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Upside

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INTO THE WIRELESS FUTURE

22

By Eric Nee

"In the last 12 months, we've seen 10 times as many interesting wireless opportunities as we saw in the previous 12 months," says a venture capitalist. Wireless entrepreneurs and their venture backers alike are eager to take advantage of what in many ways is an industry made for startups. The wireless market is fragmented into many service niches in which new ventures can participate. And advances in mobile computer technology are also pushing the market forward at great speed.

NEW WORLD MARKETING

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By Regis McKenna

A well-known chief executive once said, "Marketing is too important to leave to the marketing people." Businesses are not going to do away with the marketing department any time soon. But we must begin to include the whole organization—the entire company, from the chairman of the board to the telephone operator—in the marketing process. And what this means, says the author, is building customer relationships.



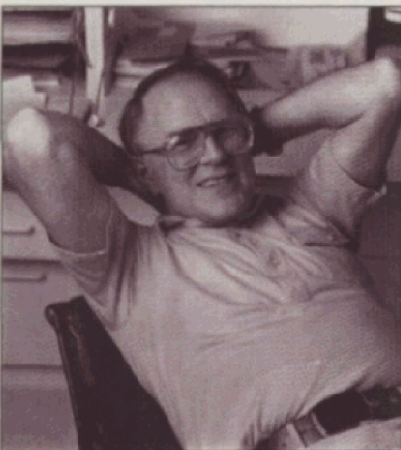
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INTERVIEW—GORDON BELL

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By Rich Karlgaard

Even given the mental might present in today's technology business, collective idiocy often prevails. That's why we need a Gordon Bell—famous engineer and, perhaps more importantly at this stage of his illustrious career, an outspoken gadfly on American technology business. Inventor of DEC's VAX computer line, a recent recipient of the National Medal of Technology and an author, Bell is still just a crusty hardware guy.



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CALL IT DIGITAL DARWINISM

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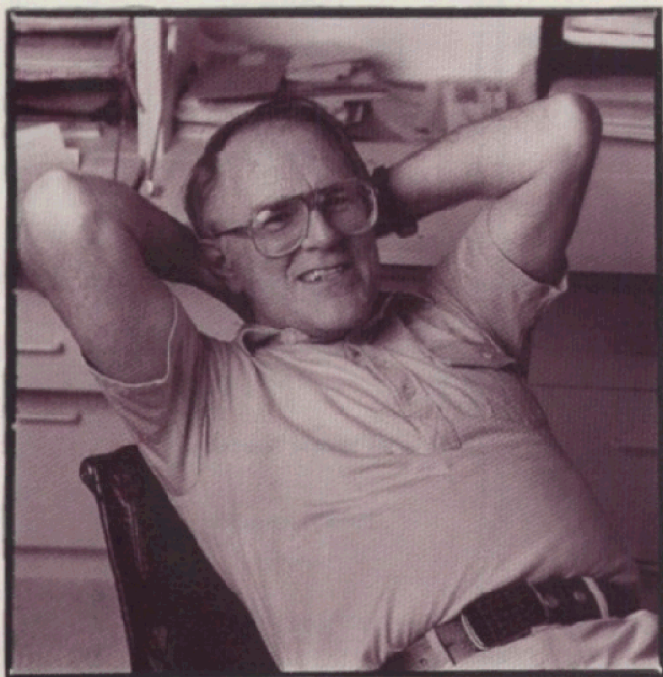
By Michael Rothschild

Why are the Soviet Union and IBM both foundering? Both had a command-and-control view of the world, with themselves at the center. But, says the author, the very notion of central planning is absurd once you begin seeing the world through the lens of evolutionary biology. Economists and executives would do well to pay attention.

Cover illustration by Pam Drury Wattenmaker

HOW FUNNY IT SEEMS THAT THE TECHNOLOGY BUSINESS, POPU-

LATED BY MAYBE THE SMARTEST PEOPLE IN THE WORLD, IS ODDLY VULNERABLE TO FADS AND GROUPTHINK. PACK A ROOM FULL OF SCIENTISTS, ENGINEERS, EXECUTIVES, ANALYSTS, FINANCIERS AND



LAWYERS, AND YOU'RE TALKING A MEDIAN IQ OF, WHAT, 140? HOW IS IT, THEN, THAT ALL THIS MENTAL MIGHT CAN FALL INTO COLLECTIVE IDIOCY? FOR EXAMPLE, SWALLOWING IDEAS LIKE THE PAPERLESS OFFICE (CIRCA 1979) WHEN JUST AROUND THE CORNER DESKTOP PUBLISHING (CIRCA 1986) WAS ABOUT TO CREATE AN AVALANCHE OF PAPER DOCUMENTS.

THAT'S WHY THE INDUSTRY NEEDS A GORDON BELL: FAMOUS ENGINEER AND—PERHAPS MORE

IMPORTANTLY AT THIS STAGE OF HIS ILLUSTRIOUS CAREER—AN OUT-SPOKEN GADFLY ON AMERICAN TECHNOLOGY BUSINESS.

INVENTOR OF DIGITAL EQUIPMENT'S VAX COMPUTER LINE IN THE 1970S AND MORE RECENTLY A RECIPIENT OF THE NATIONAL MEDAL OF TECHNOLOGY, BELL IS AN AUTHOR, TOO. HIS BOOK, HIGH TECHNOLOGY VENTURES, IS A BIBLE FOR ANYONE LOOKING TO START OR FINANCE A TECHNOLOGY STARTUP. LET'S MEET BELL.

by Rich Karlgaard



Just a Crusty Hardware Guy Gordon Bell

UPSIDE: When you went to Washington to pick up your National Medal of Technology, did you hang out with any of the other winners? What were they saying about the state of American technology?

BELL: Actually, the person I spent the most time with was Bob Galvin of Motorola. He was very much of the "we have to compete" mentality. This award was given by the Commerce Department, so there was a lot of concern about being more competitive.

UPSIDE: How?

BELL: Basically, just by competing, by not giving up. There was concern about general malaise, about giving up and being importers, which I'm really concerned about.

UPSIDE: There are two kinds of industrial policists: those who think government should fund projects and manage trade, and those who think the best government policy is low taxes, deregulation and a strong dollar. Where do you stand?

BELL: I had suppressed a lot of feelings about it when I was in the government. I guess I come down, maybe, in the middle, but probably more on the government-intervention side of things. It's not clear to me that consortia are the answer. It's more a belief I have that government and industry need to get their acts together in areas where we are going out of business. Things clearly are not working well today. The problem with the free-market argument is that it assumes a free market, and the problem is that there isn't a free market. The Japanese structure is different than that. Given the way the game is played and the value of Japanese capital and the way Japanese investors work, it doesn't work when we are in a game with them.

UPSIDE: Don't you think Japan is more vulnerable than we are? Isn't their success more easily replicated by other Asian countries?

BELL: Your argument assumes that Japan is non-added-value. That's not true. Japan is a massive added-value country. Yeah, they're get-

ting some competition with VCRs and the lower end of consumer electronics, but in the real high-tech things, they have it. These other countries aren't making VLSI and real high-tech stuff. And the way we're playing it, particularly given the capital formation problem here, the trend is to push everything into Japan for manufacture. Look at what Sun and Mips had to do to get it to happen. So sure, I see Japan being in some trouble, but not before it gamers a tremendous amount of the technology. There is no real technology in computing that we have exclusive control over...gallium arsenide maybe, but that's not a volume thing.

UPSIDE: They're not doing microprocessors.

BELL: Sure they are! Let's take three guys that have helped that: Andy Heller, by investing there and getting Fujitsu to invest in HAL, and then SPARC and Mips. There is an absolute transfer of microprocessor technology going on. The microprocessor game is just starting, particularly with the Mips transfer into NEC and the commoditization of RISC and Microsoft putting Windows NT on RISC. There will be RISC personal computers within a couple of years. And that could significantly alter the PC market.

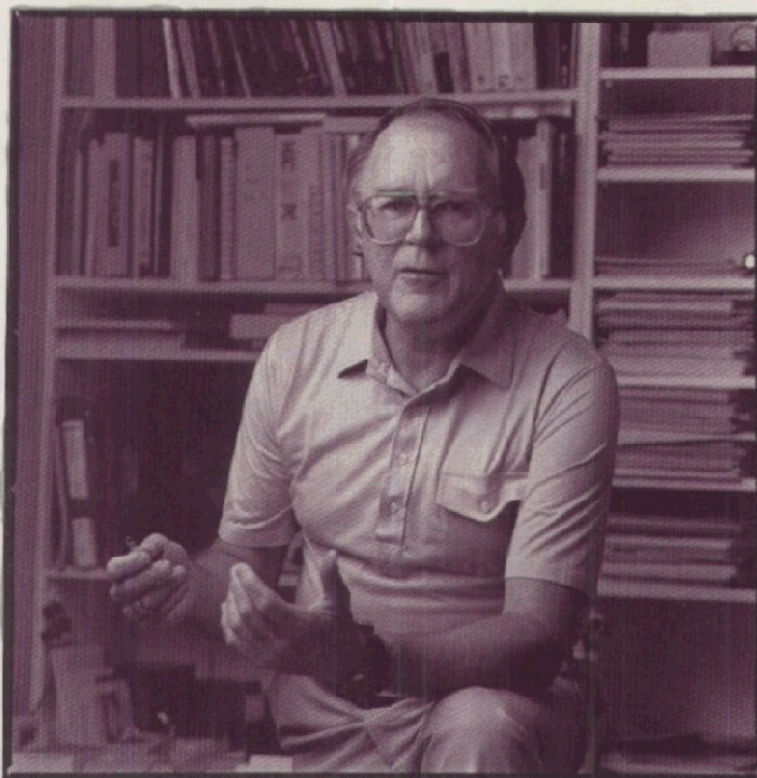
UPSIDE: What happens when the U.S. loses a technology to Japan, for example liquid crystal displays? Should we try to catch up or just punt?

BELL: I think we've got to go back—maybe it's too late, because it is so material-intensive. Sharp has put so much money in that.

UPSIDE: What about DRAMS?

BELL: We should have given a government subsidy to Micron to get whatever prices and profitability they wanted so that they

could have matched the Japanese prices. Then the Japanese wouldn't have gotten so damn much money. That was just a wind-fall profit. The 1986 trade tariff was the biggest screw-up in government policy that



you could have ever imagined.

UPSIDE: That's our point. Isn't that the danger when you get the government involved?

BELL: The government doesn't have to be that way. Now, once you have Congress involved, forget it. For one, it's random output. Two, there is no predictability. My solution is to give a lot more power to the Commerce Department and to the executive branch. Congress should set broad goals, but for things like tariffs, you need to act faster than Congress can act. And the other thing is that the Cabinet needs to be organized along industrial lines.

UPSIDE: How is it organized now?

BELL: I don't know. But when I picked up my award, I met a bunch of people from the Commerce Department and they all had something in their title that I didn't recognize—

you know, undersecretary of the blah blah policy. As opposed to minister of computing, minister of automobiles. That's the MITI way. Japan has people in government who actually feel they have responsibility to make an industry run better.

UPSIDE: What's the bigger problem in the U.S.—cost of capital or the declining technology base?

BELL: Well, right now our cost of capital is certainly less than Japan's. I don't know how long that's going to last, though.

UPSIDE: For most of the last ten years, that hasn't been true.

BELL: Yeah, but I'm not sure over the years how much that difference has played out. It's the big excuse we use, but I have a funny feeling it's really mouse nuts in the whole equation.

UPSIDE: Really?

BELL: I really do.

UPSIDE: Let's test your thesis. When Mips went public two years ago, the

American stock market gave it a \$300 million valuation. It might have fetched a billion-dollar valuation had it gone public in Japan. That's capital with which you can do a lot of things.

BELL: Mips went out to get some money. They got the money. Forget the price of the stock. The stock price is like the weather. To me, this absolute attention to the stock price is one of the things that is wrong.

UPSIDE: Why? Because of the quarter-to-quarter mentality?

BELL: It's almost worse than that. It's the daily looking at the stock price. CEOs spend too much time on something that is totally cosmetic.

UPSIDE: Yet you know why they do. The U.S. stock markets value everything as a multiple of earnings. On top of that, lawyers sue you when the stock price goes down.

BELL: To me, the fundamental problem in the U.S. right now is this whole thing—the damn stock market and the damn lawyers and the fact that we can't exist in the same way that Japan can. What would blow the whole thing wide open would be a worldwide stock market, so that investors would feel equally comfortable about investing in U.S. companies versus Japanese companies.

Then you'd get this whole shift. I don't think the U.S. problem is capital formation. In a funny way, it is capital formation, but it's a very indirect thing. Then the Japanese would have to behave in the same way that we do, which means that people would dump their overvalued stocks and buy American stocks.

UPSIDE: Intel is one of the very few American companies that can make a major investment in the future and not have it trash their stock. And that's only because Intel makes so much money anyway.

BELL: Right. Exactly. I just hope Intel can continue on that basis. My guess is that with two or three companies entering the 386 arena, that is going to totally change.

UPSIDE: Speaking of Intel, some people think the company has peaked. Has it?

BELL: Certainly, Intel's biggest challenge is to do anything that resembles their past performance. My guess is that there is just no way they can do that, given their situation today—that they don't have a technology monopoly. I mean, it was very simple: They had a monopoly. Maybe I'm not a business scholar to properly define a monopoly, but it sure appears that way to me. They were the only source for PCs, and that's where most of the profits come from.

UPSIDE: Well, three-quarters of their revenues come from the X86 line.

BELL: And how much of their profits? Probably 90 percent. So now, not only does Intel have the clones, but the probability of a RISC PC is there, too. So Intel's challenge is maintaining their position in processors and maybe strengthening it in some other areas.

UPSIDE: Such as?

BELL: For instance, the V3, which will do video compression. There are some exciting

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BUSINESS. BUT IT
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IT WOULD TAKE GUTS.
IT WOULD TAKE
GOING FOR BROKE.”*

things they have, but it's the getting there.
UPSIDE: Intel's record outside the microprocessor business is mixed.

BELL: Yeah, it really is, particularly in the systems area.

UPSIDE: If you had Andy Grove's attention for a day, what would you advise him to do?

BELL: I would pursue video. I would absolutely verticalize into the areas of communication and video and voice. That's moving away from this idea of one processor that does it all. Maybe I would tell Grove to go after all these one-chip systems and think about them in end-user terms.

UPSIDE: Such as?

BELL: Palmtops. The whole palmtop market is going to happen. You'll have something called the body-area network. All the electronics that we carry around with us will be interconnected through a little LAN, everything from our cellulars to the keys that unlock our cars.

UPSIDE: Let's keep moving on companies. IBM?

BELL: Ooh...well. Actually, I think I've seen a couple of good signs. They are out going after disks, for example. But I think large American companies are going to have to look an awful lot more like the Japanese—that is, selling at various levels of integration so that they really maintain themselves in manufacturing. I don't think it works for IBM or DEC to go in and become distributors.

UPSIDE: Why not?

BELL: That's a dumb business. It really is. That's an admission that things are so screwed up that everything you put together is custom.

UPSIDE: What should IBM do about mainframes? It's the most profitable part of the company, yet the most doomed. How do you handle that?

BELL: You have to recognize the trend. Then you have to isolate those things. [CEO Ken] Olsen at DEC always used to tell me, Bell, you want to kill things. And I would say, No, no, no. DEC management thought I was Attila the Hun in terms of getting rid of computers at DEC. Hell, I didn't want to get rid of them. What you want to do is isolate those

things; put a small, dedicated team there; have profitability be the goal; serve the installed base. But for God's sake, get going on the new paradigm. Go work that thing really hard. By the way, can I digress here?

UPSIDE: Be our guest.

BELL: When you put a small team on the old products—in IBM's case, mainframes—you will get the most aggressive, best mainframe going. What you've done is cut the amount of engineering effort that is going into it. Productivity soars and the product gets better. One of the things that is killing America is American engineers.

UPSIDE: Oh, come on. Maybe lawyers are killing America. Maybe too many paper entrepreneurs. Not engineers. We lack good engineers.

BELL: In large companies, there are too damn many of them working on too few products. It's just massive featherbedding. It's just like Detroit versus the Japanese. There is twice as much engineering going on there for automobiles. For computers, I'm sure it's the same thing.

UPSIDE: How do the Japanese do it?

BELL: They trust the people a lot more. One of the things that I think is devastating to large American companies is not going to market. In fact, having competition internally and then killing products internally, that's a terrible management mistake. It kills morale. When Japanese engineers sign up to do a product, that means the product is going to go to market. This other way, you get no incentive to do anything.

UPSIDE: Back to IBM. Can a \$69 billion company move fast enough in an environment that increasingly favors speed?

BELL: Well, they did in one case.

UPSIDE: PC development. But that was ten years ago.

BELL: Well, they actually did it in the famous case of a pin printer. Their laser printer is quite respectable. I think they can. Put it this way: I think they must.

UPSIDE: But once again they are late with a major product. The sub-\$10,000 RS/6000 workstation should have been out by now. Aren't they handing the market to Sun, HP

and Silicon Graphics?

BELL: I have no idea what happened in that case. By the way, I think IBM's ability to do silicon is minimal.

UPSIDE: How come?

BELL: Simply because they had such an ingrained infrastructure in CAD/CAM. CAD/CAM within IBM has probably been one of the biggest things that has hurt them. It helps them get a mainframe, but in fact it is kind of an overpowering use of standard CAD/CAM stuff. And it really sets a bad example.

UPSIDE: What kind of leadership does IBM need?

BELL: IBM was the strongest when the guys at the top had a lot of hands-on experience. When you look at the top guys now, Jack Kuehler is the only one who's ever managed a technical project. Kuehler came out of the disk area, so maybe that's why he supports IBM actually manufacturing disks. There are a bunch of things that worry me about IBM. I guess I have a hang-up on a lot of the computer companies now. At the top, they don't really understand computing. They've never used computing. [James] Cannavino apparently does use computers, but at most of these large companies, the top guys aren't users. For example, at DEC, the top executive committee has only one guy on it who understands computers in his bones—uses them, programs them, has a feeling for it.

UPSIDE: What do you think IBM will look like in five years?

BELL: I think it's going to be totally, totally divisionalized and broken up into manageable business units with separate P&Ls, different sales forces, things like that.

UPSIDE: Let's move to your alma mater, DEC. What's their future?

BELL: I really don't know what they're going to do. I look at the number of systems they are supporting, and I just say, Oh my God; how can they do that? I mean, they have three basic hardware architectures and something on the order of four different programming environments: VMS, two versions of Microsoft and two or three versions of UNIX. Essen-

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THEIR OWN?”

tially, you've got six or seven different products that conceivably do the same thing. They have a plethora of products, but how do they take them to the market? That, to me, is the biggest challenge—sorting this out.

UPSIDE: What should DEC try to become?

BELL: In a way, I don't know whether I know at this point. I don't feel very close to DEC. I know what I've seen and heard about the Alpha. It looks awfully, awfully good.

UPSIDE: What is Alpha?

BELL: It's their RISC VAX. The chips are superb. You know, that's one thing DEC has. They probably have better VLSI design and manufacturing capabilities than any of the big guys, including Intel. But the problems of getting it into the market, and now the issue of standardization, are pivotal. They need to make a deal to have Alpha available outside of DEC. If they want to be standard, that's critical. I would look at that and see if there is a way that you can make a business out of it that says, Let's go bet

the farm on it. DEC needs something that gets them out of the malaise that says, We'll do anything for anybody. There's just too much computing out there to think that you are going to supply everyone.

UPSIDE: Who is going to succeed Ken Olsen?

BELL: I have no idea. No idea. I think there is probably only one guy there who could do it. That in itself is a serious problem. Ken hasn't really worked out that problem.

UPSIDE: Does DEC's new Alpha chip mean that DEC is backing away from Mips?

BELL: I think that DEC is running it competitively with Mips.

UPSIDE: How about Mips? It seems to be struggling.

BELL: Well, they lost their ability to engineer, quite frankly.

UPSIDE: How so?

BELL: Running engineering is just not a trivial task. There's an art to it.

UPSIDE: Is that why the R4000 is a year late?

BELL: That's why their chips are late. That's

why they made a bunch of wrong decisions. I think the 6000 was probably a marginal decision—let's call it a marginal decision. There's not a 6000 follow-on. Hey, I don't know what Mips' strategy is, but unless there is a line of 6000 follow-ons that beats CMOS, then it was a very poor choice. Particularly in view of the fact that it's late.

UPSIDE: You say their engineering is mismanaged. How so?

BELL: The way you must operate in the microprocessor arena is that you've got to have two design teams going, ping-ponging alternatively to catch the next wave. Because when all the smoke clears, it's going to take three or four years to get it out and enhance it and be there. We're talking about an 18-month introduction cycle, where you double the cost. So Mips was late with the R4000, which means the R4000-MP is going to be late, and so on. I am very disappointed in Mips. Their performance in an engineering sense has been abysmal.

UPSIDE: A lot of observers think the Mips R4000 chip has to be out in front of Intel's 586 by a year to have any impact.

BELL: Yeah, absolutely. Right now, it looks like the 586 will be out there six months after the R4000, at least in low volume. So that's the problem with Mips.

UPSIDE: What will happen to ACE?

BELL: It could just become unglued in that regard. Or it won't have the impact it could have had. If the R4000 had come out on time, where you've got noticeably improved performance, then they could have gotten something. Can I give you a wild scenario?

UPSIDE: Please do.

BELL: If I were DEC, I would take Alpha, I would put Windows NT on Alpha, and I would make Alpha available to anyone who wants the chip. And I'd probably go into the goddamned semiconductor business and get fabs and stuff like that to build it.

UPSIDE: Is Alpha better than the RS/6000?

BELL: I think it's pretty damn good.

UPSIDE: What kind of speed does it have?

BELL: I don't know—you should probably get that from DEC. Hey, I trust those semicon-



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ductor guys. They've really been very good. They really are the best when you ask around. They could absolutely raise hell in the microprocessor business.

UPSIDE: So why don't they do it?

BELL: [Pounds his fist] Because it would take decisions. It would take guts. It would take going for broke on this thing! It's the kind of project I would like, particularly with the resources that DEC has. [laughs] There is no excuse for DEC not going into the microprocessor business and just wrecking the hell out of it—particularly in light of the R4000. But what you'd need to do is put NT on it.

UPSIDE: And not UNIX?

BELL: UNIX is such a mess, outside of Sun.

UPSIDE: Did Apple talk to DEC when Apple was looking for a RISC chip?

BELL: I have no idea. I'm sure they did, though.

UPSIDE: What do you think about Apple these days?

BELL: Well, there is the Apple thing, and that's fine. Then there's the Apple-IBM thing, and that I feel less good about. The key questions are: What is Pink? And do we need another operating system? What is it that is that far ahead?

UPSIDE: Well, it goes deeper into the world of objects.

BELL: Okay, but that does virtually nothing for end-users.

UPSIDE: Really? Believers in object-based programming say it will transform software as much as the microprocessor transformed hardware. Are you just a crusty hardware guy?

BELL: I *am* just a crusty hardware guy looking at how long it takes software to have any impact. Objects are what, ten years old now? I'll go on the record and say that I am very skeptical that Pink will do anything. I mean, you've got to have a leap of faith that this object stuff is that revolutionary—that it does something for the user. Systems developers, yes. And integrated applications, yes. But the Mac already does an enormous amount of that anyway.

UPSIDE: What about that other OS vendor, Microsoft?

BELL: Their danger is becoming a PC com-

pany when the whole world is going to palm-tops and TVs and all these consumer-electronics kind of things. There are going to be pocket machines, voice machines. Right now, Microsoft is duking it out in the pen market. To me, that's the first sign of being like the old mainframe and minicomputer companies that missed the PC market and the workstation market.

UPSIDE: Bill Gates is no dummy. He certainly makes enough noise about wanting to be involved in these new waves—anything that's digital.

BELL: Partly, he's doing preemptive strikes. In the old days, IBM paid Control Data \$600 million for doing that. It's called preannouncing a product in order to keep the market from not moving away from you.

UPSIDE: What do you think of Bill Gates?

BELL: I really like Gates. Gates is my model of what a businessman should be in the computer industry. He's precisely my model. He's got all the attributes I like. He's bright, knows the business, knows the technology, knows the products. Then again...

UPSIDE: Then again what?

BELL: Well, shit, his challenges are huge. The danger for Microsoft is not being able to get down to a new class. IBM had trouble responding to the minis, but they eventually made it. IBM is the only company that has ever been able to jump into different classes, to make it to another class. Everyone else has failed at that.

UPSIDE: Let's move to Sun.

BELL: To me, Sun is doing all... I don't know what I would change in Sun. It seems to me they are doing exactly the right stuff.

UPSIDE: What do you think of their new software subsidiaries?

BELL: Oh, that's just absolutely brilliant, splitting them like that. I've always maintained that you can't have a software and a hardware company as one. In fact, all the guys in the industry ought to take that as a model of operations.

UPSIDE: Apple, too?

BELL: Probably Apple, too. Certainly, they should take the OS part and make that a sep-

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arate profit center and let it operate and try to get market share on the desktop. That would make a lot of sense.

UPSIDE: Sun is trying to persuade the clone community that there is a true church-state separation between the hardware and software parts. Is that really possible?

BELL: I doubt whether it's really possible. But it may be good enough to not really matter.

UPSIDE: You're not the biggest fan of UNIX. Yet Sun is relying on UNIX to get onto the corporate desktop.

BELL: If I were Sun, I would do absolutely everything I could to get the human interface to be really right up there. And that's at odds, a lot of the time, with their technical base, which in fact will tolerate less.

No, I think Sun should work the human interface, maybe work some knock-off here.... Maybe Sun should embrace [Apple's] QuickTime. Above all, Sun ought to have compression chips in their boxes. If I were Sun, I would do anything that uses the high end and video to differentiate themselves. They're the ones that can do that. They can be innovative in their workstations. They've got a major opportunity to put video in there.

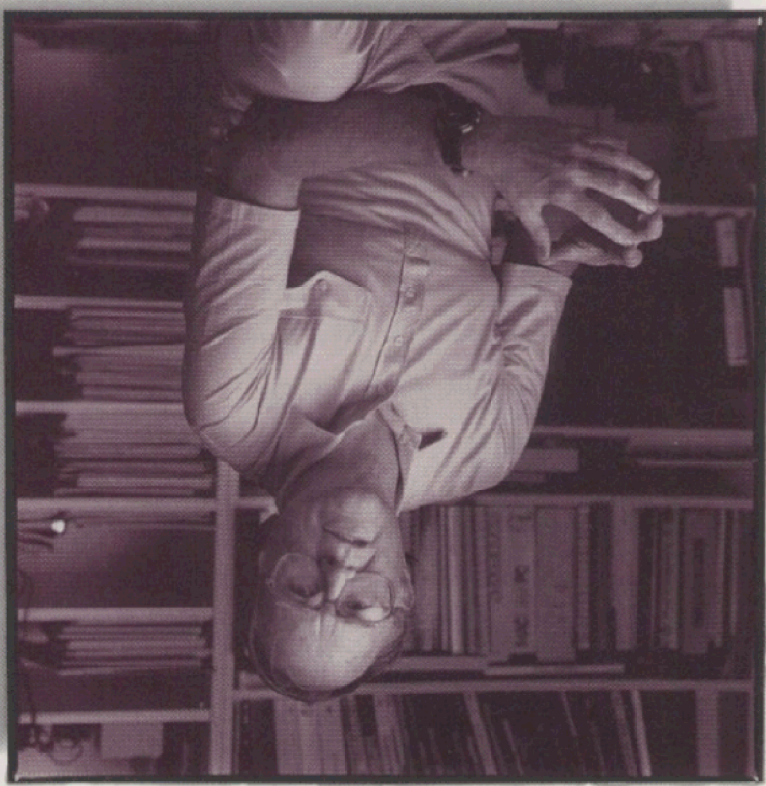
UPSIDE: The one thing that bothers us about Sun is that they seem to have the best of nothing. Not the fastest chips, not the best interface, not the best 3D graphics. Hadn't they better come up with best-of-breed in a few areas, or risk falling behind?

BELL: Yeah. They ought to be mastering some technologies. Sun is not a high-tech company. They got to where they are by being lowest in cost. Now, with the clone guys coming in, they can't continue to do that. They better start getting some real

technology in there.

UPSIDE: Perhaps they need to forge some relationships with Next or Silicon Graphics.

BELL: Next seems to be set on this go-it-alone strategy.



UPSIDE: Is that a tragic flaw of Steve Jobs? **BELL:** Yeah. It was great for the Mac at that point in time, but it's not what people want today.

UPSIDE: What do you hear about Next? **BELL:** I was hoping it was going to make it.

UPSIDE: Do you think it will? **BELL:** It's right on the edge.

UPSIDE: Next is now hedging its bet by porting its OS to Intel-based PCs. Is that smart? **BELL:** I think Next will have a hell of a hard time as just an interface company. That's a hard market to penetrate. You've got all the other established suppliers. Still, if Sun had that technology, they'd be on the desktop just like that. [snaps his fingers] Sun should use all their R&D to take a look at Next, figure it out and make it work at Sun.

UPSIDE: Let's move on to a new set of subjects. You've been involved in a lot of companies over the years. What are five attributes that a successful CEO needs to have? **BELL:** I'm prejudiced, but I put intelligence right up there. I put integrity and energy right up there, too. Those are my top three.

UPSIDE: Which is interesting, because none of them is specific to technology. **BELL:** Absolutely. I think the ability to sell is critical. But at the same time, I think CEOs who come out of sales are death. I almost won't have anything to do with them, because that masks so much. How in hell do you evaluate them? **UPSIDE:** But you're on the board of Citrus Logic, and Mike Hackworth came out of sales.

But Mike Hackworth came out of sales.

BELL: But Mike came up through a technical organization. Mike is traditional—he started technical then migrated to marketing and sales to sell the product.

UPSIDE: You imply that the sales skill must be on a foundation of technical knowledge.

BELL: It must. So let's put ability to sell at number four. Number five is management—the ability to manage. That's a CEO function. There are a lot of entrepreneurs who pride themselves on having almost no management skills. Fine. But they should be smart enough to know that the management function has to exist. Management is a key thing in a startup. Being able to set goals, control yourself and make the hard tradeoffs, that kind of thing. In the two startups I was a founder of, I'd say that was the biggest problem: classic management. The Encore experience had a lot of other problems, too. The CEO had integrity, but I'd rather not comment on the four other attributes.

UPSIDE: Venture capitalist Don Valentine

says he never fired a CEO too soon. What do you think of that?

BELL: Sometimes it can happen too soon. I write in my book [*High Technology Ventures*] about a company that had a guy who was a great CEO in four categories, but he couldn't manage. Instead of working with him, the VCs put in two guys who were absolutely corrupt—morally bankrupt. They milked the company. They were idiots.

UPSIDE: In other words, they had a lot of flaws.

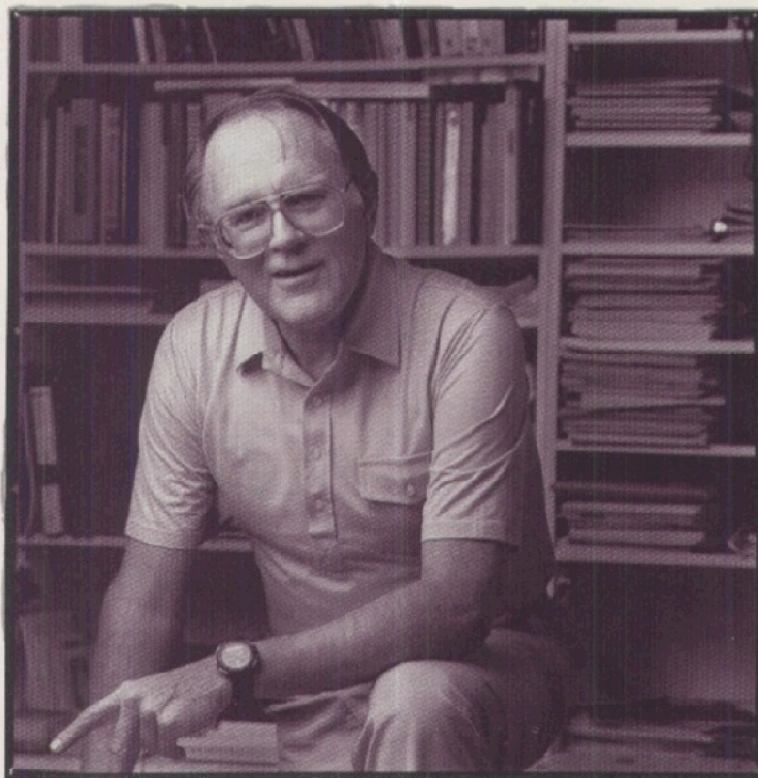
BELL: Oh, God. They lacked integrity, they lacked intelligence and they lacked drive. But here is where Valentine is right: When you've identified the fact that the CEO isn't working and there is enough gray hair on the board to make that observation, then I would agree with that. I absolutely agree with the removal of people in startups on a rapid basis. I'm very brutal about that, particularly in engineering. If you don't have somebody who's in there pulling, get rid of them immediately. The organization can't stand it.

UPSIDE: Let's move to the other key person in a startup—the chief architect. What are your thoughts on that person?

BELL: Oh, man. I put that so high. That person maintains the product integrity, has a vision of what that is. And that vision is one that everybody agrees to. If you find that missing in a company, it's almost a fatal flaw. Maybe I go overboard because I was a chief architect.

UPSIDE: How do chief architects get in trouble?
BELL: With all successful products, there has to be a plan for evolution. One shot is not going to do it. For example, in supercomputing, it's almost a rule that you throw the

first one away. They are so tricky to design that getting everything right the first time is damn near impossible. So if you can just hang in there long enough to get the second one out and not blow it, that's key.



Now you're at a point of some tension between the CEO and the architect along the lines of, what is the product supposed to look like in the first release and how is it going to evolve in subsequent releases? That's a series of compromises based on the architecture, based on the resources you have and based on the market. It better be driven by the market.

UPSIDE: How does the chief architect balance his vision with market considerations? It sounds easy to ask what the market wants, but don't great products define new categories and create demand?

BELL: I think everyone who is doing these products has to understand that. They have to have a long-term vision. I like to see a decade-long vision. When I led the VAX team, we absolutely had a decade-long goal.

We started in 1975 and the first product was out in 1978. We had a 1,000:1 range in price/performance over a decade as our goal. I had a vision of what it should look like over a decade.

UPSIDE: The VAX eventually ran out of gas. What happened?

BELL: It was a \$100 billion mistake! There were a whole bunch of reasons why it wasn't evolved right. But that didn't happen on my watch! I got it out there and thought, With good management, it will live forever and it will evolve correctly. DEC has, to me, a lot of problems.

UPSIDE: Like what?

BELL: Dumb problems. Just one example is marketing this stuff. Making the right kind of deals. Timing. Partnerships. Stuff that is independent of products and their evolution.

UPSIDE: Vertical integration has been out of style for a few years. Do you think it

will make a comeback?

BELL: Yeah. In fact, I had coined a phrase to describe a couple of cases: vertical disintegration—that is, we had dropped back to a point where the whole industry had been disintegrated so that every layer was independent. Yet the Japanese keep chugging along on having total vertical integration. I wrote an article on why the Japanese are converting U.S. companies into distributorships—or rather, how we and the Japanese are converting. Based on a very simple model, I came to the conclusion that there are three islands: a consumer island, a resources island and a manufacturing island. As you transfer paper to the manufacturing island and as you consume their goods and give them paper in return, the only stable situation is when the manufacturing island owns the consuming

island. It has to happen that way.

UPSIDE: Many economists don't see it that way.

BELL: Economists don't back up and look at that fundamental situation. It can't work any other way. We know what ideas are worth; we know what royalties are worth—they are not worth a damn.

UPSIDE: Yet Microsoft is worth more than any computer-related company in the United States, save IBM.

BELL: What will Microsoft be worth when, in fact, the Japanese learn about PCs? Will they be buying Microsoft spreadsheets or will they be knocking them off and making their own?

UPSIDE: Stewart Alsop says the Japanese have never understood PCs because they don't use them. Now that is changing. They are using the notebooks they make.

BELL: By the way, here's a story. We've helped keep the Japanese out of the PC business, because of the 8-bit ASCII character. This has been the most beneficial thing to the U.S. industry ever. The Japanese can't get their alphabet into the machine. An English character gets encoded at 8 bits. Even the Cyrillic alphabet. But the Japanese have 12,000 characters. It takes 16 bits to encode a character. Without the power to do that, you have no way to communicate with a person. That's the secret of why they aren't in the PC business! The Japanese have not been interested in computers because we've kept them out, principally because of the alphabet. Now, the Japanese might progress much faster in pen-based computing because their alphabet is harder to understand, so they may get better encoding algorithms.

UPSIDE: Some people think there is an historic opportunity for the U.S. to take back part of the consumer-electronics business, because everything is going digital, which plays into American strengths. Do you think that's true?

BELL: I think it's unlikely. The Japanese are very fast on their feet. We have digital prowess; we're setting standards. But sure, it's going to end up being like everything

else. We'll invent it and set the standards, we'll provide the architecture.

UPSIDE: So you think even more of the industry will go to Japan?

BELL: Well, who's got the semiconductors? because these consumer products are all DRAM-intensive. Who's got the liquid crystal displays? because these products are all visually intensive. I think it's critical to go back and get liquid crystals and drive that into a source.

UPSIDE: Andy Rappaport would say that if we are worried about supply of critical components, it is better to fund the Korean DRAM business and Korean LCDs. That way, we break Japan's stronghold and ensure multiple sources.

BELL: If you don't care who owns you, fine. But Korea is then the place where the wealth gets accumulated. Software is not offsetting the cost of manufacturing, in an export sense. I worry about the fundamentals on an economic basis. Does it work? Is it stable? Are we happy with the result? I don't think we would be happy. The Koreans would generate the pile of paper that they would use to buy Aspen and Breckenridge.

UPSIDE: We're nearing the end of this interview. Any last, crusty, hardware swipes?

BELL: Yeah—MBAs. My enemies turn out to be MBAs. Lawyers I don't mind, but MBAs take engineers out of productivity. Fundamentally, MBAs trained at the wrong level. I hate case studies as a learning vehicle.

UPSIDE: Advocates of case studies say they teach you to think on your feet.

BELL: They teach you to bullshit on your feet. That's what they teach you. Anybody can do those things. There's no right or wrong answer and no formality in the way you analyze things. My thing with *High Technology Ventures* was to provide an alternative way to teach entrepreneurship and to help companies in a very rigid, non-bullshitty, holistic way. It was really aimed at trying to grapple with a firm as a whole. **U**

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Interviewer Rich Katlgard is UPSIDE's editor-in-chief.