

# The power of virtual integration: an interview with Dell Computer's Michael Dell.

by Joan Magretta

**Dell Computer founder Michael Dell is responsible for the success of the \$12 billion company. Through an innovative business model called the 'direct model', the firm was able to streamline the distribution chain significantly. He is further refining the model through 'virtual integration' which relies on information technology to improve the value chain of manufacturers, suppliers, and customers.**

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HOW DO YOU CREATE A \$12 BILLION COMPANY IN JUST 13 YEARS? Michael Dell began in 1984 with a simple business insight: he could bypass the dealer channel through which personal computers were then being sold. Instead, he would sell directly to customers and build products to order. In one swoop, Dell eliminated the reseller's markup and the costs and risks associated with carrying large inventories of finished goods. The formula became known as the direct business model, and it gave Dell Computer Corporation a substantial cost advantage.

The direct model turned out to have other benefits that even Michael Dell couldn't have anticipated when he founded his company. "You actually get to have a relationship with the customer," he explains. "And that creates valuable information, which, in turn, allows us to leverage our relationships with both suppliers and customers. Couple that information with technology, and you have the infrastructure to revolutionize the fundamental business models of major global companies.

In this interview with HBR editor-at-large Joan Magretta, Michael Dell describes how his company is using technology and information to blur the traditional boundaries in the value chain among suppliers, manufacturers, and end users. In so doing, Dell Computer is evolving in a direction that Michael Dell calls virtual integration. The individual pieces of the strategy—customer focus, supplier partnerships, mass customization, just-in-time manufacturing -- may all be familiar. But Michael Dell's insight into how to combine them is highly innovative: technology is enabling coordination across company boundaries to achieve new levels of efficiency and productivity, as well as extraordinary returns to investors. Virtual integration harnesses the economic benefits of two very different business models. It offers the advantages of a tightly coordinated supply chain that have traditionally come through vertical integration. At the same time, it benefits from the focus and specialization that drive virtual corporations. Virtual integration, as Michael Dell envisions it, has the potential to achieve both coordination and focus. If it delivers on that promise, it may well

become a new organizational model for the information age.

How has Dell pioneered a new business model within the computer industry?

If you look back to the industry's inception, the founding companies essentially had to create all the components themselves. They had to manufacture disk drives and memory chips and application software; all the various pieces of the industry had to be vertically integrated within one firm.

So the companies that were the stars ten years ago, the Digital Equipments of this world, had to build massive structures to produce everything a computer needed. They had no choice but to become expert in a wide array of components, some of which had nothing to do with creating value for the customer.

As the industry grew, more specialized companies developed to produce specific components. That opened up the opportunity to create a business that was far more focused and efficient. As a small start-up, Dell couldn't afford to create every piece of the value chain. But more to the point, why should we want to? We concluded we'd be better off leveraging the investments others have made and focusing on delivering solutions and systems to customers.

Consider a component like a graphics chip. Five or ten years ago, a whole bunch of companies in the personal computer industry were trying to create their own graphics chips. Now, if you've got a race with 20 players that are all vying to produce the fastest graphics chip in the world, do you want to be the twenty-first horse, or do you want to evaluate the field of 20 and pick the best one?

It's a pretty simple strategy, but at the time it went against the dominant, "engineering-centric" view of the industry. The IBMs and Compaqs and HPs subscribed to a "we-have-to-develop-everything" view of the world. If you weren't doing component assembly, you weren't a real computer company. It was like a rite of passage. You somehow proved your manhood by placing small

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semiconductor chips on printed circuit boards.

And Dell Computer came along and said, "Now wait a second. If I understand this correctly, the companies that do nothing but put chips on motherboards don't actually earn tremendous profit doing it. If we want to earn higher returns, shouldn't we be more selective and put our capital into activities where we can add value for our customers, not just into activities that need to get done?" I'm not saying those activities are unimportant. They need to get done very, very well. But they're not sources of value that Dell is going to create.

When the company started, I don't think we knew how far the direct model could take us. It has provided a consistent underlying strategy for Dell despite a lot of change in our industry. Along the way, we have learned a lot, and the model has evolved. Most important, the direct model has allowed us to leverage our relationships with both suppliers and customers to such an extent that I believe it's fair to think of our companies as being virtually integrated. That allows us to focus on where we add value and to build a much larger firm much more quickly. I don't think we could have created a \$12 billion business in 13 years if we had tried to be vertically integrated.

Why can you grow so much faster without all those physical assets?

There are fewer things to manage, fewer things to go wrong. You don't have the drag effect of taking 50,000 people with you. Suppose we have two suppliers building monitors for us, and one of them loses its edge. It's a lot easier for us to get more capacity from the remaining supplier than to set up a new manufacturing plant ourselves. If we had to build our own factories for every single component of the system, growing at 57% per year just would not be possible. I would spend 500% of my time interviewing prospective vice presidents because the company would have not 15,000 employees but 80,000.

Indirectly, we employ something like that many people today. There are, for example, 10,000 service technicians in the field who service our products, but only a small number of them work for us. They're contracted with other firms. But ask the customer, "Who was that person who just fixed your computer?" The vast majority think that person works for us, which is just great. That's part of virtual integration.

Aren't you just outsourcing your after-sales service? Is what you're describing fundamentally different from outsourcing?

Outsourcing, at least in the IT world, is almost always a way to get rid of a problem a company hasn't been able to solve itself. The classic case is the company with 2,000 people in the IT department. Nobody knows what they do, and nobody knows why they do it. The solution -- outsource IT to a service provider, and hopefully they'll fix it. But if you look at what happens five years later, it's not necessarily a pretty picture.

That's not what we're doing at all. We focus on how we can coordinate our activities to create the most value for customers.

With our service providers, we're working to set quality measures and, more important, to build data linkages that let us see in real time how we're doing -- when parts are dispatched, for instance, or how long it takes to respond to a request for service. We look at our business and see, for example, that over the next ten years we are going to be making lots of notebook computers. Dell might need 20 million flat-panel displays, and some years there will be more demand than supply. Other years, there will be more supply than demand. A few companies are currently making multibillion-dollar investments in the manufacture of these displays.

So we cook up a little deal where the supplier agrees to meet 25% of our volume require displays, and because of the long-term commitment we make to them, we'll get our displays year in and year out, even when there's more demand than supply. The supplier effectively becomes our partner. They assign their engineers to our design team, and we start to treat them as if they were part of the company. For example, when we launch a new product, their engineers are stationed right in our plants. If a customer calls in with a problem, we'll stop shipping product while they fix design flaws in real time.

Figuring out how many partners we need has been a process of trial and error. You learn when you operate on the cutting edge of technology that things don't always work as planned. The rule we follow is to have as few partners as possible. And they will last as long as they maintain their leadership in technology and quality. This isn't like the automobile business, where you find a tire supplier that you will probably stick with forever. Where the technology is fairly stable -- in monitors, for example -- we expect our partnerships to last a long time. Others will be more volatile. But regardless of how long these relationships last, virtual integration means you're basically stitching together a business with partners that are treated as if they're inside the company. You're sharing information in a real-time fashion.

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We tell our suppliers exactly what our daily production requirements are. So it's not, "Well, every two weeks deliver 5,000 to this warehouse, and we'll put them on the shelf, and then we'll take them off the shelf." It's, "Tomorrow morning we need 8,562, and deliver them to door number seven by 7 A.M."

You would deal with an internal supplier that way, and you can do so because you share information and plans very freely. Why doesn't the same sharing of information take place across company boundaries? Buyers are often so busy trying to protect themselves that the seller can't really add a lot of value. Government purchasing. Is the extreme case with its overly structured procurement system. Protecting the buyer usually ends up disabling the seller -- and both lose.

The technology available today really boosts the value of information sharing. We can share design databases and methodologies with supplier-partners in ways that just weren't possible five to ten years ago. This speeds time to market -- often dramatically -- and creates a lot of value that can be shared between buyer and supplier. So technology enhances the economic incentives to collaborate.

What are the challenges involved in establishing these collaborations?

The key challenge -- and the biggest change from business as usual -- is changing the focus from how much inventory there is to how fast it's moving. All computer chips carry a four-digit date code. For example, "97-23" means it was built in the twenty-third week of 1997. You can take the cover off any computer and find out how old its parts are, how long it took to make its way through the system. In our industry, if you can get people to think about how fast inventory is moving, then you create real value. Why? Because if I've got 11 days of inventory and my competitor has 80, and Intel comes out with a new 450-megahertz chip, that means I'm going to get to market 69 days sooner.

I think about it this way: Assets collect risks around them in one form or another. Inventory is one risk, and accounts receivable is another risk. In our case -- with 70% of our sales going to large corporate customers -- accounts receivable isn't hard to manage because companies like Goldman Sachs and Microsoft and Oracle tend to be able to pay their bills. But in the computer industry, inventory can actually be a pretty massive risk because if the cost of materials goes down 50% a year and you have two or three months of inventory versus 11 days, you've got a big cost disadvantage. And you're vulnerable to product

transitions, when you can get stuck with obsolete inventory.

Inventory velocity is one of a handful of key performance measures we watch very closely. It focuses us on working with our suppliers to keep reducing inventory and increasing speed. With a supplier like Sony, which makes very good, reliable monitors, we figure there's no need for us to have any inventory at all. We are confident in putting the Dell name on them, and they work fine. We don't even take these monitors out of the box to test them because we've gotten them to under 1,000 defects per million. So what's the point in having a monitor put on a truck to Austin, Texas, and then taken off the truck and sent on a little tour around the warehouse, only to be put back on another truck? That's just a big waste of time and money, unless we get our jollies from touching monitors, which we don't.

So we went to Sony and said, "Hey, we're going to buy two or three million of these monitors this year. Why don't we just pick them up every day as we need them?" At first, it's a little confusing to the suppliers because you're saying, "Now listen carefully. If you will help us get your product from the end of your line to our customer faster, we won't have any in our warehouse." And the suppliers look at you like you're crazy and not making any sense. They're used to delivering in larger quantities, so at first they think this means you're going to buy less from them. And then the lightbulb goes on, and they realize we'll be buying more because we'll be taking it faster.

So now you have Sony producing a level supply of monitors for you. What happens next?

We tell Airborne Express or UPS to come to Austin and pick up 10,000 computers a day and go over to the Sony factory in Mexico and pick up the corresponding number of monitors. Then while we're all sleeping, they match up the computers and the monitors, and deliver them to the customer.

Of course, this requires sophisticated data exchange. Most people are familiar with the way a company like Black & Decker uses information links with the thousands of retailers that sell its products. When a customer in Omaha buys a drill from his local hardware store, the system immediately tells Black & Decker to send another unit of that particular drill to that particular store. So their system has to replenish supply, unit by unit, to thousands of outlets. From the supplier's point of view, Dell is dramatically simpler. Our orders are typically for thousands of units, and they need to go to only one of three manufacturing centers: Austin, Ireland, and Malaysia. It's

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almost ideal from a supplier standpoint because we have real-time information on what the demand is, and all the supplier has to do is get the product to us.

And because we build to our customers' order, typically, with just five or six days of lead time, suppliers don't have to worry about sell-through. We only maintain a few days -- in some cases a few hours -- of raw materials on hand. We communicate inventory levels and replenishment needs regularly -- with some vendors, hourly.

The typical case in our industry is the factory building 10,000 units a day, day in and day out. First the machines stack up in the warehouse, and then they stack up in the channel. And all of a sudden, the guy at the end of the chain hollers, "Whoa, hey, we've got too many of these. Everybody stop!" And the order to stop flows back through the chain until it reaches every component supplier. It's literally stop and start, because if you have a go-day lag between the point of demand and the point of supply, you're going to have a lot of inefficiency in the process. And the more inventory and time you have, the more variability, and the more problems.

In our industry, there's a lot of what I call bad hygiene. Companies stuff the channel to get rid of old inventory and to meet short-term financial objectives. We think our approach is better. We substitute information for inventory and ship only when we have real demand from real end customers.

How does the direct model benefit your suppliers?

We can go to Sony and say, "We're going to be pulling monitors from you in a very consistent, predictable way because the distance between the demand and the source of supply is totally shrunk." The longer that distance, the more intermediary channels you add, the less likely it is you will have good information about demand -- so you will end up with more variability, more inventory, higher costs, and more risk.

Another factor that helps keep our demand for computers level is the mix of customers we serve. We don't have any customer that represents more than 1% to 2% of our revenues. One week Exxon is buying, the next week Shell is buying, the next week Ford is buying. But all companies don't decide in unison, "Well, this week we're going to buy, next week we're not."

You mention your customer mix. Does the direct model imply a particular customer strategy?

If you'd asked me that question 12 years ago, I would have

said that we didn't differentiate much between our largest and our smallest customer. Today we do. Our customer strategy is one area where our model has evolved. We've become good at developing what we call "scalable" businesses -- that is, those in which we can grow revenues faster than expenses. We really look closely at financial measures like gross margins by customer segment -- and we focus on segments we can serve profitably as we achieve scale. People are sometimes surprised to learn that 90% of our sales go to institutions -- business or government -- and 70% to very large customers that buy at least \$1 million in PCs per year.

When you're trying to target profitable segments, averages obscure a lot, and aggregate financial statements are pretty meaningless. Our approach to segmentation is to take really big numbers and "deaverage" them. Until you look inside and understand what's going on by business, by customer, by geography, you don't know anything. This is a lesson we learned the hard way. We incorrectly entered the retail business in 1989, thinking that our direct business wouldn't grow enough, and went into computer superstores and warehouse clubs. But when we really started to understand the segment's profitability, we realized we'd made a mistake, and so we exited.

For years, we didn't actively pursue the consumer market because we couldn't reach our profit objectives. So we let our competitors introduce machines with rock-bottom prices and zero margins. We figured they could be the ones to teach consumers about PCs while we focused our efforts on more profitable segments. And then, because we're direct and can see who is buying what, we noticed something interesting. The industry's average selling price to consumers was going down, but ours was going up. Consumers who were now buying their second or third machines -- who wanted the most powerful machines and needed less handholding -- were coming to us. And without focusing on it in a significant way, we had a billion-dollar consumer business that was profitable. So we decided in 1997 that it was time to dedicate a group to serving that segment.

So, over time, you cut the market into finer and finer segments?

Yes, for a lot of reasons. One is to identify unique opportunities and economics. The other is purely a managerial issue: you can't possibly manage something well if it's too big. Segmentation gives us better attention and focus. [See the exhibit "Fast-Cycle Segmentation."]

Each segment has its own issues. In education, for instance, how do you get tech support to a classroom

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when the teacher doesn't have a telephone? You need a totally different approach. Segmenting lets you tailor your programs to the customers' needs. If you just lump diverse customers together, you can be sure that some of them will come last on some manager's list, and he may never get around to solving their problems. That's why we make serving one segment the manager's only job.

Do you get other benefits from segmenting your customers?

Segmentation gets us closer to them. It allows us to understand their needs in a really deep way. This closeness gives us access to information that's absolutely critical to our strategy. It helps us forecast what they're going to need and when. And good forecasts are the key to keeping our costs down.

We turn our inventory over 30 times per year. If you look at the complexity and the diversity of our product line, there's no way we could do that unless we had credible information about what the customer is actually buying. It's a key part of why rivals have had great difficulty competing with Dell. It's not just that we sell direct, it's also our ability to forecast demand -- it's both the design of the product and the way the information from the customer flows all the way through manufacturing to our suppliers. If you don't have that tight linkage -- the kind of coordination of information that used to be possible only in vertically integrated companies -- then trying to manage to 11 days of inventory would be insane. We simply couldn't do it without customers who work with us as partners.

Could you describe how you forecast demand?

We see forecasting as a critical sales skill. We teach our sales-account managers to lead customers through a discussion of their future PC needs. We'll walk a customer through every department of his company, asking him to designate which needs are certain and which are contingent. And when they're contingent on some event, the salesperson will know what that event is so he can follow up. We can do this with our large accounts, which make up the bulk of our business. With smaller customers, we have real-time information about what they're buying from our direct telephone salespeople. And we can also steer them in real time, on the phone, toward configurations that are available, so this is another way we can finetune the balance between supply and demand.

Is that what you mean by virtual integration with your customers?

It's part of it. There are so many information links between

us and our customers. For example, we can help large global customers manage their total purchase of PCs by selling them a standard product. Then when the guy whose computer isn't working calls in from Singapore, the IT people don't have to spend the first 30 minutes just figuring out what configuration of hardware and software he's using. Selling direct allows us to keep track of the company's total PC purchases, country by country -- and that's valuable information we can feed back to them. We sometimes know more about a customer's operations than they do themselves.

Close customer relationships have allowed us to dramatically extend the value we deliver to our customers. Today we routinely load the customer's software in our factory. Eastman Chemical, for example, has their own unique mix of software, some of it licensed from Microsoft, some of it they've written themselves, some of it having to do with the way their network works. Normally, they would get their PCs, take them out of the box, and then some guy carrying a walkie-talkie and diskettes and CD-ROMs would come to each employee's desk to hook the system up and load all that software. Typically, this takes an hour or two -- and costs \$200 to \$300 -- and it's a nuisance.

Our solution was to create a massive network in our factory with high-speed, 100-megabit Ethernet. We'll load Eastman Chemical's software onto a huge Dell server. Then when a machine comes down the assembly line and says, "I'm an Eastman Chemical analyst workstation, configuration number 14," all of a sudden a few hundred megabytes of data come rushing through the network and onto the workstation's hard disk, just as part of the progressive build through our factory. If the customer wants, we can put an asset tag with the company's logo on the machine, and we can keep an electronic register of the customer's assets. That's a lot easier than the customer sending some guy around on a thankless mission, placing asset tags on computers when he can find them.

What happens to the money our customer is saving? They get to keep most of it. We could say, "Well, it costs you \$300 to do it, so we'll charge you \$250." But instead we charge \$15 or \$20, and we make our product and our service much more valuable. It also means we're not going to be just your PC vendor anymore. We're going to be your IT department for PCs.

Boeing, for example, has 100,000 Dell PCs, and we have 30 people that live at Boeing, and if you look at the things we're doing for them or for other customers, we don't look like a supplier, we look more like Boeing's PC department. We become intimately involved in planning their PC needs and the configuration of their network.

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It's not that we make these decisions by ourselves. They're certainly using their own people to get the best answer for the company. But the people working on PCs together, both from Dell and Boeing, understand the needs in a very intimate way. They're right there living it and breathing it, as opposed to the typical vendor who says, "Here are your computers. See you later."

We've always visited clients, but now some of our accounts are large enough to justify a dedicated onsite team. Remember, a lot of companies have far more complex problems to deal with than PC purchasing and servicing. They can't wait to get somebody else to take care of that so they can worry about more strategic issues.

So some of your coordination with customers is made possible through technology, but there's still a good measure of old-fashioned, face-to-face human contact?

Yes, that's right. The idea is to use technology to free people up to solve more complicated problems. For example, a customer like MCI can access our internal support tools on-line in the same way our own technical-support teams do, saving time and money on both sides. They simply go to [www.dell.com](http://www.dell.com), enter some information about their system, and they have immediate access to the same information that we use at Dell to help customers. These tools are used by internal help-desk groups at large companies as well as by individuals.

We've developed customized intranet sites called Premier Pages for well over 200 of our largest global customers. These exist securely within the customers' firewalls, and they give them direct access to purchasing and technical information about the specific configurations they buy from us. One of our customers, for example, allows its 50,000 employees to view and select products on-line. They use the Premier Page as an interactive catalog of all the configurations the company authorizes; employees can then price and order the PC they want. They are happy to have some choice, and Dell and the customer are both happy to eliminate the paperwork and sales time normally associated with corporate purchasing. That frees our salespeople to play a more consultative role.

We also have developed tools to help customers set up their own customized versions of [dell.com](http://dell.com). There are about 7,000 of these to date.

How else do you stay close to your customers?

In a direct business like ours, you have, by definition, a relationship with customers. But beyond the mechanisms we have for sales and support, we have set up a number

of forums to ensure the free flow of information with the customer on a constant basis. Our Platinum Councils, for example, are regional meetings -- in Asia-Pacific, Japan, the United States, and Europe -- of our largest customers. They meet every six to nine months; in the larger regions, there's one for the information executives -- the CIO types -- and then there's one for the technical types.

In these meetings, our senior technologists share their views on where the technology is heading and lay out road maps of product plans over the next two years. There are also breakout sessions and working groups in which our engineering teams focus on specific product areas and talk about how to solve problems that may not necessarily have anything to do with the commercial relationship with Dell. For example, Is leasing better than buying? or How do you manage the transition to Windows NT? or How do you manage a field force of notebook computers?

People in businesses as dissimilar as Unilever and ICI can learn from each other because, amazingly, they have very similar problems when it comes to PCs. And we send not only our top technologists and engineers but also the real engineers, the people who usually don't get out to talk to customers because they're too busy developing products. All of our senior executives from around the company participate, spending time with the customer, listening to how we're doing. The ratio is about one Dell person to one customer. At our last session, we had about 100 customers.

The councils are another way we're able to play more of an advisory role, trying to help our customers understand what the flow of new technology really means, how it will translate into specific products. We try to help the customer anticipate what's happening and be ready. And that helps us, as well, with our own demand forecasting. So we're helping each other in important ways. We hire a lot of people from other companies in the industry, and they tell us that these meetings are unique.

Do you spend a significant amount of your time at these meetings?

I spend three days at each of them. They're great events. In the normal course of our business, I have lots of opportunity to talk to customers one on one, but there is something much more powerful about this kind of forum. Customers tend to speak more openly when they're with their peers and they know we're there and we're listening.

At every Platinum Council, we review what they told us last time and what we did about it. We keep an ongoing record of the issues. Let me give you a concrete example: A few

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years ago, the engineers responsible for our desktops were operating on the theory that customers really wanted performance from these products -- the faster the better. But what the customers actually said at the Platinum Councils was, "Yeah, performance, that's okay. But what I really want is a stable product that doesn't change. Because if I'm trying to run a bank or an airline, I don't care if it's 2% faster or 3% slower. What really matters is stability." So our engineers thought one thing, the customers thought another thing. It took the direct feedback from the Platinum Councils to spotlight this failure to communicate. We responded by building product with intergenerational consistency over many years. The same feedback has helped shape the creation of our brands. For both our desktop and notebook businesses, we created different brands designed to deliver greater stability to corporate customers, as opposed to the fast technology changes that consumers demand.

As I think back to some of those council meetings, things that would seem fairly small at the time have often turned out three or four years later to become the basis for billions of dollars of revenue -- notebooks with longer-life batteries, for example, or loading customers' software for them in our plants.

As your customer strategy has evolved, has the Dell brand changed as well?

A big piece of our brand is being the most efficient and effective way for customers to buy Intel or Microsoft technologies. But beyond that, we're evolving into a technology selector, or navigator. We often talk to customers about "relevant technology." Intel and Microsoft tend to launch into a massive variety of things, some of which are speculative and aimed at exploring new technologies. We think it's our job to help our customers sort out the technology relevant to today's needs from the bleeding edge.

How does that strategy affect your own R&D function? What role does R&D play in your company?

At Dell, we believe the customer is in control, and our job is to take all the technology that's out there and apply it in a useful way to meet the customer's needs. We're not trying to invent new architecture ourselves, but we'll spend a quarter of a billion dollars this year and employ some 1,500 people to improve the whole user experience -- that means delivering the latest relevant technology, making it easy to use, and keeping costs down. And in addition to selecting appropriate technology, our R&D group focuses on process and quality improvements in manufacturing.

Before industry standards came into play, the proprietary computing environment bred a kind of technical arrogance that, fortunately, won't fly anymore. Once standards were established, the customer started to define what was going to be successful, and it didn't matter what you invented or how good it was or how fast it was. Increasingly, what matters is what the customers want and whether it works with all their other stuff.

That means we have to stay on top of our customers' needs, and we have to monitor and understand the innovations in the material science world -- everything from semiconductors to polymers to liquid crystal displays. You need to track anything having to do with the flow of electrons, and you need to keep asking how these marvelous developments might be useful to customers. The customer doesn't come to you and say, "Boy, I really like lithium ion batteries. I can't wait to get my hands on some lithium ion." The customer says, "I want a notebook computer that lasts the whole day. I don't want it to run out when I'm on the plane."

I was about to leave a meeting at Sony in Tokyo in January of 1993 when someone ran up to me and said, "Oh, Mr. Dell, please wait one minute. I'm from Sony's power technology company. We have a new power-system technology we want to explain to you." And I remember thinking, is this guy going to try to sell me a power plant? He starts showing me chart after chart about the performance of lithium ion batteries. This is wonderful, I tell him. And if it's true, we're going to put this in every notebook computer we make.

We then sent a team over to check it out, and a year and a half later we were the first computer company to have a notebook that lasted five-and-a-half, six hours. We tested it with American Airlines, handing out the notebooks to passengers at the start of flights from New York to Los Angeles. By the end, the notebooks were still running.

How are the challenges of leadership in a virtually integrated organization different from those you would encounter running a corporation with more traditional boundaries?

The whole idea behind virtual integration is that it lets you meet customers' needs faster and more efficiently than any other model. With vertical integration, you can be an efficient producer -- as long as the world isn't changing very much. But virtual integration lets you be efficient and responsive to change at the same time -- at least, that's what we're trying to do. We think about Internet commerce as a logical extension of our direct model -- and within our first year, we reached a run rate of \$2 million a day. It's

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now about \$3 million a day, and during the peak of the Christmas buying season we saw several \$6 million days. I'm only half joking when I say that the only thing better than the Internet would be mental telepathy. Because what we're all about is shrinking the time and the resources it takes to meet customers' needs. And we're trying to do that in a world where those needs are changing.

To lead in that kind of environment, you have to be on the lookout for shifts in value, and if the customer decides, "Hey, I don't care about that anymore, now I care about this," we may have to develop new capabilities rather quickly. One of the biggest challenges we face today is finding managers who can sense and respond to rapid shifts, people who can process new information very quickly and make decisions in real time. It's a problem for the computer industry as a whole -- and not just for Dell -- that the industry's growth has outpaced its ability to create managers. We tell prospective hires, "If you want an environment that is never going to change, don't come here. This is not the place for you."

Our goal is to be one or two steps ahead of the change, and in fact to be creating or shaping it, to some extent. That's why we spend so much time with our customers. It's why I personally spend about 40% of my time with customers. Often it's a lead customer that says, "Hey, can you put an asset tag on my PC?" And the first reaction is, "Gee, we've never done that before, but why not? Let's give it a try." And then you do it for one customer, then for ten, then for a hundred, and eventually it becomes a standard offering. Putting asset tags on computers isn't by itself a major value shift, but what happens is that we get a series of seemingly small innovations that over time add up to a huge improvement. That's not a bad description of the way we get into businesses. We don't come at it the other way around, with a consulting study that says, "That's an attractive business. Let's go." Nor do we sit around and say, "What do we suppose our customers would like? If we were customers, what would we be thinking?"

So looking for value shifts is probably the most important dimension of leadership. Then there's the question of managing such a tightly coordinated value chain -- and there it's all about execution. If you look at Dell's P&L structure, I think you'd be hard-pressed to find companies that deliver the kind of value-added we do with such a small markup. My theory is that if we can continue to keep our markup as low as it is today, we're going to be able to capture most of the opportunities available to us. But that means we cannot get complacent about our growth and get careless about execution.

Sometimes, I'm taken aback when I talk to people who've been in the company for six months or a year and who talk about "the model" as if it were an all-powerful being that will take care of everything. It's scary because I know that nothing is ever 100% constant, and the last thing we should do is assume that we're always going to be doing well. But for now, it's working. The direct system really delivers value to the customer all the way from distribution back through manufacturing and design. If you tried to divide Dell up into a manufacturer and a channel, you'd destroy the company's unique value. It's something completely new that nobody in our industry has ever done before.

### RELATED ARTICLE: FAST-CYCLE SEGMENTATION

Dell's rapid growth in recent years has been accompanied by ever finer cuts at customer segmentation. This is an important element of Dell's virtual integration with customers. The finer the segmentation, the better able Dell is to forecast what its customers are going to need and when. Dell then coordinates the flow of that strategic information all the way back to its suppliers, effectively substituting information for inventory.

[ILLUSTRATION OMITTED]

### RELATED ARTICLE: USING INFORMATION TO SPEED EXECUTION

Most of the managerial challenges at Dell Computer have to do with what we call velocity -- speeding the pace of every element of our business. Life cycles in our business are measured in months, not years, and if you don't move fast, you're out of the game. Managing velocity is about managing information -- using a constant flow of information to drive operating practices, from the performance measures we track to how we work with our suppliers.

Performance Metrics. At Dell, we use the balance sheet and the fundamentals of the P&L on a monthly basis as tools to manage operations. From the balance sheet, we track three cash-flow measures very closely. We look at weekly updates of how many days of inventory we have, broken out by product component. We can then work closely with our suppliers so we end up with the right inventory. When it's not quite right, we can use our direct-sales model to steer customers toward comparable products that we do have. So we use inventory information to work both the front and back ends at the same time.

We also track and manage receivables and payables very tightly. This is basic blocking and tackling, but we give it a

## The power of virtual integration: an interview with Dell Computer's Michael Dell.

high priority. The payoff is that we have a negative cash-conversion cycle of five days -- that is, we get paid before we have to pay our suppliers. Since

our competitors usually have to support their resellers by offering them credit, the direct model gives us an inherent cost advantage. And the more we can shorten our cash-collection cycle, the greater our advantage.

The real-time performance measures in the P&L that we regard as the best indicators of the company's health are our margins, our average selling price, and the overhead associated with selling. We split the P&L into these core elements by customer segment, by product, and by country. These metrics can alert us instantly to problems, for example, with the mix of products being sold in any particular country.

**Working with Suppliers.** The greatest challenge in working with suppliers is getting them in sync with the fast pace we have to maintain. The key to making it work is information. The right information flows allow us to work with our partners in ways that enhance speed, either directly by improving logistics or indirectly by improving quality.

Take our service strategy, for example. Customers pay us for service and support, and we contract with third-party maintainers (TPMs) to make the service calls. Customers call us when they have problems, and that initial call will trigger two electronic dispatches -- one to ship the needed parts directly from Dell to the customers' sites and one to dispatch the TPMs to the customers. Our role as information broker facilitates the TPMs' work by making sure the necessary parts will be on-site when they arrive.

But our role doesn't stop there. Because poor quality creates friction in the system, which slows us down, we want to capture information that can be used to fix problems so they won't happen again. So we take back the bad part to diagnose what went wrong, and we feed that information back to our suppliers so they can redesign the component. Clearly, we couldn't operate that way if we were dealing with hundreds of suppliers. So for us, working with a handful of partners is one of the keys to improving quality -- and therefore speed -- in our system.

Kevin Rollins is vice chairman of Dell Computer Corporation.