had a ROM in a cartridge and a microprocessor. You could just sell the ROMs with the cartridge and use the hardware. It was a base system with the software. They designed it and he built the first one. I think they got a patent on the cartridge stuff. It was pretty clear.

We were going to make our own, but the problem was, as I said before, that if you want a custom chip made, you had to go to a semiconductor company. Jerry was a good engineer, but he had to use the Fairchild microprocessor. "Who's ever heard of the—?" you know. It wasn't a great microprocessor, but he had to use it. That made it tougher for him to go do that.

The semiconductor companies are in the business of selling semiconductors, and so they don't want to make the design as small as possible; they want to use a lot of their chips. They did the classic thing you would think of doing, which is you have a microprocessor and you have a frame buffer that is a big area of memory. Every point on the screen has some memory for it and you can write into that with the microprocessor. Then read it out for the display. That's great, but that's about ten chips, and these memory chips are very expensive.

The geniuses up at Grass Valley, in this case, Steve Mayer and Ron Milner, came up with a *brilliant* system that required the 6502 microprocessor because it was so fast and had a couple of tricks in it. We could make a chip called Stella, code name Stella after Joe Decuir's bicycle, that would do two lines of video, and the software would write the next lines. The computer was fast enough to do about two lines, so you had like three chips in the whole thing with the ROM memory. It was like, "Oh, my god. There's nothing there."

It wound up being an excellent system. Far more flexible than the ones that the semiconductor companies designed, because the hardware guys had said, "This is what a sprite should be." They had preset all the stuff in hardware, defining it, and it was not flexible. We didn't have anything in this. It was a nightmare to code, but it was more flexible to make more games and dirt cheap. Nobody could compete with us on the price or the quality of the games at that point. There was a lot of fun with that.

I remember going to the Consumer Electronics Show in Chicago in June 1977. The interesting problem was Magnavox prior to this had sent us a nasty letter. It

said that we were violating their patent, the Baer patent on video games. We could argue is it deserved or not, but Baer's got it and Magnavox threatened a lawsuit. Nolan negotiated a settlement with Magnavox. It was brilliant. We went to our attorneys and said, "How much will—?"

They said, "Well, you can win this. You could beat that patent."

"Great. How much would it cost, and how long would it take?"

"Oh, a million bucks, and it would take a year or two."

Nolan was able to negotiate a paid-up license for like half a million or something like that. Boom! And it was a paid-up license, not a royalty. They were very smart, because once we caved, everybody else had to cave.

The other clause in the contract said that Magnavox had the rights to market and sell any new product we came out within 365 days from signing that contract. It was signed a week before the CES [Consumer Electronics Show] in Chicago in 1976. We had to keep our mouth shut for a year, which was the only time we ever kept our mouth shut about a product. When the guys from Magnavox wanted to see what was going on, we let Steve Bristow, who was running coin op, handle it. They never got anything out of it. At the 1977 Consumer Electronics Show, when we introduced the product, it took the industry by storm.³ And I invited—all our engineers to go to the show and share in watching the industry take a gasp.

At one point, National Semiconductor was trying to knock us off. We had hired pretty much their entire consumer engineering team away, because we were far more fun to work for than the semiconductor company. One of the engineers is walking by the booth at National, and a marketing guy grabs him. He said, "We've got to get the prototype for the cartridge game out and show it, because Atari's killing us."

The guy says, "I'm sorry, but I'm not working for you guys anymore. I'm working for Atari." [Laughs.] Yeah, that was hilarious.

Anyway, so it was a great experience. It produced one of the, apparently, important products, Stella, the 2600, yeah.

Weaver: Who were the key members of the Stella project, and how did you recruit them?

Alcorn: When it came time to do that chip, that hard product, these are important people. Wade Tooma. John Ellis was a key guy. He did the calculator stuff for National. And we basically took the whole team. We had a consumer

³ Referring to Stella, the development code name for the Atari VCS (Video Computer System), otherwise known as the Atari 2600.

engineering group that could really design a great product and meet FCC requirements and all that, but to do the chip, I went to Harold, who had worked with me on the *Pong* chip. Harold says, “I can’t do that chip. This is beyond my skills. It’s going to require dynamic logic, and I don’t do dynamic logic,” he says.

I said, “Well, who can do it?”

He says, “Well, Jay Miner.”

Jay’s the best guy around, so I’ve got to hire Jay. At the time, Jay was working at Synertek. They were supplying our *Pong* chips and other stuff. I go to my friend there and say, “I’ve got to hire Jay.”

“No, no, no. Jay’s working for us. He’s going to work on the 6502 microprocessor.”

“No, I need him.”

Basically, we cut a deal where he was an employee of Synertek, but he also had an Atari badge and he would come to work for us. I had the three people doing that chip that was architected in Grass Valley, but it was Jay Miner, Larry Wagner, and Joe Decuir who came down. Joe was a personal technology [division] transfer. He worked up at Grass Valley for three or four months on the project, so he understood it. He came down and helped us get it in production.

I had that team, and I put them away from coin-op. This was another inadvertent brilliant thing that I did, in retrospect. At the time, it just seemed to me to be wrong to take my coin-op engineers, who were excellent, and have them do this chip. They didn’t understand that technology. They weren’t good at it. I did not want to rob from a very successful group effort. I needed a different culture, so I rented a space down about a quarter mile from the Los Gatos main headquarters on Division Street. It had a little office setup with their Calma computer and everything. I remember the coin-op guy, “What’s going on?”

And, “None of your business.”

Eventually, they broke in. They got in to see what was going on. It worked out all right. But Steve [Bristow] was running the coin-op side, and we did that. It was a very interesting team.

Weaver: What effect did the development of the Fairchild Channel F have on the Stella project?

Alcorn: The Fairchild Channel F was the first machine in production that had a cartridge-based system with the ROM. There was never any question that that could be done. That was really helpful to have that. It was like when Ralph Baer had the

Magnavox Odyssey hooked up to the TV set's antenna terminals. I could not say that that can't be done, because Ralph did it. And similarly, Fairchild had done that part of it with a cartridge thing. Only problem was their base unit cost about five times as much as our base unit. We had a better technology on that.

Weaver: Did you incorporate any of the solutions of the Fairchild designers in terms of building a programmable system? Doug Hardy, who designed the VCS cartridge mechanism, had worked on the Fairchild mechanism too.

Alcorn: I don't recall that we took a lot of technology other than the basic cartridge approach. The idea of a microprocessor hooked to a display, a graphic controller chip—that was pretty well understood.

Weaver: One of the lingering structure questions is what was that relationship between the microelectronics group and the consumer division? What ultimately happened to the microelectronics department at Atari?

Alcorn: You're talking about the guys that did the chip design versus coin-op?

Weaver: Yes.

Alcorn: They were *completely* different cultures. God bless them, they both had their own thing. There wasn't a whole lot of interaction. I remember at one point—the testing of the chip was very important. To write a program to test the chip, you had to have access to the Fairchild tester. It was a nightmare to get time on that; rent it from a semiconductor company. One of the guys said, "Hey, you can buy one for about \$80,000. I've got a used one here." I did a little bit of math on it. It made a lot of sense, but it was a big expenditure. I had to go to the board of directors at a board meeting and propose that we spend that much money on a machine like this. I had numbers what it would cost to test the chips commercially versus [internally]. It was a no-brainer. It would pay for itself in less than six months.

Nolan, he had a really good guy on the board. I don't remember his name, but he was a real pro, senior guy. He wasn't on the board that long, but he was sitting there, and he listened to what I said. He says, "I'm sorry, you said it would pay for itself in six months?" He says, "How many of these machines can you buy?"

I go, "Huh?"

Because I'm getting ready for him to say, "No, you can't spend the money."

He says, "If it pays for itself in two years, it's a good idea. Six months, you should buy more."

We eventually had about eleven of these machines in a big factory. Then when consumer got really big and Warner had kicked in—oh, a long story. They had mismanaged it, but that’s a later story.

Weaver: We’ll get to Warner. Can you go into the true story, if you know it, behind how Steve Jobs got tasked to build *Breakout* and how Wozniak got involved?

Alcorn: Boy. Yeah, there’s a lot of different views on that one.

Weaver: Yeah, exactly.

Alcorn: Success has many fathers; failure is an orphan. I hired Steve because he was an inexpensive tech. He had no real qualifications. He’d dropped out of Reed College, which I said, “Is that an engineering school?”

“No.”

But he had enthusiasm. I don’t care if you’re cleaning the toilets, you’ve got to have enthusiasm. I could get a tech trained—all you had to do was solder, wire wrap, and read a schematic. He could do that, and he was cheap, so I hire him. He’s kind of gabby and talkative and he didn’t mix—I mean, like I said, I had a nice culture of people in my own image. But, he’s working there, and Nolan has the attention span of a golden retriever. I had these projects taking three or four engineers working on a product for a few of months and we’d release it. Nolan would go into the lab and say, “Oh, I don’t like that,” and change the project.

And I said, “Well, Nolan, if you keep doing that, we’re *never* going to release *anything*. We’ve *got* to finish the stuff. You’ve got better ideas, write them down or whatever.”

“I know, I know.”

I couldn’t keep him out of engineering, so I had a pager set up. I wore a pager only to be used by the secretary in the event Nolan went into engineering, because he’d go in when I wasn’t there, and he’d changed a project. Then I’d just run in after him, reset everything, and get it going again. Gosh, Nolan was frustrated so he goes behind my back and he pulls out Steve Jobs. Nolan didn’t know he wasn’t an engineer. All Nolan knew was Steve worked in engineering and he talked a good story. Nolan describes this game *Breakout* and says, “Can you do it?” And he gave him a bonus for \$1,000 for every chip less than fifty [in the circuit board].

Now, *Pong* coin-op had seventy-two or seventy-five chips in it. *Breakout* had all these little paddles down there, bricks, so how the hell could he design anything less than seventy? More like 100 chips would be expected. Nolan felt that was a safe bet, because Jobs didn’t know how. Jobs gets his buddy Woz [Steve Wozniak]. Woz was coming in after work to our place. Steve Jobs had worked

out a deal where he basically worked at night when his boss wasn't there. This was like some kind of catch-22. That way he got the stuff done.

But Woz would come in after a day at Hewlett-Packard and we had a production line full of driving games in production that were being burnt in. Anybody who wanted to play them, "Please play them and break them," because we could get them fixed here. He'd play games all night. [Laughs.] And I knew Woz was there. I talked to him. He was brilliant. He was a fun guy. He worked on the calculator stuff at Hewlett-Packard. Jobs basically gets Woz to do the work for him. Now, that wasn't bad enough, but he does it in like less than a week.

I walk into engineering one morning and Jobs pulls me over. He says, "Look at this." Here is a working prototype of a game that wasn't even in development.

Now, imagine my shock. I mean, it's one thing to hear about a new game coming out, but to have it just appear as a working prototype, "Who did this?"

"I did it," Jobs—no, you didn't. [Laughs.]

And it had like twenty-three chips. Now, Nolan never said you had to be able to buy the chips, so Woz was getting parts out of Hewlett-Packard. Taking parts that are custom to Hewlett-Packard that you couldn't get. But it was a *brilliant* design. I mean, Woz is a savant. I mean, breathtaking. You look at the stuff he designed, and this guy just had a whole fresh approach. It was amazing; the synthesis.

Now, because of that, it could not be put in production. In those days, a coin-op board had like 100 chips on it. You had to test them, have a pool of techs with oscilloscopes with a schematic, and a test fixture that could go back, because every TTL-based part had about a 1 to 2 percent failure rate. With 100 chips, you're going to have one or two dead chips. You've got to have solder bridges. A tech has to be able to go through it and get it working. This thing was a ball of logic that made no sense to me, a normal human being, and let alone I couldn't do it, and a tech certainly couldn't do it.

We eventually shelved the game but gave it to a normal engineer who actually redesigned it with 100 chips. It was a great game and it went into production. But Nolan kept his promise and paid him the bonus. Now, Jobs had apparently told Woz it was \$100 a chip. Woz said he didn't really care. Jobs could have said free. But somehow Jobs tore a page out of Nolan's book. He tore a lot of pages out of Nolan's book. Shouldn't have torn that one. He lies to Woz to get it done. A year or two later when the first book about Apple came out, the guy had done a good job and had talked to me about it. I told him the truth, the facts. Woz, I heard, was on a plane with a bunch of his buddies, reading the draft of the book, and starts crying. He realized that his best buddy had lied to him. Not that it really made any real difference, but that's the way Woz is. That ended that friendship.

But that's the story of *Breakout*. That was funny. I mean, you walk into engineering and you expect to hear, "Hey, why aren't you getting this thing to work?" Instead, something is working you didn't even ask to be working. It's ready to go. [Laughs.] Oh, boy, those were the days.

Weaver: Just out of curiosity, when did that book come out? How long had Jobs and Woz been working together at Apple by that time?

Alcorn: What was the name of that book? *The Little Kingdom*?⁴ I don't remember. I was at Rod Holt's house for a party. Rod Holt was one of the engineers we stole from National Semiconductor. He is a *brilliant* engineer. He was a backup engineer that we had at consumer. Consumer engineering group were all into motocross and motorcycles off-road. On Monday mornings, I'd go over to consumer and just count the guys that came back, because they had broken legs and arms. Rod Holt didn't do that. He was chain-smoking Camels. We would just talk. He was the most interesting guy you ever want to meet; really knowledgeable about politics and everything. Found out later he's a Communist Trotskyite. That's another story. But, a *brilliant* guy.

Rod Holt became an Apple fellow. Jobs hired him away. He asked me for help in finding an engineer that could do a switching power supply, which they needed. I said, "Look. I've got the best guy to do that, but he's working for me. But he's not really busy right now. He could moonlight for you." Well, not only does he moonlight, he gets hired and gets a ton of stock. And, hey, you know, but—yeah.

So, Woz was very involved with Apple with the Apple II, but when Jobs decided to go do the Macintosh. Again, he kind of needed a different development team than Woz—but Woz was brilliant. The floppy disk interface he did was *brilliant*. He just looked at the way it was being done at the time, which required a big interface board, and he got rid of all of that and designed it. I talked to the guys at Shugart, who were just, like, blown away. "He can't do that." And he did it. [Laughs.] In fact, it was called the IWM, the Integrated Woz Machine, at Apple.

Weaver: You had mentioned something very interesting about Steve Jobs basically rewarding, I guess, what would be considered a kindness on your part by stealing your employee. I think around the time of the Atari 400/800 project's start, there was a similar problem in terms of Jobs—I guess the word would be pilfering—from Atari. I'd like to know how you dealt with that.

Alcorn: Yeah. I mean, it's like you want the A players. We had the A players. Jobs and I had a pretty good relationship. Damn, he offered me stock in Apple. I told him I already had enough wallpaper, thank you. "I'll take a free computer instead." Ah, ponder what life would be like had I'd had founder's stock.

⁴ *The Little Kingdom: The Private Story of Apple Computer* by Michael Moritz was first published in November 1984.

Anyway, so there were a bunch of people [who left for Apple]. One of the first ones was Ron Wayne, an engineer that I had in coin-op. Steve [Jobs] was around in coin-op. This gentleman was an old man. I mean, he must have been, Christ, maybe thirty-five, forty. [Laughs.] Oldest guy in the building. But he had experience. He wasn't that good an engineer per se, but he had a lot of on-the-ground experience. He set up my parts catalog and, on the whole, organized engineering, thank goodness. But he and Jobs hit it off; the youngest guy and the oldest guy. Jobs was looking to him for inspiration, because Steve originally offered the Apple to Atari as [its distributor]. We said, "No, we don't want that. We're busy doing other stuff." Jobs, Woz had offered it to HP. They said no. So, they went off.

I said, "Well, maybe you could get some money from Don Valentine." He was on our board.

"Okay." That went off.

He went off with Ron Wayne. That's another story. Ron didn't last, because Ron really got spooked when Silicon Valley came in. He was really more a Vegas and [the Markle Foundation] and everything.⁵ He ran away from 10 percent of Apple. That'd be worth something today, wouldn't it?

So anyway, he's hiring all these guys. As I said, Steve [Jobs] wanted an engineer to help with this project. I offered him Rod as a favor and he goes and steals the guy from me. I lost him. I was not pleased. And I'd heard from other people he'd tried to snatch that didn't want to [go to Apple] but told me instead. This was getting annoying, and I wanted to stop it. I'd call and he wouldn't answer the phone anymore. One time, I did manage to get through, because he had a secretary. They were having *big* trouble with the FCC. FCC was going to shut them down, and I knew this, so I called, and they said, "Who is it?"

I said, "This is Al Alcorn from the FCC." Boom! He was on the phone before he realized it was Al. I said, "Don't hire these people," you know. He wouldn't stop.

Joe Keenan, Nolan, and I were all kind of frustrated at this and we came up with this idea. We are going to start a project in coin-op engineering to basically knock off the Apple II. I mean, they'd published schematics of it and everything. It was wide open, and we could build it. You know, we were building these coin-op boards. We could build it far cheaper than Apple could. We could distribute it and all that. We knew that.

⁵ Incorporated in 1927, The Markle Foundation is a US charitable organization concerned with technology, health care, and national security. In 1969, Lloyd Morrisett, the Markle Foundation's president at that time, shifted the foundation's focus to mass communications in a democratic society.

And I also knew that the good engineers, the A players, are not the kind of people you say, “Oh, copy this guy’s product and put it in production.” They’re not going to do that, you know.

Well, I said, “No, you’re going to do it.” [Laughs.]

I got a couple of the good engineers and started this project, and I knew what would happen, because the word would filter right out back to Jobs. I think it was like two weeks after we initiated the project that I get a call from Jobs. He says, “Okay. I won’t steal any more of your people.”

“Okay.” That’s it.

So that worked. And I was able to cancel the project, which wasn’t going anywhere. I mean, you couldn’t have had a simpler project. Unfortunately, I didn’t have any C players to go build it who were dumb enough to build this thing. So that’s how we stopped that.

There’s another story about Woz. In the early days, Woz and Jobs needed the 6502 microprocessor. Well, that was sole-sourced to MOS Technology back in Pennsylvania. And I remember something was wrong, because I go back there, talk to the engineers to get a deal going. They said, “Oh, by the way, would you please buy us?”

“What?” I’m dealing with a big company, a vendor, and they’re asking me to buy the semiconductor company for \$1 million. Really?

Well, what had happened was they were doing work with Jack Tramiel on the watches. Jack’s a real hard businessman and these guys were not very good businessmen. They allowed shipping parts, watch parts and stuff, to Jack. Jack wasn’t paying and they kept shipping. Pretty soon, they’re going to be out of business. Jack was going to buy them for nothing and forgive his own debt.

I go back to Atari and say—Warner had us at the time—I said, “Hey, we can buy a semiconductor company. Wouldn’t that be cool? A million bucks.”

And Manny Gerard wisely said, “No, you guys, you’ve got enough trouble doing what you can.”

Well, anyway, I got them to make a second source, Synertek, because Joe Keenan said, “You’re going to be sole-sourced to Jack Tramiel now?”

I go, “Well, kind of.”

He goes, “No, we can’t do that.”

I got them to give us a second-source contract, which I gave to Synertek. They became the dominant 6502 microprocessor supplier.

Jobs and Woz were like nineteen years old by this time. They're going to try to meet with Synertek to get an account, get parts, and they couldn't get through the door. I get a call from Jobs. I get my friend Jack Boletto, who was the marketing VP, the guy I got Jay Miner from. I said, "Talk to these guys. They're good."

"Okay."

A couple weeks later, I get a call from Jack saying, "Hey, Al, that was the funniest meeting I ever had."

I said, "What?"

He said, "Yeah. These two kids, Jobs and Wozniak, come in and they're trying to negotiate, get a price on this part, and we're not selling it to these kids." They give this whole story, and Jobs is busy trying to negotiate the price down. "We're not even selling to you guys."

Woz is trying to get Jobs to just take a deal. "Get the parts. We can negotiate a price later." Jobs is trying to get Woz to shut up.

Apparently he [Jobs] tries to kick him under the conference room table, but Jobs is so light and frail from this stupid diet he's on that he slides off the chair, disappears under the conference room table. They pull him out and say, "Basically, here's the deal, kid. We'll give you a line of credit, ninety days, so many parts. You don't pay, we cut you off."

"Okay, okay."

Between us and Apple, we were the largest users of microprocessors in the world for a couple years. [Laughs.] Funny.

Weaver: You brought up an interesting sidebar before that. You were saying by this time, the Warner sale had gone through. Unless I've missed something that you feel is critical on the timeline, it seems that it's probably time to talk about the Warner sale. What led up to it? How did it transpire? How did R&D change under Ray Kassar?

Alcorn: Yeah, let me set the stage on this, if you don't mind. We are in the consumer business, and as I said, it was a big risk. You had to guess how many you were going to sell at the end of the year, so you needed all this money up front. Also, we were coming out of the disaster of the Wakefield, Mobilio, Oliver stuff. We didn't have a whole lot of money. We needed a way to get funding to do this the traditional way: We went to Wall Street. We were going to do a public offering.

I actually had the only copy of a red herring prospectus done for Atari. That is now in the possession of Stanford, Professor [Henry] Lowood, because that's a public record. That didn't work. A whole bunch of stories could come off of that.

Then we looked around to try to find a corporate acquisition. Warner popped up as a possible purchaser. Again, you had this East Coast-West Coast Silicon Valley clash. Nothing could be more different than Wall Street to what we were doing in Los Gatos. I remember Manny Gerard coming out, and, like, "Wow." He said, "Where's the pit that you throw people in when they get to be thirty years old?" There's nobody in this company over thirty years old. There's a smell of rope burning in the back. Nobody's wearing any bra. I mean, it was a real California company, you know. But he sort of realized that it was for real, but it was fairly remote.

One day, we had a staff meeting at Nolan's house. Nolan and Joe had come back from Warner with a meeting about something. Of course, Nolan had it in the hot tub out in the back of his house in Los Gatos. They said, "Well, they basically offered us \$30 million for the company."

I was personally stunned because I was always waiting for the company to just blow up, go away, and I get a job somewhere else. I never really had counted my stock or thought of anything. All of a sudden, I did a little bit of math and I go, "Wow. That's a lot of money."

That's what happened. That deal came through, but that was one of the toughest negotiations they ever had. I was involved in those negotiations, but we kept it quiet. I remember Carl Nielson congratulated me. He says, "I didn't think you could keep your mouth shut."

But I was up in the city maybe two or three times a week meeting at McCutchen Doyle law offices. And Warner had a group of about ten or eleven attorneys on their team. We had two. And three months of negotiation, because there were attorneys and people back at Warner that just were convinced we were a fraud. "This can't be for real." Manny actually had to fire some of the top corporate attorneys at Warner. They were not going to do the deal. It was that strange. But they did it, and it was wonderful.

The honeymoon was wonderful for the first year or two, but then what happens is the experts from the big company come out and tell you that, "You can't do things this way." [Laughs.] That caused some real clashes once in a while.

They had these misfits, the guys that had worked at some other big company. Manny or the chairman of the board at the time, Ross, would hire them, put them on the shelf. Well, they sent this guy out to talk to us. We were going to do this home version of the cartridge with the engineers, and we'd take them out to this wonderful dive restaurant that we all liked. They had cheap, good food.

He basically told us that, “You’re never going to succeed because Sony’s in the business and you guys can’t beat Sony or IBM. That’s just the way the world is.” And the engineers just laughed at him and were a bit rude to him.

I called Warner and I said, “Don’t ever send any of those guys out again.” It was a real culture misfit. But it was, like I say, wonderful for a while, but then it turned ugly after a while.

Weaver: How did R&D change now that, as you said, the honeymoon is beginning to wear off and you’re basically working for Ray Kassar, right? How did R&D change in terms of your role, the way that it played a role in Atari, etc.?

Alcorn: The way we did things at Atari was we were all engineers. We would solve any problems we had with engineering. The Atari VCS did really well for the first year or two, but then kind of tapered off. Warner wanted to put more into advertising and marketing, which eventually they did. It was the right thing to do, but Nolan and Joe wanted to build a new system. There was a big meeting back at Warner, and it was a come-to-Jesus meeting. Nolan had had enough of this. I was not there, but it was apparently very colorful. That was the end of Nolan [at Atari]. They had already put this guy Ray Kassar in, who was a dropout from top management at Burlington Industries. He knew nothing about Silicon Valley or consumer or electronics or games. Other than that, he was a pro. He hired people in his image like we hired people in our image. That didn’t work so well.

But I will say they did the right thing with advertising. They sunk so much money into advertising that Joe and Nolan and I didn’t want it. There was this clause in the contract, that provided a bonus pool for the key execs. If we ever made more than 30 million or 50 million dollars a year, we’d get like 2 or 3 percent of the corporate profits among a small group of ten guys. Like, “Woo!” But if they paid that money on advertising, that would cut our profits that year, so it didn’t trigger the bonus. Frankly, that’s one of the reasons we did not want to do it, but they prevailed. They were right. A few years later, that bonus pool would become ridiculous. Like when we were selling like a billion dollars a year of stuff, that got a little crazy. They fixed that. We’ve all resolved that nicely.

What was it like? [Sighs audibly.] Here was the problem. Warner was afraid of introducing a new product. Now, here we were at Atari. Every year, we risked the company making new stuff. If it didn’t succeed, we’d be in big trouble. But we took these risks and we did it. We succeeded a lot of times. We failed now and then. But I never expected to see Atari making so much money that we could put out a new product and fail, and it wouldn’t be even noticeable.

A good example was I quit the corporate mahogany row. I went over and put a team together of the best product designers we had: Harry Jenkins and Roger Hector, two of the best designers ever. I set about to make a holographic game. Part of the reason was, we would put out the lie that our next technology in coin-op was going to be holography. [Laughs.] Nobody knew what it was. We figured

we would delay our competition by getting them to waste money on that. Well, I figured, “Now let’s go do it. Let’s go do it.”

We surveyed the field and managed to develop a cartridge-based game, because Ray said, “Well, can we make a cartridge-based game that costs less than the VCS?”

The VCS had nothing in it. We do it by getting rid of the cartridge. The ROM in the cartridge, there’s nothing in there. *That’s* the way to do it. And we had this holographic game.

By the way, we had to solve a little technical problem called making embossed holograms. At the time, all holograms were made by a laser and cost about five, ten dollars apiece just to make. It would take a long time to make one. We knew it could be done. We figured out a way to hot stamp them on Mylar.

We had this product and we had it all tooled, everything done. We took it to the Toy Fair or the CES, and marketing wouldn’t even help us. Can you imagine? This is a product. The reason being that the VCS was so hot, the marketing job was to say, “I’m sorry I can’t sell to you. I don’t have any more allocation.” Basically, “What can you bribe me with?”

And here we go to the them, “We want to put you to work.”

“Why would I want to do that? It might not work.”

So, the engineering team and product team sold the product and got a bunch of them sold at the CES. It was, “You can’t do it because we’re too busy building the VCS to build this for you,” says market manufacturing.

I said, “Great. Put that in writing.” I get them to write a memo to say that.

Then I go contract a company outside that would do it cheaper and better. “Oh, well, I guess we could do it.”

Then another guy in marketing says, “Well, where’s your business plan?”

“What do you mean, business plan? There it is. There’s the product. Go sell it, dummy.”

“Oh, no. We’ve got to have a business plan.”

I got one of the bright older guys in marketing to help me actually do a business plan. It made money in the second year. The guy says, “Well, that doesn’t work. You’ve got to make money, and it loses money in the first year.”

I said, “Really?”

I come back with Project X, another product, and it showed maybe even less money in the first year, but eventually [it would turn a profit]. They said, “No, we can’t do that.”

“Okay.”

I get on the phone right there, call Paul Malloy, the manufacturing guy. I said, “Shut down the Atari VCS line, because your marketing guy says that was actually the real numbers of that product and it shouldn’t exist.”

“Okay. You can do it.”

And it went on like that. I had to fight everybody.

At the very end, Ray Kassar—I’ll never forget this—we had this ineffective board meeting. We had a little staff meeting of the old-timers that Ray would run, for some reason. We would sit around and talk and complain. They’d ignore us and we’d go away. I was at that meeting and I said, “Well, what about it?”

He just kind of pursed his lip and said, “No, we’re not building.” No reason.

It was really because the fear of failure at that point. Ray was just like, “Wow. I’m the head of this big billion-dollar company. Why would I want to put a new product out that might fail when I’ve got this product that’s making all this money?”

I told Ray that in Silicon Valley, if you don’t obsolete your own product, somebody else will. He never got that.

At that point, I realized it’s over. The engineers were kind of demoralized and the wheels were coming off. We were starting to get B players in.

Weaver: How did the Atari 400 and 800 computer project start? What was its genesis, the original start?

Alcorn: The Atari 800/400 computer, home computer thing, was an answer. Apple had created some stir with the Apple II. It was not really a project that Nolan, Joe, and I had considered because it just wasn’t our specialty, the forte. There was a whole bunch of this software stuff. It was a different industry. But when Ray Kassar came in, the common wisdom of the normal, proper kind of company, you see what’s going on around you then copy it and go into it. That’s not what we did at Atari. The consumer engineers said, “Okay. We’ll build it.”

One of the key things about Atari was the FCC rules were very strict for these home computers. It was very, very, very difficult. The Apple II never passed the regulations, to my knowledge. It just couldn’t be done. You don’t fix that later. You have to design that in from the start. The Atari VCS, if you look at the guts

and take it apart, the electronics are in a die-cast aluminum. I mean, it's military-grade stuff, and we did it. We went through a lot of effort. And when we did the [Atari] 800, those rules were still in effect. We passed the rules with all the peripherals intact and everything. Our plan was to be the only personal computer in the market because of that.

Funny story, what happened was we had submitted this to FCC for approval and got FCC-type approval on it. At the same time, the industry was complaining that the original regulations were way too severe., They were, because they were designed for the Magnavox Odyssey game. They were complaining it couldn't be done, so the FCC does this study where they asked Radio Shack, Apple, Atari, and all the companies to submit computers to them so they could see how bad it was, then make regulations that would make it more possible to do this, because it couldn't be done [as they originally stood].

The report comes out. Now, we had not submitted a prototype for this because we had passed the regulations. They already had it and we meet the regs. End of story, right? Well, the report comes out—and Warner owned us at the time—and it said that, “We conclude that it can't be done and that the new regs should be—,” yadda, yadda, yadda, yadda. And in a footnote on the back, it mentioned that Atari had submitted a system, the 800, for approval and got it. They just ignored it based on the fact that it couldn't be done. And we're thinking, “What the hell happened?”

I forget who the president at the time was, but Warner was in the wrong political party or something. Nolan, Joe, and I had flown his jet down to the NAB show in Dallas, Texas, at Love Field. One thing I noticed was Air Force One parked over there. “What the hell is Air Force One doing over here?”

“Oh, it's over at—TI [Texas Instruments] is giving it a tune-up electronically.”

And I'm going, “Duh.”

TI's got far more pull, and we didn't. TI got the rules basically changed. Then they built a product which they pulled from the market for other obscure reasons. So—yeah. We tried that one. That was a trick that didn't work.

Now we had a computer, the 800/400, that was actually slow with slow peripherals, but it met the regulations. Now the regulations had changed, so it kind of put us at a disadvantage for it.

The problem with the 800/400 also was we now had this enormous marketing department with people that had mostly been at Procter & Gamble. Real pros that knew what they were doing. We put out some games for the Atari 800/400 and the marketing guy said, “No, no, no, no, no. It's a business computer. We don't want any games in there.”

“Okay.” So, we did business stuff.

Then about three months later, they would say, oh, hey, they were missing the games market. So, “We’ll do games.”

This flopped over about every three months for a while. We got tired of it. When the time came and they said, “No, we don’t want games anymore,” I said, “Put that in writing.”

They did. We put the games up on a bulletin board, free. Then when they flopped over three months later, they said, “We’ve got to do games.” They were already out there. It’s done. We managed to snooker our own marketing department for what we could.

But I knew the end was in sight. Steve Bristow ran consumer engineering at that point. He went on vacation, asked if I would sit in his place. I said, “Sure.”

I had to sit at a meeting with the marketing guys. We were talking about changing the ROMs to allow bigger ROMs. I start the meeting and say, “Well, let’s go through the parts list and the cost of goods sold. What’s the cost of goods sold? What’ll be the change?”

“Oh, we can’t tell you that.”

I said, “Excuse me?”

“Well, that’s confidential, what our cost to product cost is.”

I’m sitting there stunned. The guys in the company, they’re like, “Yeah, this is what we have to deal with.”

I said, “Let me explain. Where do you think the cost of goods sold comes from?”

“Well, the parts list.”

“Yes. And *who* defines the parts list?” I said, “*These* guys. These are the engineers. We can figure out what your cost is if we want to. Just tell us the number.” He wouldn’t do it. I said, “Well, there’s no point in having this meeting. This meeting is cancelled.” [Laughs.]

And they won. Marketing guys won. I knew it was going to be ugly after that.

Weaver: Let me ask you two follow-on points. The first, your prior answer about the 400 and the three-month morphing from, you know, “Is it a game machine? Is it a business machine?”; Is that how it ultimately became like the home machine? In other words, you basically put the games online and—

Alcorn: When we put the games online, we weren't thinking about—we just got tired of this craziness.

Weaver: Were they put in this weird position of now it had to be a home machine in terms of the 400?

Alcorn: Oh, I don't think—I really don't know.

Weaver: Because it did morph.

Alcorn: The marketing people were more involved with the kind of font they had on the typewriters. It was madness. It was really madness over there, so I didn't—

Weaver: It happened somehow.

Alcorn: I don't know if there was a coherent thought going on, and if there was, it would change in a month.

Weaver: You mentioned that Bristow had gone on vacation, and it brings up a slightly different question. Bristow was working on a prototype—I think it was codenamed Super Stella—in 1980, which was ultimately abandoned in favor of the 5200. Do you know that one?

Alcorn: I was out of it by that time. I had come to the conclusion, accurately, that Warner was not going to release *any* new products under that management. End of it. And why waste my time designing products there if they're not going to be produced? It's very destructive to kill products at the end. A friend of mine who was at Apple, one of the original guys who's still there, and I talked about the secrecy. He says one of the problems is because the products are all secret. They can kill a product a week before delivery, before the show, and get away with it. It's *very* demoralizing.

Weaver: Just for a minute, let's revisit the Cosmos project, because you spoke about holography. I would be curious if you would fill in the story about what advances you made in the field. The kind of unique things that you were able to do and what could have been, had certain other things occurred?

Alcorn: Yeah. As I said, we wound up inventing embossed holography. How you could stamp them out, you know, “ka-chink, ka-chink, ka-chink,” for pennies. It was kind of a breakthrough because it changed what holography would be. The idea of the Cosmos was to have a game that was cheaper than the VCS with cartridges. It was cheaper because it had no electronics in it other than a little display and LED board.

In the middle of all that, Manny Gerard, the Warner president, talked to us and said, “We've got a problem in the record business because the vinyl records are being pirated.” This was back in the good old days of records and cardboard

jackets at the record store. The copiers were so good that the one way to tell a copy from an original is the copies are better quality than the originals. He said, "We've got to stop this. We're losing a lot of money. Does anybody have a technology that could stop it?"

So, I said, "I've got something that might help."

"What?"

I said, "Well, it's this thing called holography. We can emboss them." And I said, "We could get rid of the paper that's on the center of the record and emboss a hologram right there on the plastic. You could see a 3-D color picture of the band and all the words would be there. You'd save a little bit of money and it'd be really hard to copy. Impossible."

"We've got to have it in the bin on the outside."

"Well, we could do that too."

They sent up their head recording engineering guy at Warner in L.A. He came by with some assistants and we showed him our holograms. We explained how we could get it made really cheap and how we could put it in. They said, "Well, it won't work. It has to be seen from outside on the cardboard, outside of the record store."

I said, "I could do that too." I said, "I could take a little piece of this Mylar, put beautiful artwork in there, whatever the band wants, and then put it on the album cover. I'll tell you what. I'll pay for the holograms for all the records for the next release of the Eagles," which was going to get knocked off. "Don't say it's for anti-piracy. Just put it on the front cover and see what happens. Just experiment as a piece of decoration."

The engineer looked at me kind of sad, said, "Well, how many places can do this?"

I said, "Well, just one, in Baltimore, Maryland."

"Oh. What if it burns down?"

I go, "Yeah. Okay." I said, "I bet if I said three places could do it, you'd say it wasn't secure."

He goes, "Yeah."

What had happened was they had already made the decision to go with a 3M label like you have on your license plate, that kind of reflective material. They'd already decided to go there, so I was just an annoyance. Manny made them come

up and listen to me. “Okay. I don’t give a shit. You go ahead and do what you want.”

But afterwards, it’s funny, because the technology got stolen and went to American Bank Note. I always tease Manny, saying, “Oh, those idiots over at Visa and Mastercard, what do they know about secrecy and piracy?” Yeah, right.

Anyway, I guess we did change the industry a little bit there but did not benefit a penny from it. But it was a lot of fun. It was a hell of a lot of fun.

Weaver: Was this about the time that you had sort of had it and it was time to leave?

Alcorn: Well, indeed. I think the straw that broke the camel’s back for me was when they cancelled this holographic product that was all ready to go. I had to run through a lot of hurdles. Manufacturing didn’t want to build it. Marketing didn’t want to sell it. [Laughs.] What the hell is a marketing department that doesn’t want to sell a new product? But, okay. At that point, it was clear that there was no valid reason, but we’re just not going to build it. I realized that these guys were never going to release anything new, anything that I did, or Steve Bristow did, and I was just spinning my wheels wasting my time. The option I had through the contract that we had negotiated with Warner was I could be on the beach. I wasn’t allowed to work for any competing company. I got full salary. I had a company car not to show up in, a nice BMW. And, “I’m really good at that. I’m your man. If you don’t want me to be there, I’m good at that.” So, I did.

Then Joe, Nolan, Lipkin, all the team, and I were on the beach. That was kind of fun, because it was supposed to end in 1983. In 1982, we’re plotting other companies. I remember a meeting in the Chinaman Number Two room, basement of the Folger Mansion, with all us guys, an accountant guy, a lawyer, and plotting and scheming an array of companies. In the middle of this, Nolan, in typical fashion, and Nancy, his lovely wife, opens the door and says, “Oh, I’ve got another guy coming in.” It’s a guy named Tom Zito, and he’s a reporter with *The Washington Post*. We go [demonstrates shock and surprise]. We were erasing the blackboard. Nolan, it’s a super-secret meeting plotting against Atari and you’re inviting a reporter. Typical Nolan. So, we became friends. Zito was a colorful guy, industry guy now.

Weaver: So, in no particular order, it’s almost 1983. Is this when Nolan decides to form Catalyst?

Alcorn: Yeah, he did the Catalyst. He also got interested in sailing. He caused a yacht to be made that won the Transpac, which then spun out Etak and a bunch of other great companies out of that.⁶ One of the companies was called Sente, which is the move that can beat Atari. [Laughs.] Given that we were being paid not to

⁶ The Transpacific Yacht Race starts off the Pt. Fermin buoy in San Pedro, California and ends off Diamond Head in Hawaii, a distance of 2,225 nautical miles. It was started in 1906.

compete, it seemed a little kind of odd to go right up their throat. But, you know, that was Nolan.

Weaver: Let's talk about Catalyst for a minute. Just as a side note, was Cadabroscope before or after Catalyst?⁷

Alcorn: Boy, refresh my—what was Cadabroscope about?

Weaver: It was Nolan's computer animation—

Alcorn: Oh, the movie? The movie?

Weaver: I think the computer animation experiment.

Alcorn: Yeah, it was a movie. That was bad from the start. Cadabroscope. Well, Chuck E. Cheese was going. Yeah, Chuck E. Cheese was started at Atari, and Nolan bought Chuck E. Cheese from Warner. Warner threw it. You should ask Manny about that, because he thought it was just a big distraction and stupid. Nolan bought it kind of out of spite for Manny just to show him that he was wrong, and Nolan made it a success. I remember Manny coming in and saying, "Nolan is the best entrepreneur I've ever seen, because he turned that into a success."

But the Cadabroscope was kind of the death knell. We were supposed to be on the beach. I was over there at Chuck E. Cheese hanging out. We would meet there. Joe Keenan became the president of Chuck E. Cheese. But Nolan had seen, in my understanding, some early work with Alvy Ray Smith and those guys at the NYIT. It was kind of a fake school, but they had all the top graphics guys there. They were alleging they could do cartoons, animation, by pressing a button. Nolan always wanted to compete with Disney. He always wanted to do something better, so the animated characters were better than the Lincoln stuff, which they were still running. He thought he could out-Disney Disney on movies by pushing a button. I said, "No. No, that's not going to work." And, sadly, I was right. But he wasted a lot of money and time on that, which hurt Pizza Time Theatre.

Weaver: When Nolan realized Cadabroscope wasn't going to work, was there a sale of the animation technology behind Cadabroscope to [George] Lucas? Was that the basis for Pixar?

Alcorn: No, I don't think so. God no, not that I know of. No, no, no. I mean, the technology wasn't there. We had nothing. Nolan had hired, frankly, a bunch of B players to put that together and run it. They didn't know enough to know that it wasn't going to work, and they were all bullshitting themselves. There was

⁷ Catalyst was founded in 1981, while Cadabroscope was reported by the Associate Press as in development as of May 1983.

nothing there to sell, as far as I could tell. No, that was a separate thread, I believe.

Weaver: Okay. But Alvy Ray Smith, of course, later has gone to Pixar, right, from NYIT?

Alcorn: Yes, what became Pixar. [Ed] Catmull and those guys, yeah.

Weaver: Let's talk about Catalyst for a minute, because you started mentioning Etak. I guess we should start at Etak first, because Nolan's friend Tom Zito was involved with boats, correct?

Alcorn: Not Zito.

Weaver: All right. So, who was the one who was responsible for bringing the marine concept to Nolan?

Alcorn: Stan Honey.

Weaver: Ah. Got it. Okay.

Alcorn: Let me explain: To win a high-end yacht race like this, you've got to have the best of everything. Nolan had this special boat constructed that turned out not to be as good as advertised. What he did have was he found Stan Honey, who is absolutely the world's best yachting navigator in the world. He's so good that when the French set the around-the-world record in a sailboat, the whole team was French except for Stan. He was so gifted.

But here's the problem. They got Joe Keenan, Nolan, Stan Honey, and a bunch of other top Stan Honey guys on this yachting race, which took about five days to get to Hawaii. In that time, Nolan got this idea thing, so basically, throughout all of this with Stan Honey, probably the one guy in the world that could pull this off, they figured, "Let's go build an in-car navigation company."

Stan was really an employee of SRI International doing spook work, but he wasn't getting a whole lot of money and zero visibility. All of a sudden, "Hey, we can do a startup company," funded with Nolan and the team; The whole thing. He went off and pulled his team together and became Etak.⁸ It was my honor and pleasure to go participate in that. I love it when you have the smartest guys in the world on a subject in a room working together. The conversation is really stimulating, shall we say.

Weaver: Just for the record, why don't you tell us what Etak was originally conceived of, how it evolved, and how it's in use today or portions of it in use today.

⁸ Founded in 1983, Etak, Inc. was an independent US-based vendor of automotive navigation system equipment, digital maps, and mapping software.

Alcorn: Yeah. Damn it, we missed it. [Laughs.] The idea was that you could do an in-car navigation [system]. This is before GPS. It used a technology that was amazing. It was called map-matching, dead-reckoning. We had databases of maps on cassette tapes that were special recording format and a tape reader that was controlled by their little computer. Basically, each cassette would cover about maybe a 10-square-mile region. You popped in another cassette tape when you crossed the border of a region or something. And it used a magnetic sensor. They had to invent a cheap one to measure the magnetic north. It had wheel sensors, which now all cars do, so measure a high-resolution tach on each wheel, so if the car was turning, it could tell if it was turning and all that.

The idea originally was we were going to use maps from the census department, because even back then, the census department was charted. One of the things they had to do was map the entire country and make that available to all industries. We thought, “Great. We’ll go do that.”

Well, we get the maps and those maps are 98 percent accurate, which in a mapping world is ridiculously useless. They discovered two percent of the data points went off to somewhere off the tip of South Africa. I mean, I don’t know what these guys were doing, but the map was flat. What I mean by that is it wasn’t hierarchical, so when you zoomed out, you lost all the detail [and couldn’t zoom in again]. They were forced into making their own maps. And again, with his brilliance, he figured a way of scanning aerial photographs, which he patented. Then he had human beings go in there and quickly trace over them to make accurate hierarchical maps.

There were some interesting things we learned. I had my BMW with one of those things in it, and I thought, “Who are we going to sell it to?”

The [Etak] president—I don’t know who it was—they got a real president and CEO to do this. They’re going to do something with General Motors. General Motors bought an exclusive for like five years. Just before they were going to do anything with it, Buick came out with some kind of a horrible dashboard with a digital display on it. It was horrible. It was a flop. They decided, in the wisdom of General Motors, that all digital electronics on the dash were stupid and they killed the project. Joe Keenan warned them, because they paid like a million dollars for this contract. He says, “What if they don’t do it? You’ll be locked out of the American market for five years,” which is exactly what happened. Joe advised them not to take that deal, but they did.

We then went to Japan. If you’ve ever been in Tokyo driving around in a taxicab to the airport, the cab driver’s talking to the cops on how to get there. The streets make London look organized. It’s just terrible. Everybody’s lost. So, they’ve got to have this. We take it there and show it to the police department, the Tokyo police, and they go, “Oh!”

And you could see what happened. They go, “This is too important—.” This is my reading of it, okay. There’s this organization [in Japan] called MITI [Ministry of International Trade and Industry] that kind of controls what technology gets done and all that. I think they decided this is way too important to be buying it from an American company. They commissioned Mitsubishi or gave it to some company and said, “You go do it.” There was silence. Then two years later, they had a bad knockoff of it at the CES show. That was depressing.

We sold it to Bosch, but there was a problem in the midst of all this. Rupert Murdock, who I guess lives in the Bay Area, his daughter came home from a date way late past [curfew]. This is before cell phones. She claimed to be lost. Long story short, within a month, Rupert Murdock buys Etak for \$30 million. When Warner bought Atari for \$30 million, it took three months to negotiate. It was like, “What happened?”

Okay, so it goes off. Because the technology of the mapping—the map-matching, dead-reckoning part, now, even with GPS—you all have to use that still because if you get out of GPS range a little bit and this thing will still go on. Last time I saw Stan, he tells me, “Yeah, they just sold the remains of Etak again for like \$2 billion just because of the maps,” because they had done that.

And we’re kind of going like, “Man, we were like ten years too soon on this thing.”

It’s just like I see all these young people that are billionaires that designed some little fucking app on a cell phone. We go and create a whole new technology and we get thirty million. I remember we went, “Thirty million dollars. Wow! I’m the richest guy in the world.” [Laughs.] That was then.

Weaver: Let’s talk about a few of the other projects that Catalyst was involved in.

Alcorn: Yeah. Well, mine. I had a project called Cumma that solved the SKU [stock keeping unit] problem.⁹ This is before video games collapsed in 1983, I guess, back when we were free from our contract. Like rack jobbers, you know, all these titles for video games, many of them were stinkers. The retailers didn’t know which ones. They’d buy some, they’d get stuck with this inventory. It was a nightmare. What we needed was a way to electronically distribute this content. This is before the Internet or any of that stuff.

Basically, a Cumma machine was a kiosk, a vending machine. We had a special cartridge made for Atari and all the other game systems with a static RAM with a battery backup on it. You could put it in this machine, give them five bucks or whatever, and you could download a new game into that cartridge. Now it only cost you five bucks and you had no inventory. It was all digital, all bits, not atoms.

⁹ Cumma launched at the Consumer Electronics Show in 1984.

Hey! And we got there just in time on the market, just in time to watch it all blow up and disappear. [Laughs.] End of Cumma.

Weaver: Let's talk about another one of the Catalyst projects. Want to try ByVideo?

Alcorn: Okay. ByVideo was the idea of building a kiosk that used a laserdisc in kind of an original format kind of multimedia. One success was Florsheim Shoes. You could put one of these kiosks in a mall and you could explore the catalog of all the shoes or whatever you wanted. It would let you basically place an order, take your credit card, and this was all before the Internet or any of that stuff. They built that company. I don't know how that resolved. I don't remember what happened. It didn't really take off, but we solved some interesting technical problems about making images on a laserdisc. Had to use that MCA [Music Corporation of America] big old professional heavy-duty laserdisc.

Weaver: What about Androbot¹⁰?

Alcorn: Oh, Androbot. Ouch. Androbot—how do I put this? Nolan had the idea that he could build a robot, an autonomous robot that would go the refrigerator, get a can of beer, and do all this wonderful stuff. I'm thinking, that's a little tough. Nolan had convinced Merrill Lynch that this was going to happen. Merrill Lynch was going to underwrite it, take it public. They had loaned him like fifteen million to get it going. It became clear that things were not good over there.

At one point, Nolan asked me as a favor if I would spend a day with the team at Androbot. See what's going on and then come back and tell him. And so, I did, and I came back, and I told him, "Call the cops, Nolan. It's never going to work. These guys are not even close to solving the right problems, okay?"

Nolan said to me, "That's not what I wanted to hear."

I said, "Well, you don't need me to get involved in that."

Years later, he said, "I should have listened to you."

And I said, "You know what, Nolan? After that," I said, "when you ask me to do these things, I'm going to charge you big money. Not because I need the money, but because if you're going to ask me to do something and I tell you—and this was not a guess; this was like, 'Call the cops,' not a question—and you don't listen to me, I feel bad because you're the one getting hurt."

Weaver: Axlon.

Alcorn: Axlon. Ah, yeah, that was an array. I forget, what was their key product?

¹⁰ Androbot Inc.'s first product, Topo, was released in 1983.

- Weaver: That was the talking bear in cartridge system.¹¹
- Alcorn: Oh, yeah, a lot of that. Yeah, they did a lot of things. They had a lot of little ideas. It was not bad. I mean, they had a lot of little ideas. Scrappy. They were building prototypes of the stuff, but I never saw it wasn't focused enough to really have one killer product. I mean, a line of plush toys. Of course, what's his name, Kingsley, took one off and made a splash with Teddy Ruxpin or whatever, big splash. [Laughs.]
- Weaver: PlayNet.¹²
- Alcorn: I don't know about that one.
- Weaver: It was the location-based network entertainment system for hospitality. Ah, okay, okay. It was one of the projects.
- And Octus.¹³
- Alcorn: What did they do?
- Weaver: Octus was that managing voicemail, fax, voice on a PC.
- Alcorn: No. Sorry.
- Weaver: Okay. In terms of your perspective with the projects that you knew about at Catalyst, other than just being a forum for some of Nolan's ideas, did you see the potential for societal impact with any of these things?
- Alcorn: Well, indeed. Etak was profound. I mean, everybody expects to have in-car navigators, and that was *way*, way early. Yeah, I mean, there's always the possibility. You don't set out to change the world, but in my mind, if you have enough smart people on a project and you have a reasonably good idea, you could make something out of it. I thought the whole concept was very, very wise. I could go over and throw a problem at the Etak guys and they would have a solution.

And sometimes I would help them. For example, the display in the car, in the Etak thing, was a little green cathode-ray tube, but it was an X-Y scan. It wasn't a raster scan. Guess where that technology came from. Atari. We were making the

¹¹ The A.G. Bear manufacture's tag lists the production date as 1985.

¹² In 1996, Nolan Bushnell became senior consultant to the small game developer Aristo International, which was later renamed PlayNet. Aristo developed two main products: a touchscreen interface bar-top/arcade system that would also provide internet access, phone calls, and online networked tournaments, and a digital jukebox, capable of storing thousands of songs and downloading new releases.

¹³ Automation Systems Inc. was renamed Octus Inc. after Nolan Bushnell was named chairman in Oct 1991, planning to offer new data, imaging, electronic mail and facsimile products, all of which were shared on personal computer networks that used Novell Inc.'s software. (New York Times, Oct 19, 1991)

coin-op games with the X-Y display. The trick was instead of doing it the professional way, we were basically using high-fidelity amplifiers for speakers. High-fi systems, basically running the horizontal and vertical coils. It was dirt cheap, and we just, I guess, expropriated, borrowed. Basically, you get a couple of bright guys in coin-op and say, "Hey, come on over. I'll buy you lunch. You're going to see some of the in-car navigator which you've never seen before." And they did. It was cool.

Weaver: Let's talk about Cumma for a minute. You're familiar with Steam, the technology by Valve?

Alcorn: A little bit, yeah.

Weaver: Would I be wrong to create an equivalency?

Alcorn: Steam, that has software for all the different platforms or just their platform.

Weaver: Well, many platforms.

Alcorn: Okay. I guess. I don't know enough about it. All I know, I know Jeri Ellsworth that used to work there, but that's about it.

Weaver: Yeah, it's electronic distribution for software.

Alcorn: Okay. For cartridge-based or dedicated home systems? I mean on CD or whatever.

Weaver: Steam will download directly to your standard Mac or PC.

Alcorn: Okay, to a personal computer, yeah.

Weaver: Yep. In this case, would it be fair to say timing is everything?

Alcorn: Oh, yeah. Oh, absolutely. We did not see the market dying as fast as it did. But it did. Warner created this big vacuum, basically assuming that the industry was dead. It'd be like hula hoops; that's the end of that. We saw that that's not really true, but we did not want to compete directly with Atari at that level. It's boring knocking off some old stuff that you did five or ten years ago. Come on, we've been there, done that. They fucked it up. Okay, fine.

Weaver: In terms of the whole concept of Catalyst, given the timing, would you say that that was one of the earliest technology incubators?

Alcorn: I think it was. I mean, I'm not a historian, but I think it was. I mean, it was, again, a brilliant concept by Nolan. Like I said, Nolan had all these ideas gushing out. One engineering group could not handle them at once. [With Catalyst,] he could do this and start companies like seeds. Well, okay. Let the market decide.

Don't forget Sente.¹⁴ It eventually got bought by Bally, but that didn't fit. It was too big. I think it may have started in the Catalyst for a little while and then got spun out to its own facility. That was doing something we really weren't supposed to be doing, which was making coin-operated amusement games, competing with Atari coin-op. We kind of decided, not with legal advice, that "Warner's going to look pretty stupid suing Nolan for innovating new games, so let's see what happens." They never did.

Weaver: Can you talk a little bit about Widcomm, you know, the H.261 encoder and your interest in video compression?¹⁵

Alcorn: Oh, wow. Boy, you really go back. One of the projects that was going on in the background at Atari towards the end of Nolan's era was what we called the Phony project, which was going to be a picture phone using dial-up voice-grade lines. We needed some technology. We needed digitizing video technology to take from real images to digital images. Then we needed a way to transmit that through the telephone lines. We tried. Unfortunately, I had an engineer there that could never make it work. We were going to build a 12,000-baud modem at the time when 4K modems were just considered the ultimate. As fast as you could go. I knew from the math, the physics, and Shannon's equations that it could be done. We were going to try to do that, but we never really got it to work properly. Eventually, it went off to Grass Valley after that project was cancelled. They wanted to do it a different way and they made something work out of that. Actually, sold that to a Japanese company at one point.

I always had a fascination and a frustration with video compression. One of my associates at Atari was a gentleman named Jim Tubb, a relative of the country and western singer, who ran manufacturing was over at Widcomm. He asked if I would join them and be general manager there. I did, and they had a working 56-kilobit video compressor that worked really, really well. It used a discrete cosine transform, DCT, and I thought that was really, really cool. Unfortunately, Widcomm had some other *fundamental* problems I'd never experienced before. Bob Widergren—how shall I say—was somewhat unethical when it came to dealing with Wall Street, sales, and promotion. I think they had a really good product, but they really couldn't really market it properly. It was ugly and I got out of there. It was too bad.

But that was my fascination. Then it wound up when I was at Apple, I ended up back on that with the video compression project.

¹⁴ Sente Technologies was an arcade game developer. Founded as Videia in 1982 by several ex-Atari employees, the company was bought by Nolan Bushnell and made a division of his Pizza Time Theatre company in 1983.

¹⁵ H.261 is an International Telegraph Union – Telecommunication [ITU-T] video compression standard, first ratified in November 1988. H.261 was the first truly practical digital video coding standard (in terms of product support in significant quantities). As of 2019, all subsequent international video coding standards have been based closely on the H.261 design.

Weaver: Well, so let's talk about Apple. Have I missed anything in terms of your leaving Atari or working on certain Catalyst projects with Nolan? Was it thereafter that you went to Apple and became a [Apple] Fellow?

Alcorn: Well, I went to Widcomm. After Widcomm, I got a call from Apple HR basically asking if I wanted to be VP of engineering at Apple. [Laughs.] This was after Jobs had been evicted. Gassée and Sculley were running the place. I knew enough about what was going on in the politics that a VP of engineering would just be chewed up. It was crazy. But they were inviting me by for these lunches to interview all these people. Man, I get a chance to sit down and chat with Jean-Louis Gassée, Sculley, fascinating people. And this went on for months. I'm collecting all these badges. I wasn't going to take that job, but I had nothing else to do. I was getting free lunches and meeting these people.

One day, I get called into a meeting by Jean-Louis Gassée with the HR people there and everything. They said, "Mr. Alcorn, we understand that you're probably not going to take the job."

And I go, "Oh, yeah. You found me out. Yeah, I'm *really* sorry, but thank you for all the lunches and meeting, and, guys, wish you all the luck."

"Would you want to be an Apple Fellow?"

"What the hell's that?"

They weren't quite sure. I asked who the Apple Fellows were, and they mentioned a couple of them.

Weaver: Alan Kay?

Alcorn: Alan Kay was one. The guy that did *QuickDraw*, Bill Atkinson.¹⁶ And Rod Holt, who was a friend of mine from Atari, who was the guy they stole. He was an Apple Fellow, but HR didn't even put his name on the list. I'm going, "Well, *this* is a really good job. If you could be an Apple Fellow and HR doesn't even know you're there, what could go wrong?" you know. I say, "Sure."

Well, I met them. I talked to them all, and they were all very nice and said, "Hey, Al, you should come to work."

Rod Holt just borrowed some cigarettes. We chatted and swapped lies about communism, whatever.

¹⁶ QuickDraw is the 2D graphics library and associated Application Programming Interface (API) which is a core part of the classic Mac OS operating system.

I got the job. But the funny part is—here’s the weird story—the day I show up at Apple, my first day at work, my wife gets a call from Steve Jobs. He was off starting NeXT. Steve calls, “Where’s Al?”

And Katie says, “Uh, he went to work.”

“What? Where’s he working?”

“Apple.”

Click.

That was the last conversation I had with Steve, sorry to say.

Weaver: As a Fellow, what projects did you work on while you were there? You can put them in any order that you want. What projects and what did you accomplish with some of those projects?

Alcorn: Well, the first project they put me with the VP of advanced technology, Larry Tesler.

Weaver: ATG, yeah.

Alcorn: Larry Tesler. *Fabulous* guy. He never interviewed me, so now I’m working for him. He said, “How come I never interviewed you?”

And I go, “I don’t know.”

Well, he was cool with that., He basically gave me the project to design something called the Trojan horse board, because we had just come out with the Mac II. He thought it would be a good idea. I did too. “Let’s put a Mac Plus on a plug-in card for a PC.” We knew that Mac was a better platform, that a lot of people wanted the Mac, but IBM had owned the business market. You buy one of these boards, plug it in, and loop the video through. It split the file systems. You could run a Mac, all your stuff on Mac, and then when the boss showed up, you push a button, it would flip right back into a stupid PC window.

And besides that, guess what. We had no power supply. We had no disk because we shared the disk that was already there. No keyboard, nothing. It was like \$150 for a full-blown Mac. So, like, “Wow!” you know.

Well, sadly, marketing department at Apple isn’t that good. I got the thing to work. It was so balkanized there, so political, that the software development team would not give us access to the ROM code. Like, “Well, how the hell are we supposed to build a Mac without—?” I managed to get that.

By the way, I hired three people on the team. One of them was Al Caso [phonetic], who now works as a curator here. We got it to work. Really clever. And once we got it to work, marketing ran for the hills because, “Well, if, uh, we sell this to a PC guy and the machine breaks, they’ll blame us for it. There’ll be confusion as to who owns the customer.”

“So, your solution is to not build the product, so now we’ll *know* that IBM owns the customer. That’s your clever marketing.” That got killed. Okay.

I forget what other things I worked on, but then the most interesting thing happened. There was this consulting group that would move around the world and work. They were so smart, so good. They’d pick where they wanted to work. They had worked in Australia for a year. They would work at different places for a year. They would decide where they would work was based on what interesting projects and technology [was available]. That team was called Sutherland, Sproull and Associates. It was Ivan Sutherland, Bob Sproull, Bert Sutherland, and a team of other engineers that were probably the smartest engineers in the world. I mean, Ivan won the Turing Award, invented computer graphics, virtual reality, a few things like that, and I’m going to get to meet him. I said, “Jeez, I could—really be neat if I could meet them.”

And Larry said, “Oh, you’ll meet them. I’m going to have them report to you.”

I said, “You’re going to have God report to me?” I was petrified. I mean, holy moly.

We had a meeting in Larry’s office with Negroponte and Andy Lippman from the Media Lab, who came out because we were tithing them. All big companies had to do that. They were giving us a report on what was coming down, what technology and what they were doing for us and all that. Larry invited Ivan Sutherland and Bob Sproull to be in that meeting with these guys. They had never really met before. If you know Ivan, Ivan is, whew, hyper smart and suffers fools badly., He could go and ask the *one* question so succinctly that you can’t answer. So quickly that it’s spooky.

Andy is talking about this video compression technology they were working on with the pyramid coding scheme and talking about compression. Ivan asked, “What’s the nature of the sensor that you’re using?”

Andy being from New York, “Whadda ya mean?” Said, “You know, it’s a television camera.”

“Well, is it a linear, logarithmic, square law? What’s this—?”

“Why do you ask?”

And Ivan says, “Oh, if you don’t know, that’s okay. Just forget it.”

This was [the kind of] crossfire going on.

Part of the reason we wanted those guys, because we had this Cray computer, the fastest computer in the world, we could play with. Nobody else had one you could play with like that. We got to play with that toy and put the team together. And Andy calls me up and says, “I want to be on that team.”

And I said, “What do you mean? Are you going to quit?”

“No, no, no. I’m allowed to do [that]—I want to be with that group.”

Now I had Tom Stockham, Andy Lippman at the Media Lab. I had the most powerful with the powerful computer in the world working on this project. I remember Alan Kay said, “Oh, you’re going to have a good time.” He says, “Ivan will come up with fundamental stuff in a new field within three months.” And he did.

Then at one point, Bob Sproull comes to my office, my cube, and he says, “Al, I think I got you in trouble.”

I said, “What?”

He says, “Yeah. I was using the Cray, working on it. I used the whole Cray last night, the whole machine. I reserved it.”

I said, “You know what? You’re going to get two free T-shirts.”

Two days later, interoffice mail, two free T-shirts in the pack. It’s a Cray log with “My other computer’s a Mac,” or “My other computer’s a Cray.”

You’ve got to understand. The Cray is not the easiest computer to work with. It’s probably the hardest computer to ever work with. Nobody is using it here. We have it for this secret project going on, but it’s failing. We’ve got the finest IT team working on this thing keeping it alive and nobody’s using it. If you could use it, they’ll give you free T-shirts. And you keep doing that, you’re going to get a lot of free T-shirts out of this thing.

Why wouldn’t everybody want to play with the Cray? Well, if you’ve ever tried to play with a Cray, you will discover why. This was the first Unix Cray that was built. But anyway, so it was fun, fun, fun little project.

Weaver: With that group, did there come a time when you had meetings with all of them about video compression and the need for standardization?

Alcorn: Okay. So, what happened was we were working on something called vector quantization. Very high-tech, which Ivan had used the Cray to deduce all the images and break them down. The idea that we could take maps of popular

things that were in the picture and replay them anywhere else. That was one approach. The Media Lab was working on something called pyramid coding where you would have low resolution and higher and higher and higher. That was their approach. All these different conceptual approaches for how to do this. Their contract with us at Apple and every other company up to that point was like a nine-month contract, and they would go off.

They're going to end this thing and Andy Lippman was very, very helpful. Very interested in what was going on. He'd come out for meetings. We said, "How do we end this thing?"

It was really Andy's idea. "Let's hold a consortium."

Now, there was work going on elsewhere. It was called the MPEG Committee, Motion Picture Experts Group. All the big companies had peer research groups that was looking at this thing, but it was not considered really that important. And they were all pissing about, "What algorithm should we use? Should we go to DCT [discrete cosine transform]? Should we go to fractal coding?" Oh, you know, all these different things. They were all fighting this typical standards war.

At the end of this thing, we said, "Let's do a consortium where we can show our work and invite all the companies around the world that are working on MPEG." At that time, there were about maybe six or seven groups, including Intel, which had just bought the DVI stuff from RCA. It wasn't meant to be a bakeoff or anything. It was just a forum where we could all show each other's work. I was the draw because I was with Apple Computer. Maybe we'd buy your technology and incorporate it into some product. We're research men. We don't do any of that stuff.

I had it at Rickey's Hyatt House. It's no longer there, but Intel was started at Rickey's. It was a famous watering hole, really important. I thought that'd be fun to do that there, and it was. That worked out really well.

Andy really solved the draw issue. What he did was he got a clip from the TV show *Moonlighting* with Cybill Shepherd, a thirty-second clip of her walking down an alleyway, a beautiful woman. There was a graffiti on a wall, so we knew it was busy. He got it digitized, which was not easy to do in those days, then sent copies out to all the different people that were going to come to this thing. You can show anything you want, but you have to compress *that* image at one-megabit data rate. You can do anything else you want.

The problem was all these guys would compress their own images. They'd look great, but not with somebody else's computer. When we did that, inadvertently. We had created a bakeoff, so now everybody was viewed, and you could see what the technology would do. One megabit. We chose one megabit because that was the data rate you'd get off a CD-ROM at the time. We could now put real movies with sound and everything on this.

Intel came out and said, “We’re only going to stay to the morning. We’re going to leave, because we’re busy selling our technology,” which was one-way. It required a supercomputer, MACO, to do the compression. It was not a two-way thing.

I said, “Look. You really ought to stay and see this. You’re going to see everything.”

“Oh, no. We’re going to go off and—.”

“Okay.”

What happened, in a nutshell, is we all showed our stuff. I had an engineer, Paul Gavarini, from France working for me, and, of course, the sun rises and sets in France. He says, “I will go back and—.”

“Okay. You go back and do that.”

He goes and finds the French telephone company Kinet. They were working on it and they had a team working on a 56-kilobit rate, but it was scalable. It would go up. He said to them, “Run it up at a megabit and run cartoons off the air through it.”

“What? This is meant for telecom.”

“Just do it. Just do it.”

After a few drinks, they did it. It worked really, really good. They bring it over and everybody was blown away by how well this DCT thing worked.

All of a sudden, in one day, we had de facto changed it. Now we had solved the argument about what the standard was going to be. It was going to be DCT. It wasn’t our technology; it wasn’t the Media Lab’s; it was public technology. It was kind of from the French. And, like—boom! Now all of a sudden, everybody took off and ran with it. I went off and decided we had to have a chip made. I got Thompson SGS, convinced them, and we helped them. We worked with them to design encoding, decoding chip, built the first one, and changed the world. Now I’m responsible in some way for the Internet clogged with videos of puppies and kittens and crap like that. Thank you, world. You’re welcome. [Laughs.] Unintended consequences, yeah.

The other things you may not know about, FireWire, how that happened. That’s kind of interesting.

Weaver: Right. Actually, I have FireWire down along with *QuickTime*. Al, would you tell us about the Aquarius project that you managed at Apple?¹⁷

Alcorn: Yeah. Aquarius project was one of the super-secret projects at Apple. I wasn't even fully informed on it, even though it was under Larry Tesler in Advanced Technology. It was super-secret, but I knew it had something to do with making a new kind of chip. What it was about was to make a new microprocessor chip that would use a concept called fine-grained parallelism that would be much faster and cheaper than any other chips, as though chips were our problem. I remember talking with Al Caso about it. When you have these secret things and you're not allowed in, you tend to piss on it and whatnot. I remember Sam Holland, who was the original guy running it, finally found me and Al and told us to shut up. [Laughs.] "This is not helping."

Well, eventually, the project wasn't getting anywhere. They had bought the Cray computer, a multimillion-dollar computer, just for this project. They were using software from AT&T for advanced chip design that wasn't really fully working. Then they were going to port it to this Unix Cray that was going to speed it up enough to make it work. The fine-grained parallelism was a concept that we sort of knew about, but it didn't make a lot of sense. Even if it did, the real problem was the software, because they weren't working on any of the software. Someone was going to make a compiler that would compile fine grain and be able to separate out normal code into different. Anyway, it came apart. Sam Holland disappeared, went off with the Dalai Lama, and the project team is like, "Oh, no. What do we do?"

I knew a lot of the guys on the team. They were really smart people. They asked me, "Al, would you take the project over?" Because *nobody* wanted to do it because it was suicide. I'm the kind of guy who was an Apple Fellow that I did not mind suicide. I didn't care if I failed or not. If it was a fun project with a good team, I'd give it a shot. I managed to take it over and try to make something out of it, but it just didn't happen. But, hey, we had a Cray. That did pay off on the video compression.

The other weird thing was the guys in Product Development that are doing the packaging and the tooling for the plastics. They found the Cray, and these guys were really smart. They were sharp. And they got a program called *Moldflow* that was a program that ran on pretty powerful computers, but it was really slow. We got them to port it over to the Cray so it actually worked fast enough that they could take the packaging design for a new plastic case, build it virtually, flex it, and see how the plastic flowed into it. When you're building a plastic case for a product, if you're really well funded, it's like three months to make that tooling. You shoot the plastic and you try it. If it doesn't work, you've got to go back and do the three-month cycle again. With this program running on the Cray, they

¹⁷ Apple's Aquarius project began in 1987 with the intention of creating a four-core computer processor. Alcorn would dismantle the project in 1989.

cut three months out of the design cycle. That turns out to be worth it to buy the Cray for Apple. Nobody in management knew that these guys were stealing time on the Cray getting this done. When they finally pulled the plug on the Cray, mysteriously, the product development cycles went out another three months. Weird, weird consequence of it.

But that was the Aquarius project. I tried to do as much as I could to pull it out. Great people.

Weaver: What was your involvement in *QuickTime*?¹⁸

Alcorn: *QuickTime*—okay. Advanced Development is not supposed to release products. It's research. You don't do products out of there. Oh, sure, we did *HyperCard*.¹⁹ [Laughs.] And a few others that had to be snuck out, much to the disgust of Jean-Louis. But with *QuickTime*, we were working with the fundamental technology of compression. Al Caso, Galyn Susman, and Bruce Leek had this project started over in Product Development called *QuickTime*, because they liked the idea of making it.

Indeed, we decided in Advanced Technology that the graphics group were going to do a movie for SIGGRAPH [Special Interest Group on Computer GRAPHics and Interactive Techniques]. We were going to render it on our own Mac computers, which weren't meant for this. They decided to do that, and eventually, we did do the movie. It actually got selected to be in the SIGGRAPH. But the reason wasn't because our technology was so great. It was because our secretary, or "area associate" in Apple speak, was dating a guy called John Lasseter. He eventually married her. So, he'd come over after work, and they got him suckered into making the movie. Lovely human.

We got it but doing that process of making that movie was critical. People deride it as something stupid for Advanced Technology. We realized that the Apple platform, the Apple software platform was *terrible* for doing video. For media, sound, or video, because one of the problems it had was a fair arbitration scheme. Well, you can't be fair when you're doing music. You have to do unfair, because you blow a hole in music. It really sounds awful. The project initially was, "Let's create an operating system, hacks to the operating system that will make it do media in the way we want, two ways."

Again, Advanced Technology can't release the product or do that, but we contributed a lot. They didn't actually use our compressor. They made their own very, very simple compressor, but that wasn't the point. It was the point of having *any* compressor that was symmetrical that could record and decode and

¹⁸ Apple released the first version of QuickTime in December 1991.

¹⁹ Apple's HyperCard, originally released in 1987, is among the first successful hypermedia systems predating the World Wide Web.

have that in. And that was kind of done. It wasn't a management idea. It wasn't Jean-Louis' idea.

In fact, Larry Tesler concocted this thing. "We've got to get some support out of Jean-Louis." What we did was Larry scheduled a one-hour meeting on a project that we knew he wasn't going to like. It wasn't going to take much time, and he'd be over in the right building, which he normally wouldn't be in. We had hired a consultant, since he wouldn't let us hire full-time people, that made a MacroMind *Director* mockup of what it would look like if you could have video, take the video, put it over here, and manipulate all this stuff in a *Word* document.

What happened, when the meeting broke up, we said, "Hey, Jean-Louis, would you like to see a demo?"

Well, who doesn't want to see a demo? It was right next to where we had this meeting. We did it on purpose. And, "Hey, Bob. Hey, can you show us some of this?" It was all set up, and there it was.

And Jean-Louis, a light went off, because prior to this, he said it was like watching television. "It's stupid. It's not something we should do."

Well, he saw this, and he says, "Oh, I get it. I could send my mother a document with movies, pictures, and text about our vacation with the kids and everything. She could just throw away all the words and just save [the images and videos]."

"Yeah."

"Oh, okay."

That was one way we got that more accepted.

But *QuickTime* in itself was a project that was not, again, an Advanced Technology project, but we infused it. This team got it working and everybody fed them all kinds of support to help them with some of the problems. It was very fundamental. Now thanks to that, we've got the Internet clogged with puppy videos and God knows what. The world is a better place.

Weaver: What about FireWire?²⁰

Alcorn: FireWire is a very interesting project. Michael Teener was a guy working on the idea of an ultra-high-speed network for the Macs. I don't know if it was in

²⁰ IEEE 1394 is an interface standard for a serial bus for high-speed communications and isochronous real-time data transfer. It was developed in the late 1980s and early 1990s by Apple, which called it FireWire, in cooperation with a number of companies, primarily Sony and Panasonic.

Product Development or Advanced Technology. I saw what he was doing, and I said, “This is really important.”

He had the idea that we were going to do an optical [network]. He already got a deal working with Bell Labs, AT&T to make a special connector that could be really cheap. It had to be like a gigabit data rate. This was back in the eighties. I saw how important this was. At one point, Apple decided to have a command performance by all the Apple Fellows. Each would give a presentation to the exec staff. We were down at the Fairmont Hotel in a nice conference room and everything. I had to talk about high-temperature superconductors because it was in the press. If it said “super,” it must be important. Maybe they’ll compare it with the computers. [Laughs.]

That was crazy. I smuggled in a quart of liquid nitrogen and I had the high-temperature superconductor floating on a magnet in space, which is a great demo. All the execs, Sculley, Gassée, and all of them, were standing around, and the magnet fell off and went on the floor. Jean-Louis is a very, very polite man. He went over to pick it up. I couldn’t let him do that because it would get stuck to his finger. I actually had the pleasure of giving him a body block to save his finger.

But anyhow, I gave this talk on something that I called AppleScream. I discovered, much to my surprise, that nobody on the exec staff at Apple knew that we were the world’s leading network manufacturer. Think about that for a minute. We had this thing out there called *AppleTalk*.²¹ I found out that it was the most installed, biggest network in the world. The management didn’t know they won a war they even know they were in. That was a little tough for me, because I’m thinking, “Wow,” you know.

Somebody once said—I think it was Jerry Lawson, “Shoot low, Red Rider. They’re riding Shetland ponies.”

I had to convey to these guys that didn’t understand the business and how important this was. And I was using this gallium arsenide chip in the base unit to handle the speed and all that. This’d be wonderful. Basically, what I was doing was nobody knew what [Michael] Teener was up to, cared, or thought it was important. I figured, I’m going to use this time to pitch his project because it’s the right thing for Apple to do that.

Years later, it eventually came out, but Apple was, like, scared of its own shadow. Sony had to adopt it before Apple would. It’s crazy. But anyhow, that was FireWire. But it was fun giving Jean-Louis Gassée a body shot.

²¹ AppleTalk was released in 1985, and was the primary protocol used by Apple devices through the 1980s and 1990s.

Weaver: Were there any other things that you consider major contributions at Apple or was your tenure there coming to an end?

Alcorn: Well, I mean there was a lot of wonderful stuff going on, like *HyperCard* with Bill Atkinson. That was not supposed to be released. Once again, it's Advanced Technology. How could we do this? They waited until Jean-Louis was on vacation in the south of France. Every year, he goes out there on the beach. We released it, and by the time he got back, it was in the press. It was a great success, so now he couldn't cancel it. He did not like that, but, hey, we did it anyhow. Yeah, yeah, a lot of that stuff went on.

Weaver: When did you actually leave Apple and go on to other things?

Alcorn: Oh, god. I don't remember the actual date. Apple all of a sudden had to start cutting budgets a little bit. It was not done in a fair way. It was basically "You guys fight amongst yourself." We had the staff, Larry Tesler's staff, you had people like Alan Kay, Dave—these are great people—Michael Carter. I was going to have to do a zero-sum game with these guys.

I just said, "I don't want to be part of it." It was getting very political. [I said], "You guys just take my whole budget and save these other projects," because I get bored. It wasn't as exciting anymore. I didn't want to do the politics thing.

Weaver: Was your next project that you thought would be interesting Silicon Gaming?

Alcorn: You've asked me—so I brought my resumé along so I could remember. After Apple, Digital F/X was a company started by Steve Mayer that made very high-end digital graphics compositing system.²² Big rack-mount high-speed electronics that allowed you to do Chyron text, floating video on layers. It was just the most advanced system around. Very high end, but these were hundred-thousand-dollar systems. They wanted to build a smaller desktop version, which they called *Video F/X* that worked off a Mac.

Unfortunately, in those days, you had to use videotape, so it would play two videotapes. You had two professional-level frame-insertable videotape players, which were not cheap. They run ten to twenty thousand dollars apiece. You get two of those and the computer, the two-thousand-dollar Mac. It would control [video recorders] and could do inserts and put together [video edits] It was the first system that used the timeline for video, for editing, that you all use today. That was invented by Digital F/X. It was then stolen by Avid and MacroMind and a few other people, but hey.

That was a company I worked at, and a fascinating system. At the end, we realized that it wasn't going to be videotape. You're going to have to do

²² Steve Mayer founded Digital F/X in 1984 after Steve Jobs agreed to have Apple fund the company.

compression and have it on the machine all as digital data. But we were too late to make that shift. So, we had that.

Then after that, I believe I went to Silicon Gaming. Yeah, that was fun.

Weaver: Why was Silicon Gaming fun? What did you do and how did you change that industry?²³

Alcorn: Well, once again, it's this concept of missionary marketing where you build a product like a home computer that no one's ever used before. Now you have to convince people they want to buy something they never bought before, and there's no infrastructure. I got a call from Dave Morse, who was the angel that started Amiga and 3DO. He did that. He said, "Hey, Al, let's start a company that does slot machines."

And I'm going, "Wow! That's out of left field. Wow! What's going on?"

He invited me to go to a big trade show in Vegas for the slot machine gambling business. Now, I advise you guys, if you get into that show, that's one of the best trade shows to go to. We're talking smoking cigarettes, beautiful ladies, slot machines and all that kind of good stuff. I went to the show to see what was going on. I'm looking at these machines that were real spinning behind glass, but they're on stepper motors. So, it's digitized, but it's basically 1970s video game technology that I had bypassed years ago. They're using Z80 microprocessors. Meanwhile, it's a billion-dollar industry and the technology is like the Stone Age. I'm thinking, "I am missing something. Can't be this stupid."

Well, yes, it was, because the industry is so protective. To run a game in the industry, you've got to be approved by the Nevada Gaming Control Board. That takes a minimum of a year to get approved. Very few companies want to spend that much time, especially in Silicon Valley. They were like this little closed thing that hadn't seen the real world in ten or fifteen years.

We came up with an architecture that would use all digital stuff with a big screen. Steve Wynn had shown that Vegas is not about gambling; it's about entertainment. And gambling is a form of entertainment just as much as the theaters, just as much as the food and all that other crap. He really understood this. But the entertainment machines, these three reels spinning behind glass, are the most boring thing you could think of. Let's put media in this thing. Basically, that was the concept of it.

Got a million-dollar seed [funding] from Dave [Morse]. Classic. I put a team together, a *really* good team of engineers that was my pleasure to lead. We hired Andrew Pascal, Steve Wynn's nephew, to help us understand the customer, because we did not understand the customer. In terms of funding, our seed

²³ Silicon Gaming was established in 1993.

round was the angel round. Then we got the B round or A round from Kleiner Perkins, the top venture capital firm in the Bay at that time, and we were off and running.

We had enough money, put a great team together, and architected a very interesting system that used public-key cryptography to really protect the data on this thing while having rich, rich media, because we put in a hard disk. [At the time], you couldn't have a hard disk. We had to get the rules changed. I accidentally stumbled over the best attorney in Vegas, the guy who happened to have helped write the rules. I just found him in the phonebook somehow and I went to his office. I knew he was the right guy because when I went in there, he was on the floor with a screwdriver hooking up a modem to a telephone jack. I'm going, "This guy will understand what I'm talking about."

So, we changed that industry. Boy, that was fun. A lot of good stories.

Weaver: Didn't you at one point arrange to educate the Nevada Gaming Commission so that they understood the difference between a single- and multi-key encryption system?

Alcorn: Yeah. Again, I'm always skeptical about this stuff, and I'm thinking, "I'm missing something. What's going on here?"

I arranged a meeting with Ed—I forget his last name—wonderful man who was the head of the technical branch of the Nevada Gaming Control Board, and basically explained what we're doing. "We're from Silicon Valley, and we want to make a high-tech modern multimedia slot machine."

I thought they might be kind of skeptical. "You can't do that."

He said, "Wonderful. If you can make a better slot machine that would attract more players, we'd make more tax revenue in the state. What we can do to help, we'll be happy to help. But watch out. Here's the approval process. This is hard. You're going to have to submit."

In a nutshell, the first thing you have to do is get the company licensed, which means you have to do a background investigation of all the execs on the company. For each exec you give a \$50,000 down payment for each one, and that's just to start. They do this investigation that takes about a year, and they want to unroll every deal you were ever in. And, "Oh, boy. Okay."

Then once you've passed that, you can then submit a prototype to the Nevada Gaming Control Board lab. "We have to understand everything about it, and then we will look at it and approve it if it meets the regs and all that."

Then once that's done, you then put it on a field trial for three or four months. It was the Bally Grand Hotel at the time. Then if it passes all that, you can sell machines. Now you're two and a half years into this before you can make a dime.

And we had to do a public offering to help us get licensed. [That way] you have the money, but you would also now be easier to license in Nevada because the SEC does a lot of background checking. So that was, in a nutshell, how that all happened.

I remember going to Ed at the Nevada Gaming Control Board and saying, "Look. We want to use public-key cryptography."

Now, the law before said the program had to be stored on a ROM chip because a ROM can't be cheated, even though the ROM was on a socket and it was reprogrammable. "Okay. How about if we put public-key cryptography around that to make it impossible?"

And he goes, "What's public-key cryptography?"

It's something coming up from this company called RSA [Rivest, Shamir, Adleman], data security. I said, "Uh, okay. I'll tell you what—."

We paid for RSA to run a little training course on their premises to explain how it all worked. A couple of the guys got it like a big light bulb going on, so that got their attention. There could be a lot more security using public-key cryptography, two-key cryptography, and we were off and running.

One of the tricks about doing this is you have to have a good random-number generator. Really important. I learned a lot about random-number generators. We said, "How do you evaluate them?"

"Oh, we have this professor at University of Nevada, Las Vegas, Professor Yfantis, who teaches computer science over there. He does that inspection for me."

"Oh, can we talk to him?"

"Oh, sure."

Not only could we talk to him, we could hire him. Professor Yfantis teaches computer science over there, so we basically sent a bunch of our engineers. One of them was Tim Kay, a Ph.D. from Caltech, who won the Academy Award. Smart guys. We go over there and they're talking to him. Professor Yfantis is saying, "Well, the coin goes in here and flips a little micro switch, and it goes—."

And we said, "No, no, no. We really understand this."

He said, “Oh, my god. You’re computer scientists. You actually—.” We were the smartest guys in the industry. He was so thrilled.

Of course, we hire him and give him some stock as a consultant. But a funny story was one of our engineers goes over there, Lou, to talk with Professor Yfantis. He is teaching a class, so [Lou] goes into the class and sits in the back until the class is over. He goes into the door and the thing is half full of showgirls. It’s a computer science class. He said, “I’m in the wrong room.” No. He’s in the right room. The modern showgirls today are not stupid. They know they’ve only got a finite time to do this and they need to have something to go on after this ends. They’re all learning computer science. Lou decides he wants to take a course in computer science. [Laughs.] That was a weird one.

Anyway, it was a lot of fun. We actually had a really good random-number generator. However, it was too smart, and we outsmarted ourselves. During the final testing that was going on at Bally MGM, we had two production-ready machines in the back being played just to see how it would work in a real environment. The numbers were coming back. The odds and the payout were not matching what it was supposed to be. It was only off by 1 percent, but I knew enough about statistics that this was way out of the sigma [standard deviation]. This is not supposed to happen. I gave a task to another group that didn’t design the random-number generator, but it was really smart. “Eagle Eye” Burns, great guy, figured out that it was broken, and we had a perfect random-number generator. We de-randomized it by some other actions that we did. We got it fixed a week before it was approved and slipped in the new code under the noses of the Nevada Gaming Control Board, because it would have ruined the company.

That was a fun thing, because here’s the problem. To make a successful, revolutionary product for an existing market, the engineers have to understand the customer. They have to understand why the customer played that machine and not another machine. Now we’re talking about gambling. We’re talking about something any good engineer doesn’t do because he knows the odds are against him. Just mail him the money. I had to educate the engineers on the customer. We had a lot of fun doing that. I bought three real brand-new slot machines through a secret path I had figured out. We had them running in our offices in Saratoga; hoppers, payouts, the whole thing. It might have been illegal. SRI [Stanford Research Institute] said it was illegal, but nobody ever stopped us. But we could play our slots, we could play card games, and do all that stuff. And we brought the engineers to Vegas actually through Andrew Pascal. He got an opportunity for us to all work as slot repair technicians on the floor of the Mirage one day. We dressed in the uniform with the little walkie-talkies and everything. That was a lot of fun. Vegas-meets-Silicon Valley.

Weaver: Do you know what became of Silicon Gaming? Do you know who bought them?

Alcorn: Yeah. Silicon Gaming had a lot of opportunity. Once again, we were about five years too early. The president, God bless him, wanted to grow the company and he thought it was going to grow really fast. His motto was “You can’t soar like an eagle if you shit like a pigeon.” He spent all the money. He basically put in an order-entry data processing big computer system that cost millions of dollars. Worse yet, he took away all the execs’ time learning how to use this horrible system we didn’t need because we didn’t have any sales at the time.

Yeah, a lot of mistakes. Not the way I would have done it. I eventually left. The company finally tanked. The remains got bought by IGT, I’m told, for the Alcorn patent, which was something that our team invented that I got the credit for because my name begins in “A.” That was the public-key cryptography, which is really the main technology for having rich media platform, which is unbreakable or unhackable.²⁴

Weaver: Was the next place that you went to Paul Allen’s Interval Research?²⁵

Alcorn: Yeah, I think so, yeah.

Weaver: Would you like to tell us about your time there?

Alcorn: Sure. Boy, strange journey. Yeah, I’ve got a bachelor’s degree in electrical engineering. I’m not a Ph.D., I’m not a Master’s. Paul Allen basically decided that corporate R&D centers like Bell Labs and whatnot no longer exist. The last big one was Xerox Park. They changed the world, but Xerox didn’t want to take advantage of it. Paul thought firmly that “Hey, I’ll do advanced research, taking years to develop stuff, and then I’ll commercialize the product and I’ll take advantage of that.” I think it would have worked if he was willing to license the technology, but he insisted on spinning out a company because Paul thinks he needs more money. [Laughs.] Paul is a *wonderful* man, just brilliant, but it would seem to me after the first three or four billion, my quest for making more money would kind of taper off.

But anyhow, he had about 110, 120 of the smartest minds in research in this one spot called Interval Research, but it wasn’t getting out. They hired me and a couple other people like me called Senior Business Management Advisors that knew how to take technology and make a company out of it and a product. But they’re kind of different. The company and the product are a little different. That was my job there.

Again, I got to work with these brilliant, brilliant people and try to figure out how to make a product out of that. We did a few. I spun out towards the end something called Zowie that really was kind of clever. Again, ahead of its time.

²⁴ US Patent number: US RE39,370 E; Issued to Al Alcorn on Oct 31, 2006.

²⁵ Interval Research Corporation, founded in 1992 by Paul Allen and David Liddle, focused on consumer product applications and services with a focus on the Internet.

Kids like to play games. What if you had a video game that you played on your little personal computer, your laptop, Windows platform, and it worked with a child's play set. We're talking about kids that are like five years old that like physical play sets. They don't want to necessarily press buttons or joysticks.

Basically, it was a play set; a play board which had like eight objects on them. They could be a ship, a doll, or whatever, like Chess pieces. There was a technology in the board that would know where each piece was within a millimeter positioning accuracy and some height. It was actually based on kind of a nuclear magnetic resonance for kiddies that cost like ten or fifteen dollars. We had to make a couple of custom chips to do it. We got it to work and shipped the product, but a bad mistake was made by management of the company. They wanted to be a competing video game company that would be showing at E3 [Electronic Entertainment Exposition] and stuff like that. This is a kids' game. We spent *way* too much money on getting good graphics when we'd already gotten a prototype with MacroMind director and crude graphics. The kids loved it, so don't waste the money on it. Just make it simple and make the fun interaction. Anyway, they didn't do it and it didn't work.

Weaver: Who ended up buying it?

Alcorn: Oh, the technology was bought by Lego. It would have been a brilliant addition to their stuff, because now you could tell what objects you made on the play set would do it. It would have worked; except they had a financial setback. They just cancelled all the advanced stuff, so it never got out into production.

But one funny story. I'm touring the [MIT] Media Lab about that time, and you get to see all the little projects going on. One of them was a canonical project that's always been done at that time where you had a video projector projecting on a flat surface. You could move physical objects and the video would respond to that. These guys were proud because they had actually taken this weird technology from this stupid thing called Zowie that they could buy at the closeout store for like ten bucks. They would repurpose the technology. My wife is with me there and these wonderful scientists are working on this stuff and they talk about that from the Zowie technology, and I said, "Oh, I designed that."

"No! You're a god."

And my wife goes, "Oh, don't humor him." [Laughs.]

That was hilarious, and I said, "I'll tell you what. You guys reverse-engineered this thing. I'll give you the SDK [software development kit]."

"Really?"

"Ah, just do it."

I gave them the SDK, showed them how to modify it better, and all that. But that was kind of funny to have it come all full circle. [Laughs.] When you're in the closeout bin with stuff you've done, you know you've made it in Silicon Valley. Your stuff is in the surplus store, and, "I don't know what it is, but there it is." [Laughs.]

Weaver: Can you tell us what the family makeup was in your family? In other words, two parents, one parent, an aunt, an uncle. Who were you raised by? What was your primary family? And then what was your birth order? Were you the oldest, the middle, the youngest?

Alcorn: Well, I was the second child born. I was born in 1948 on January 1st. My mother said I was a bad champagne hangover. My brother was born a year and a half before me. My father was a Merchant Marine, which is kind of tough because he was out at sea a lot. My mother had been a secretary. Grew up in San Francisco.

At one point, my mother and father got divorced when I was pretty young, maybe seven or eight. We lived in a flat in Haight-Ashbury, 520 Ashbury, just down the street from the corner of Haight-Ashbury. I lived there for many years until it got kind of weird. Then my grandmother passed away, but my mother got enough money that we were able to buy a little house out in the Sunset. Not as colorful a neighborhood as Haight-Ashbury, but that was Haight-Ashbury. My mother and father were divorced. My mother primarily raised us. I was lucky, because I went to Lowell High School, which is a great school. I got a good education. Through football, I got myself into Cal and didn't have to worry about getting killed in Vietnam.

Weaver: And you got what degrees when you attended college?

Alcorn: I went to University of California and got a Bachelor of Science degree in electrical engineering and computer science.

Weaver: And a master's degree?

Alcorn: Did not get a masters. Got out of there as quick as I could. I went to work at Ampex. At the age of twenty-four, started Atari, so I kind of got a Ph.D. in business by trial and error.

Weaver: Got it. Other than English, do you speak any other languages?

Alcorn: No. A little bit of Spanish.

Weaver: Do you have any hobbies?

Alcorn: Yeah. I always enjoyed photography. I had my own airplane. I was really into aviation. That was a lot of fun. Joe Keenan and I almost bought an A-26 attack bomber. That was fun, but sanity prevailed at the last minute. Whew.

And what other hobbies? I like to hike and do that sort of stuff. Fast cars. I like fast cars.

Weaver: Would you say that your hobbies run from the complacent to the high risk?

Alcorn: Yeah, I like high risk. When I was younger, like driving the motorcycle around in a dusty roller-skating rink. That was fairly high risk, yeah.

Weaver: What aspects of video games do you view as significant properties?

Alcorn: Wow! That's an interesting question, because I've never thought of that. I think I'll say one thing. What little study I did at Cal on McLuhan, the idea of a hot medium versus a cold medium. I think that was, in retrospect, one of the most profound things. When people played the first arcade *Pong* machine, that was the first time, whether the people knew it or not, that they were interacting with the high-speed digital electronics, right? And it turned television from a cold medium, by McLuhan standards, where you just sat back and got data pumped at you, to a hot medium where you interacted with it. If you didn't interact, you just sat there and did nothing. It kind of changed the way people could view that box, the idiot box. I think that was, in my sense, one of the more profound, bigger aspects. Beyond that, the low-level stuff is all just computer graphics and transitory stuff, but, in general, computer graphics are how you solve those problems most effectively.

Weaver: From the perspective of somebody who's a pioneer in the industry, how have games evolved, in your opinion, to the present; in other words, good, bad, lazy?

Alcorn: That's an interesting question. Maybe I'm a bit selfish, but I think the creativity has kind of gone out of the game business. Back when we were at Atari, if you look at the games that we came out with, every game fundamentally was a new system. We did very little follow-on except for the very early days when we were dirt poor. You look at our array of arcade games that were just coming from all over the place. They don't do that anymore in the consumer area because the numbers are so big. Like when we did *Pong*, it was just me, three months on a bench. The VCS with Steve Mayer, that was a three-month project from start to working prototype in three months with two guys.

Now to do a video game, what is it, \$50 million, \$100 million dollars with a cast of hundreds. You don't go off and do something stupid that might not work. They're too risk-averse. They've got too much money on it and nobody can afford to fail. I think it's equalized a lot with the games on iPhones, that stuff. Now two or three engineers can make a good game without having to do all that

stuff. But it's a much different business. I would be terrible in the video game business today. It would just kill me.

Weaver: Do you think that there'll be a subset of the gaming community who'll want to keep the physical game objects in circulation much in the same way that like vinyl LPs have had a new renaissance in recent years?

Alcorn: Yeah, I mean, there already is. I mean, there's a show, California Extreme. There are a lot of people that really worship and adore the old stuff. Frankly, I'm not one of them, because I like to see the new stuff. I think it's exciting but I'm not going to say no to somebody who really likes old stuff that I did.

I remember one time I was at one of these shows and there's a *Pong* machine there. An original arcade *Pong* machine. Two-player, of course, and there's a ten-year-old boy playing by himself. I go up and I say, "I'll play with you."

I'm playing and I'm beating him, and I tell the kid, "You know, at one point, I was the best *Pong* player in the whole world."

He looks at me and I said, "Yeah, I was the only *Pong* player." [Laughs.]

Yeah, but so people like that stuff. It's kind of fun. I've restored a bunch of games for some people. I still have the original schematics for the original *Pong*. I don't have the production schematics, but the original hand-drawn ones still work. I've been able to get them working again.

Weaver: Listening to your answer to the issue of having the physical interaction with the television set, going to the hot medium, do you have any thought relative to the preservation of video games through emulators as opposed to the original objects upon which they were originally played? As far as museums and libraries are concerned, who have an obligation to educate the public?

Alcorn: Yeah. I think emulators are really valuable for that, but they have to be very, very good. They have to really emulate. They really should run the *real* software, like the MAME system, you know. It takes the *real* code that was in those ROMs and runs it. Sadly, I've seen a lot of versions of *Pong* that have been recreations that aren't quite accurate. They miss some of the little subtle aspects about the game that they just weren't aware of. Fundamentally it's great to do that, but I think from a preservation standpoint, you need to be careful about that.

I mean, for example, on the original *Pong* machine, one of the defects was that the paddle won't go to the top of the screen. That was a design defect I had in there, and I knew it. It was the way I was using the 555 timer. I knew how to fix it, but we realized that if that wasn't there, that provided a blank area where a good player could get the ball through. Had I got rid of that, two good players could play it forever and the machine would be a flop. Boom! That would be the end of the machine because it would just monopolize the machine, wouldn't

be any fun. That little defect needs to be there, for example, if you're going to do that.

Now, for hardware games like *Pong*, it's really hard to emulate. You have to just create new software for it to do as good a job as you can. Things like MAME where we actually had a microprocessor machine, you can then build hardware. The Computer History Museum here has a great exhibit on the Alto computers. We have a bunch of them, but you can also play with an emulator. You could use, effectively, just what the Alto did at the same speeds and everything.

Weaver: In a different aspect relative to the question that you just answered, how would you preserve virtual worlds that are in games today?

Alcorn: Ooh. Well, I've played with a few of them. I think they're fascinating. I never really thought about that. I think you just have to be able to get them off whatever old platform they were on and preserve them, but you also need to have the back end. Those systems have a huge back end, so that's expensive. I don't know. I'm just thinking about it. It's not insignificant to run those backend systems. I don't know how you do that. Tough question.

Weaver: Now I want to go to a slightly different area of the societal impact of games. Can you talk a little bit about the influence of video games on other art forms such as the visual arts, music, and film?

Alcorn: There's a great band that has a song called "Play Pong." I love that. [Laughs.] I mean, that was really crazy. I don't know. I'm always stunned that people appropriate some of that and put it in modern context. I don't know, gosh, how it impacted other stuff. I mean, you see it all the time, which is weird. The concept of *Pong* and all that is still talked about. When the original prototype was still working, somebody did a really interesting, recreated scene of Andy Capp's Tavern. We used the Dutch Goose up here and we took the space on a Sunday morning. They didn't open till noon. We had the machine set up, and, of course, things took longer to develop at these filmings than they're supposed to. They had my son playing Nolan because he's tall. They had somebody else playing me, a fat guy with a beard. All of a sudden, a Little League baseball team comes in. These are like ten-year-olds, eight-year-olds. They see this original *Pong* machine and they go, "Oh, *Pong!* Cool."

I'm going, "How the hell does an eight-year-old know about *Pong*?"

But they do, which stuns me. Sometimes you go, "Maybe I went too far." [Laughs.] Could be worse.

Weaver: Do you see any parallels between the virtual economy in games and the real-world digital economy that's given rise to Bitcoin and other digital asset systems?

Alcorn: I'm going to have to pass on that. A friend of mine got to help with the Bitcoin mine. I got to watch a Bitcoin mine. Crazy, but I think it's gone a little too far, don't you? [Laughs.]

Weaver: In your opinion, what is the educational imperative of the video game industry, if any?

Alcorn: Well, education and video games. I think it's really important because young people connect with video games, whether we like it or not. It's a language and a culture. We can use that as a basis to teach computer science. I'm involved with a project called Hack the Future where we mentor junior high school-age kids. One of the things we'll have them do is make their own video game using *Minecraft* and other stuff like that. Kids are entranced by that. One of the most wonderful things people ever say to me is, "I got into electronics and mathematics because of *Pong*," and the early video game stuff. I'll take that. That's great, great compliment.

Weaver: I want to talk about the future of the industry for a minute. Do you think that advancements in graphics and processing have made video games any more of an art form than they were originally?

Alcorn: That's a good question. See, is the art in the graphics and the image or is it in the gameplay? Nolan on *Pong* wanted a round ball. I said, "To hell with it. I'm not going to do that. A square's cheap. You don't have any parts." Does it make any difference if it's round or square, right?

If the gameplay is shitty, but the graphics are really pretty, does that make a game work? No. I'm not a big fan of that. I mean, I love to see great graphics; Wonderful graphics in virtual reality and all that. But I think a real true video game, a good one, has to have good gameplay. *Tetris* is a great example of a great gameplay, but the computer graphics are pretty simple.

Yeah, I personally think it's a false thing people fall back on. Great graphics. You can just throw enough money and people at it. Anybody can do that, but what about the simple, subtle games, you know, the essence of the game.

Weaver: Based upon your last answer, you'll like this question. Have more powerful high-level tools helped make better games or have had the opposite effect by allowing developers to become lazy and not know enough to test the limits of the hardware?

Alcorn: Well, I don't think there's any requirement to test the limits of the hardware. I think you have to conceive of a great game and then build it with whatever technology. Now, if you've got a game that requires virtual reality and all this other technology that's out there and it only works in that medium, then, great, so be it. But for its own sake, I don't think it adds anything. I'm trying to think

of an example where you take an old game and just dress it up. It's really fundamentally an old game. I don't think that's the way to go.

Weaver: Do you see any parallels in today's indie development and the industry when you began developing games?

Alcorn: Fill me in a little bit more. What do you mean by indie development?

Weaver: Well, in general, indies are small companies, not a lot of money, generally young people without a lot to lose because they don't have a lot to lose.

Alcorn: Well, indeed. Today, again, when it was the big platforms, then you had so much money, you had to do the stuff. Now the iPhone and the iMac are very powerful platforms that you can build a lot of stuff on it. If one kid wants to take the time to understand how to program and get in there and do it, you could make a great game on that. You don't need to have all the back end. I think it's come to the point where people could make a whole lot of money, more than we ever made at Atari, just making a simple game. I'm always surprised that these new platforms come out anymore because they're so expensive to develop and build. I don't know that they make the game that much better.

Virtual reality, I've been a big fan of watching how it works. How that works doesn't always make sense, but I love that it's possible. I saw it two or three years ago, because virtual reality's been around for thirty years. It was actually started by Ivan Sutherland, the guy who invented the field way back when. Now the price has come down to where it's accessible to a lot of people. But nobody's had the killer game yet for it, nobody. You have to have a killer game.

Apple II wasn't going to be a success until *VisiCalc* came out. I remember, because I was a big fan of Apple computers. When I saw *VisiCalc*, when they gave me the first pre-released copy, Bricklin and those guys, I said, "Now *there's* a reason to own an Apple II."

When I got the first Apple II computer, the whole company came by and gave it to me. I got Apple II number forty, so the whole Apple company was there; about a dozen of them. I got it to work on my Advent projection TV, because it had a video input jack on the back, in the living room. Woz shows me how to use the Tiny BASIC and all that stuff. They leave and I tell my wife, "I can make it do anything."

She says, "Great. Make it mop the floors." [Weaver laughs.]

"No, I can't do that."

"Well, make it wash the dishes."

"Uh, I can't do that."

“Well, get it out of the living room, because I want to watch television,” you know.

It’s the wrong tool for the wrong job.

Weaver: Okay. Here are some closing questions. What did you believe you were originally doing at the time you got into the business? Now with the luxury of hindsight, what do you think you actually achieved?

Alcorn: Well, when I, quote, “got into the business,” there was no video game *business* per se. What I thought I was getting into was a job with my friends, Ted Dabney and Nolan Bushnell, in this crazy thing called video games. I didn’t really enjoy playing them that much. I was into *Computer Space*, you know. “Okay.” I thought I was getting a job that would fail in a year or two and I’d go back to work for Ampex, but I’d have a lot of fun doing it. I would learn a lot about other aspects of running a company, because being an engineer at Ampex, all you saw was that little thing. But all of a sudden, I got to do everything from emptying garbage to designing circuits to whatever. That was my motivation at the time. Nolan was saying, “Oh, it’s going to be a billion-dollar industry.”

And I’m going, “Yeah. Right, Nolan. And we’re going to have a contract from General Electric, too, at any time now. Yeah, yeah, yeah, right.”

When it took off, I was an anarchist at Berkeley. I’ve got a bumper sticker left over that says, “There’s no government like no government.” Here I am at Atari, and all of a sudden, we’re doing capitalism. Like, “Oh, okay.”

The first year, we have sales of over \$1 million. I’m just going, “Whoa!” I never seen that many zeroes under any circumstances in any way. I was just hanging on for the ride, and it was fabulous. Nolan at the helm with all these crazy ideas that I didn’t think would work but did anyway. In retrospect, I look at it and I don’t know. I think it’s good for society, but some people don’t like it.

Weaver: Al, at the time that you were involved in the creation of video games, could you have imagined the societal or social impact they’d have on societies around the world?

Alcorn: No, and I’m very sorry. Apologize for anything that I did. It was not my intention. But, no. God, no, no, no. Yeah, I’m humbled by what’s become of it. I feel sorry for people that set out to do something like that and can’t succeed. I wasn’t even trying, you know.

Weaver: The last question is this one. How does it make you feel to have contributed to the birth of an industry?

Alcorn: [Laughs.] It’s kind of funny. My lovely daughter is married to a young engineer that went to Cal. He’s working now at Apple. Remember, I like him a lot and

he's a great guy. I said, "You better get to work, because by the time I was your age, I already created a whole new industry, so you better up your game a little bit here." [Laughs.]

Again, I don't feel that I have actually done that. I just think I'm impressed that people still like it. I'm always surprised. I guess I have changed society a little bit, but it wasn't that I was trying. Nolan was sort of trying to do it, and he succeeded. I never had that much ambition in that spot. It was all curiosity.

Weaver: Is there anything else you'd like to put on the record?

Alcorn: I deny the allegation. I deny the alligators. [Laughter.] No.

Weaver: What was your biggest regret?

Alcorn: Telling Jobs to fuck off on the stock and just give me a free computer. That's a big regret. [Laughter.]

Weaver: Thanks, Al.

Alcorn: All right.

[End of interview]