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CASE STUDY

Dell Computer Corporation

A Zero-Time Organisation

This case study will be used throughout the term.

Dell Computer Corporation:
A Zero-Time Organization

Deep in the heart of Texas lies a Fortune 500 company who exemplifies many of the principles of a Zero Time organization. Dell Computer Corporation has seen extraordinarily growth: a 58% revenue increase and an 82% profit increase in 1997, an equally extraordinary short period of time. Sales rose to $12.3 billion in 1997, profits to $944 million in 1997, and the stock split for the sixth time in 1998. Much of this success is due to management principles and a vision that we describe here. First we provide some background information on the company, and we describe the management principals and philosophies we think make Dell a success. Finally, we describe Dell using the lens of a Zero Time organization.

Company Background

Many know the story of Michael Dell, his college-based business of building personal computers with available parts, and his build to order strategy. Founded in 1984 as PC's Limited, the name was officially changed worldwide to Dell Computer Corporation when the first stock offering took place, in June 1988. Other key turning points, according to Michael Dell, were in 1986, when Dell first went outside the US to Europe and hit $50 million in sales; 1989, when the company when from last to first place in their industry on the management of their inventory; and 1993 when the concept of segmenting took shape and allowed the management to regain control of customers.

At the core of Dell's business was the build-to-order strategy. Customers ordered PCs directly, and their order was routed through a credit check, then directly to the manufacturing floor. The order was then built, tested, and shipped to the customer, who received it 5-7 days after placing their order.

This strategy afforded Dell some impressive results. First, Dell eliminated middlemen-the resellers, who were part of the traditional distribution model. As such, Dell not only passed the savings to the customers in the form of lower costs, but was also able to understand customer needs first hand and adapt to market changes faster than competitors. Second, Dell built computers directly for customers, not for inventory. This meant that the company did not waste resources building systems that may not reach a customer, need staffing positions to move inventory around the world, or spend time managing and tracking inventory, and reworking systems that become obsolete before purchased. Third, Dell Computer practiced just-in-time manufacturing, where trucks with vendor parts pulled up to one side of the plant, and unloaded

directly into bins used for building customer orders. These parts did not become the property of Dell Computer until they were unloaded, which took place as frequently as every few hours. Fourth, information systems tied together the entire company, routing orders to the next step in the business process and eliminating waits, backlogs, and losses that a less automated system may experience. Michael Dell explained,

> *In this business, it is not about how much inventory you have, but about how fast it's moving through the cycle. I don't want a warehouse of stuff, because it becomes obsolete so quickly. With our model, we start with the customer whose order pulls inventory through the channel. That results in our ability to deliver a desktop computer in 3 days which is configured exactly as the customer wants. That provides a great deal of value.*

In 1998, Dell Computer employed 16,000 employees in central Texas, its largest workforce, and was in the process of expanding their European facility, in Limerick, Ireland, to 4500 employees. There were five plants: three in Texas, one in Ireland, one in Maylasia. A sixth plant was planned for China, and a seventh was planned for Brazil.

Customers were initially divided into three categories: Large businesses, Small to medium businesses, and personal consumers. Each group was supported in a manner consistent with their requirements. Large businesses had dedicated sales people who managed the orders. Small and medium businesses shared sales staff who insured that the needs of these businesses were met. Individual customers interested in Dell's products were served by either telephone-based inside sales people, or later by the sales system on the Internet. Underlying all customer accounts was the famous Dell Direct distribution strategy. The inside sales force took phone calls from a toll-free phone number from customers seeking information about the products and placing orders. These sales people sat at a computer at one of the Dell offices and serviced customers as they called in. The entry of an order by the inside sales group initiated the entire build to order process. Customers with corporate accounts could order from these sales people, or they could work with the dedicated sales teams for the corporate account. Each large account had field people in charge of the relationship with the client, and dedicated team members in Austin, Texas to service the account. But the ability to call directly to Dell, order a computer, and have it arrive a week later became the cornerstone of the business.

In 1996, Dell expanded their direct order model to the Internet, and their success in this medium quickly became legendary. Scott Eckert, Director of Dell On-Line, began as Michael Dell's Executive Assistant in 1995. In 1996 when Dell decided to launch an on-line sales program, Eckert took over the project. In the first quarter of 1997, the on-line business did $1million per day in sales. In the second quarter, they did $2 million per day, and the success continued. By the end of the first quarter of 1998, Dell logged $ 5 million in sales per day, by the end of the third quarter it was up to $10 million per day in sales over this channel, and the rate of growth was expected to continue. In addition, the web site had grown in functionality. In 1994, it was a simple technical support tool for disseminating tips and bug-fixes to internal and external customers. In addition, Dell conducted customer surveys. In mid-1996, Eckert was put in charge of using the Internet for a "yet to be determined" online business. The first application was an order status system, where customers could track their orders through the Dell process.

By fall 1996, the configurator system was ported to the Internet, and electronic commerce began. The configurator assists customers in designing the exact product they need, and in pricing it out. Once this system was available to customers, the revenue took off. Eckert explained,

> *Using the Internet, we were able to offer our corporate customers special services like our Premier Page. This was a custom web site designed and dedicated to the individual corporate account. It included sales and technical information. One part of this service was a set of standard configurations for the customer based on those approved by their information technology people. Another part was technical support custom designed for the systems we know the customer has. We even linked the premier page to the technical support pages in our internal customer support system. A third part of this page had reporting tools like purchase history and service history so that the customer could keep track of their Dell activity. And we included some marketing information such as the account team contact information. We had built over 8000 of these pages, and each one was different. Some had the orders go directly to us, while others had the orders pass through their internal groups for approval. We had the ability to offer this level of customization in our sales and customer service using the Internet.*

Dell Computers was best known for its pioneering use of the direct marketing channel for selling and distributing personal computer systems. Its well-known strategy of manufacturing a system for a customer, or build to order, provided Dell with a cascading series of advantages over its competitioñincluding low inventory costs, no dealer costs, and current technology in every system manufactured. Conventional wisdom said that it was necessary to have inventories of systems in order to provide customers with many choices, and it was necessary to have those systems sold through dealers who could explain the complexities of the systems and give customers a chance to "kick the tires." Instead, Dell gave the customer a chance to pick whatever features he or she wanted from those available. In addition, Dell manufactured systems only after they were ordered by a customer, which conventional wisdom would say was either too costly or took too long. But Dell was able to guarantee delivery within five to seven days of order. Finally, Dell saw that personal computers were becoming a commodity and realized that sales people would not be needed to explain the systems in the conventional, physical way.

The result was a win/win situation for both Dell and its customers. Factory inventory was at most three days, supported by tight alliances with suppliers who deliver smaller loads, but more frequently than traditional manufacturing systems. Downstream inventory was zero since the systems were directly shipped to customers. No one in the "stream" was sitting with more than 7 days of inventory, whereas traditional supply chains held up to 60 days of inventory of parts and 30 days of inventory of systems for dealers. Exhibit 1 summarizes the business model of Dell, as compared to a more traditional value chain model.

Management Principles

The Dell Direct Model, described in Exhibit 2, highlights how the build-to-order philosophy was central to the Dell management principles. The direct model was the most

visible and important principle of Dell: it aligned all of Dell's business units and people. Within the Dell organization, the direct model meant that everyone was a customer. For example, the IT organization had very few central staff. Almost all of the IT personnel reported directly to business units. Similarly, Dell University was structured into different colleges each residing in a business units. In fact, Dell University's budget did not come from corporate, it came from each business unit, and hence Dell University's survival depended on the satisfaction of each of its customers. The philosophy of *central planning with local implementation* supported the direct model principle. This philosophy enabled the organization to grow at its breathtaking rate because it provided the capability of *build to order* for all parts of the organization and all business processes needed to run the corporation.

In addition to the principals of build to order and direct marketing, Dell Computer managers spoke of a few key principles that were fundamental to their business. These included:

- *Exchange inventory for information*
- *Velocity, value and volume*
- *Constant change*
- *Criticality of coordination*

Exchange inventory for information

At the heart of the successes at Dell was their strategy of exchanging inventory for information. This meant that instead of keeping inventory on hand at Dell, or on hand in a warehouse, or on hand at a retail outlet, Dell kept information about customer orders, needs, and forecasts. Manufacturing predicted what orders would come in, alerted suppliers of anticipated needed parts, and staffed up to meet demand. This gave Dell an advantage in the marketplace for several reasons. Information was easier to store than inventory. Information was easier to move than inventory. Information was easier to discard than inventory. And information was less expensive to have than inventory. Consequently Dell managers architected a way to minimize inventory, and in its place use information. This dovetailed with the build-to-order philosophy Michael Dell had used since he began his business, since both helped achieve the minimum inventory possible. As soon as demand forecasts changed, information about that change was sent out to the rest of the organization and shared. The closer Dell got to this exchange of inventory for information, the closer they got to their vision of strategic advantage through cost and service.

This advantage was also passed on to the suppliers. Eckert elaborated,

The business was founded on the idea of getting the middleman out of the transaction. The next step is to build Internet capabilities for our suppliers. For example, we can give suppliers like Intel a view of processors shipping out of our factories on a very frequent basis. That is quite a bit different from what our competitors can do, since they put finished systems in inventory first which are sold later by a reseller. Therefore they don't have a direct view into what the customers are actually buying. As we refine our information we can reduce inventory levels and the cost for our suppliers will decrease.

Focus on velocity, volume and value

As Dell exchanged inventory for information, they increased velocity, or the rate at which their business processes happen. Velocity was a critical focus for Dell management. In order to manage the changing requirements of their customers and the changing technology critical to their products, it was necessary to be able to quickly and effectively respond. This was termed *velocity* at Dell. Michael Dell expressed this as a "time driven" culture, where the focus was on how fast inventory is moving rather than on how much inventory there was.

As velocity increased, the volume of business increased. Volumes were dependent on the amount of information Dell could obtain or access, store and process. The ultimate result of this was value to their customers, shareholders and employees. For example, the rate of their inventory turns was multiples of their competitor, which translated directly into a steady and large volume of supplies from suppliers. In addition, Dell's systems provided a view of customer demand in real time. This gave Dell the opportunity to negotiate favorable agreements with suppliers in part because their volume had grown in a much shorter time than other competitors. This then translated into value for Dell customers.

In the IT organization, velocity, volume and value meant seeking out improvements in systems so they did not get in the way of decisions, actions, and management. According to Andy Greenawalt, VP and CIO of the Americas,

> *System requirements were to make dramatic improvements in our processes through IT. We wanted to reduce obstacles to the flow of information, in the origin of information, and every other place where information may reside. IT's perspective was to get the systems 'out of the way' so business processes are not impeded by the systems.*

Time was a key value at Dell and the compression of time added value to all stakeholders. The compression of time meant reducing task and process time whenever possible. Value was added as a lower cost for customers, higher returns for shareholders, and bigger profit sharing bonuses for employees, as noted by the CFO, Tom Meredith. As the velocity at Dell increased in all their business processes, time was further compressed, and value was increased.

The only constant in this world is change

While virtually every business knows that their environment changes at one time or another, Dell managers took for a given that the only thing they knew about their future was that it would be different from the present. This assumption had implications for how the company was organized, and how management control systems were put in place. It further complemented the focus on velocity, forcing managers to both deal with constant change and an increasing pace of change.

As part of this predictability of change, Dell executives described "time pacing" as a critical characteristic of their organization[1]. This concept was based on Gordon Moore's 1965 predication that capacity of the computer chip would double every 18 months. The authors who created the term, Eisenhardt and Brown, considered time pacing strategic for successful competitors in fast-changing, unpredictable markets where change was scheduled at predictable time intervals. Tom Meredith described it this way,

> *We created order, discipline, and focus in order to make innovation occur in approximately the time frame we desire.*

In fact, while acknowledging the time pacing effect, many executives also consider Dell's pace to be accelerating.

Coordination is critical

Coordination efforts at Dell continued to be extensive. The top management team of 16 executives met monthly, quarterly, and ad hoc to discuss everything from strategy and new product development to alignment, empowerment and optimization. Meredith estimated that he spent about 1/3 or more of his time planning and coordinating. In an organization as fast moving as Dell Computers, empowerment was critical. However coordination was the ingredient that helps prevent suboptimization. To keep all elements of the organization moving in the same direction, while at the same time responding to changes and movements in the environment, coordination between individuals, business units, and geographical segments was necessary.

Coordination throughout the company was achieved through keeping the business model first and foremost in the minds of the employees. Effort was spent on trying to help people know where to find information, not just on communicating information. The human resources group provided tools that assisted in keeping a consistent message. Paul McKinnon, VP of Human Resources, described the process of orientation for new hires as,

> *At Dell, 75% of the training budget is spent on new hires, job basics and new product training, and the rest is used for everything else. We send new hires as much information as possible ahead of time. We send them a video tape as well as a list of locations on the web they can use to get oriented. For executives, as soon as they join Dell, we send them a laptop loaded with a CD providing an overview of Dell, which also has web addresses for information. This provides a virtual guided tour of Dell even before the executive starts work.*

Coordination was done through heavy communications over the intranet. Every year, after the annual vice-president conference, a digest of the meeting was put on the net so every employee could access it and know what happened. John Cone, VP of Dell Learning, commented that "people loved that digest, and we experienced huge volume of hits on the site

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[1] For more information on time pacing, see K. M. Eisenhardt and S.L. Brown, "Time Pacing: Competing in Markets That Won't Stand Still." *Harvard Business Review*, vol. 76(2), March-April 1998, pp. 59-69.

after a conference." The intranet was one of the basic communication tool for senior executives. Cone related a story about coordination with Michael Dell.

> *About a year ago, I was copied on an e-mail from Michael saying that he would not open attachments anymore. If I wanted him to read stuff, he wanted it put on the net. The implication was that the net, itself, was an attachment. It also made it much more efficient for the network since attachments were on the net, not downloaded with the mail. As a consequence, I have begun to require all the people working for me to do the same. Michael was right on target with this request. He is amazingly fast at recognizing a technology and has the patience to put it into the right place within the organization.*

At the pace of Dell's growth, such coordination was almost an impossible challenge. Aggressive communication was part of an overall coordination effort to keep people aligned. Michael Dell commented,

> *Communication came in many different forms. We had at least one massive meeting a year in which we discussed what happened last year, what worked for us, what should be the goal for next year, and the overall theme for the year will be. For example, 1998's theme was 'the customer experience,' the year before was 'the Internet,' and the year before was 'servers.' We celebrate our success in these meetings.*

Time pacing helped to cultivate a culture of speed and a sense of urgency by keeping people moving with a general rhythm. Finally, good management systems, which include company performance-based incentives and monitoring measurements, provided general guidelines for steering actions in the direction most beneficial to all stakeholders in the long run.

The Customer Experience Initiative

May 1998 saw the company-wide launch of a strategic initiative called the "Customer Experience." This was a program designed to leverage the direct model to "deliver the best possible customer experience across all points of contact with Dell," according to Michael Dell. It meant looking at all aspects of the business from the customer's perspective. Kevin Rollins, vice chairman, described the initiative.

> *In the past we defined quality in terms of the failure rate of hardware. Hardware reliability was an essential element in satisfying our customers, but it was not the only element. The Customer Experience was a way to challenge ourselves to expand our focus, to look at quality in all the ways the customer saw it, and to convert this perspective into solutions that met or exceeded our customers' expectations. As we improve every customer's experience with Dell, we accomplish two important objectives: we build brand loyalty, which translates into increased business; and we continue to add value, which makes us more*

resistant to low-cost competitors. Improving the customer experience will be the key to maintaining our success.

The "Customer Experience" was defined to be the sum of every contact a customer had with Dell, including looking at company advertising, browsing the company web site, purchasing a system, and receiving follow up support. Dell had more than 16 million customer contacts a week. The key to making this initiative successful was to encourage every employee to take a customer-centric view, and to encourage every department in the company to own part of the customer experience. Michael Dell elaborated,

> *There are countless stops along the way where employees behind the scenes make day to day decisions that affect the customer. Each of us owns part of the customer experience because everything we do ultimately touches the customer. At Dell, a complete customer experience should never end. The satisfied customer should want to call Dell for all of their hardware needs and all of their future upgrades. Strategically speaking, this affects all employees all the time in everything we do. This initiative will keep all of us focused on the most important people outside Dell—the Customers. Our customers should be treated like VIPs.*

To measure the success of this initiative, performance goals were clearly set. Managers targeted three key metrics to evaluate the progress of the company, and each metric was to improve by at least 15% during the year. The metrics were:

- Order and Delivery (the percentage of orders shipped to the customer by the targeted date)
- Installation and Operation (the percentage of customer calls to technical support which require a part dispatch within 30 days of the invoice date)
- Service (the percentage of on-site service incidents resolved by a Dell Service Partner within the target time-frame)

Michael Dell summarized this initiative.

> *The Customer Experience is the most important initiative we have at Dell. We monitor progress all the time in all parts of the company and tie everyone's compensation to it. I personally monitor it, and we present the results at every board meeting. It has a company-wide, world-wide focus.*

Information Systems at Dell

Information systems were critical to Dell. The information systems supported the Dell Direct business model by providing a range of tools from order entry to production integration. Information systems provided the means for delivery of instant information to employees through e-mail or over the intranet. And information systems were a way to connect suppliers to the business, to collect and analyze information collected from the marketplace, and to support decisions on everything from hiring practices to product offerings to pricing. "IT is an enabler to

make the business model work," remarked Jerry Gregoire, the CIO. The backbone of the information system was an architecture called "G2" (See Exhibit 3).

The G2 architecture was an object-based infrastructure, with a web browser front end interface. It had a single point of connection and was built in small pieces. There was local control of functionality but a global view of the business. The primary components of the G2 architecture were commonly available applications such as Microsoft office, database engines, and Internet servers. The G2 architecture was similar in design to the Dell organization structure, which was also built in small pieces, with local control but a global view of the business. "We have to have an information architecture that can grow as fast as our business grows," explained Gregoire,

> There was nothing about our situation that was normal. We had to think differently because we were growing by about $1 billion every 9 weeks. Growth like that meant we typically used existing or commercial systems rather than build them from the ground up. And we didn't have time for extensive classroom training, so we tried to design systems that maximized the efficiency of our training. We had to use an interface that everyone could easily understand and intuitively use. The only thing slowing the business down might be the rate of expanding our information technology. We had to continuously evolve our systems. Our model was simple, but there needed to be a high rate of success with its execution. Our model required a high degree of precision. Since we bought off the shelf parts, anyone could build a similar system. Our advantage was in our execution of the system in conjunction with our business model. We wanted to get to everyone in the world, and we could by letting them plug into our systems using the Internet. The G2 architecture was the architecture for doing business using the Internet.

The Dell business model resulted in a different production profile than other business models. The direct model implied that every production run is unique in some way, and hence every lot was of quantity one. Gregoire elaborated on the implication for the information systems,

> That was why we chose not to implement a standard enterprise information system. The systems in the market could not support our business model. We built something like 45,000 lots of 1, which was what the Dell direct business model was all about. But standard systems didn't support that number of unique transactions.

The information systems were highly decentralized. No programmers reported directly to the CIO. Instead, each division and business had some IT people. Gregoire defended this approach, "Even if we had a centralized structure, the local business units would have IT people. I believe all IT, like politics, is local." This was an example of the Dell philosophy of central control of strategy, but local control of implementation.

Dell as a Zero Time Organization

We believe Dell Computer Corporation exemplifies many of the principles of a Zero Time organization. In this section, we briefly describe the concept of a Zero-Time Organization, and then provide a perspective of the company using the core characteristics of Zero Time: Zero-value-gaps, Zero-learning-gaps, Zero-management-gaps-gaps, Zero-process-gaps, and Zero-inclusion-gaps.

A Zero-Time organization has a mindset different from other organizations. Zero-Time organizations design and operate with the assumption that processes can be done instantaneously if information technology and people are creatively combined. This mindset translates into a set of organizational disciplines summarized in Exhibit 4.

A company which successfully implements each of these disciplines is closer to achieving the organizational objective of instant customerization, which means that the needs of any customer are fulfilled as soon as the needs are expressed. Instantaneous fulfillment of customer needs is achieved by converting knowledge into something valued by the customer.

There are three models for how to achieve instant customerization (See Exhibit 5). One is based on the concept of an emergency room, an organization that provides virtually unlimited resources (access to experts, databases, processing time, products, etc.) to the individual servicing the patient. In an emergency room, the doctors, nurses, and equipment needed to treat emergency patients are all immediately available and easily accessible. Similarly, this model suggests that organizations can achieve instant customerization with large inventories and by making all resources available to those who service customers. An example of company that uses this model is Amazon.com, whose large virtual inventory makes it possible to order just about any book in print and have it delivered directly to the customer. Another example is a luxury hotel, which pamper customers by providing anything needed, such as business centers, health clubs, a variety of restaurants, etc. to make the stay exceptional.

In a different model, the Disneyland model, an organization provides the customers with a set of choices and allows the customer to effectively provide self-service. By providing the environment and a choice of rides and attractions, Disneyland enables every guest to experience a unique vacation within the boundaries of the park. Elite manufacturers such as Dell, Mattel, GM and fast food chains like McDonalds are in this category; customers have a wide range of choices of products to buy, but these choices are bounded by what the company offers.

A third model, which we call the Hybrid model, is a mix of the Emergency Room and Disneyland Models. Mega-retailers such as Wal-Mart and Home Depot fall into this category because, similar to the Disneyland model, they have enormous inventories that provide a wealth of selections. However, the Hybrid company's business model also offers customers services that enable them to customize their selections. The result is a supply of almost endless possibilities, like the Emergency Room model. The book store chain Barnes and Noble, is also a hybrid in that it provides a rich selection of books coupled with an ability to custom order any book in print.

This is different than the Disneyland model, which may provide customized services, but as an exception rather than as the rule.

Dell Computer Corporation's management style and business processes were based on many of the same principles as the Zero-Time organization. Their goal was to provide products to customers instantaneously, and to do so they instituted many of the Zero-Time disciplines using the Disneyland model described above. Below we elaborate.

Zero-Value-Gaps

Dell's business processes continue to be customer centric, not driven by what the internal managers wanted to provide. The basis of the build-to-order philosophy was that every product was built when and only when a customer asked for it. Customer value was derived from the fast response time provided by Dell, from the lower costs provided by the inventory management approach, and from the ability to give the customer exactly what was asked for, with predictability and consistency, by customizing every product built. The Customer Experience Initiative was another example of closing any gaps between what the customer valued and what the company valued.

But the management at Dell took the characteristic of Zero-Value-Gaps even further by broadening the concept of the customer to include all stakeholders. Simply keeping Dell Computer Corporation in business provided customer value. As suggested by Tom Meredith, the Chief Financial Officer,

> *Seeking stakeholder value is not the same thing as being customer driven. We not only give customers what they want, we help them to stay in business. We need to think like a customer and focus our whole mindset by looking at things from the customer's viewpoint. We believe we add value to our customers by staying in business, and in order to stay in business, all our stakeholders need to see value. For example, we could give our products away to customers at a very low price, but then we would not serve our stockholders, because there would be no profit, and we would not serve our employees, because we would have to offer low salaries. So there is a point below which we would be out of business. Now, going out of business would actually hurt our customers because, for example, they would not be able to get support from us. This means systems would become obsolete sooner, problems would not be rectified quickly, and upgrades would not be forthcoming. Therefore, we communicate to our employees that while we want to satisfy the customer, we do not want to take actions that go overboard and possibly drive Dell out of business.*

The expanded concept of shareholder value was best exemplified at Dell through the stock value. Dell stock soared between 1992 and 1998. Employees had greatly benefited from this increased value, in part because of stock options they got from the company. Partners and suppliers benefited as the volume of business done at Dell increased. By focusing on being a customer value-driven company, Dell built barriers to entry by increasing switching costs. For example, customers with Platinum Accounts

had customized web pages that gave them access to Dell's operational systems. They could check on orders, configure systems, and manage their inventory directly on Dell's systems. These types of services increased the value to the customers, and in turn increased the switching costs.

Zero-learning-gaps

A major contribution to Dell's success continued to be from the way the company managed information and knowledge. A Zero Time organization had a great capacity to continuously learn and create knowledge, then converted it into customer value. There were many examples at Dell. In an organization where people were the key asset, managing knowledge was a corporate imperative. One example at Dell was on the manufacturing floor. At Metric 12, a showplace manufacturing operation in Austin, Texas, cell assemblers were required to be able to produce a range of products. Whatever product was in the "kit" they receive from the conveyor belt must be perfectly built. To support this assembly operation, monitors were carefully placed at each station with complete assembly instructions. Should the line worker need assistance, the first line of support were the assembly instructions, and they were immediately available. As errors were uncovered during the test phase of the production line, an entry was made on a networked computer. This entry was immediately sent to all testers, and back to the individual who assembled the system. In this way, the individual "learned" what he/she did wrong and could correct it immediately, and the other lines were alerted to the problem, "learning" what to look for in order to correct the problem.

Dell incorporated the concept of Zero-learning-gapss into its process immediately after the customer places an order. This order triggered the manufacturing process. There was "Zero Time" between when the customer's order was received and the manufacturing process began. This process involved ordering the parts to include in the system, and preparing the software to be downloaded into the system. When Dell accepted the order, the information system set all necessary components in motion. The information, entered by a customer or Dell's salesperson, contained all the information manufacturing needed to begin building the product. This was an example of a well done knowledge management life cycle. The initial information from the customer's order triggered the knowledge infrastructure, which instantly provided manufacturing with the information needed. There was instant transmission of the information from the customer's order to the systems that would need to complete that order.

Another example was in the use of the Internet. Dell managers had information available to them instantly that their competitors do not ever have available. Eckert explained,

> *The Internet is useful because of the richness of customer information and the possibilities of integration. For example, the configurator tells us what a customer bought, but it also tells us what other choices he or she looked at. If a customer looked at a Pentium II and a Pentium system, then bought the less expensive Pentium system, we assume the customer bought the best 'processor for the price' and therefore we would have information telling us that, for this customer, the Pentium II system was too expensive relative to the Pentium*

system. We've never had this kind of information about what
customers evaluated but didn't choose.

The training at Dell was done on an "as needed" basis and delivered instantaneously. Some training was incorporated into the job itself, and other was done through testing. For example, the company had a strong belief in ethical behavior, therefore they gave all employees an ethics test, rather than an ethics class. When the employee passed the test, he or she could move on. Until the employee passed, the system was designed to reinforce the ethics the company supported through explanation and retesting. And the Dell business model was applied to the provision of training, called "Stealth Learning." John Cone, the VP of Dell Learning, elaborated,

> *We try to put knowledge on the critical path of people's work. For example, if I am ready to do a performance review, I can simply call up a smart form on my computer. And if I don't know what the meaning of something is, I will just call up a module for explanation. Now, is this learning? We think so. But it can be done as part of the work in real time. In manufacturing, during a quality assessment for example, people can call up a tool to do a Praeto chart on-line. They don't think they are going to school on quality. They just do it as they need for their work. It doesn't feel like training, but it is. That's why we call it 'Stealth Learning'…We create a kind of structure to allow people to learn. We talk about the micro-bite, a chunk of knowledge about 5 minutes long, which we think is an ideal chunk to deliver…. The important thing is to give people what they need to know to do the work, and to make sure they know about things the company thinks is important."*

When learning took place the way it did at Dell, embedded into the actual task, the metrics also changed. It was no longer meaningful to measure hours of training given by the training group, nor taken by the employee. "At this point," McKinnon described,

> *20-25% of our learning is in the category of stealth learning. When it works, however, no one knows we are providing it, because it is so integrated with the task. In fact, there is no corporate budget allocation for Dell University. Whatever Dell learning is doing is based directly on a customer request. Education within Dell is "built to order" since this is the only way to insure education stays current with the business needs. If you have a corporate budget, you have to defend it year after year, and you cannot scale and grow as fast as we need to grow. The Zero-budget approach allows us to listen and to scale with the business.*

Zero-management-gaps

A Zero Time organization structure includes a holonic organization structure, where each part was in itself a complete whole with the authority and had the ability to function independently if necessary. The best example of the concept of Zero-management-gaps at Dell was their cell manufacturing structure, where every individual on the cell had access to any

information necessary to complete the assembly and delivery of the computer. Further, each individual had the power to "stop the line" if they found a major problem that caused defective products. The interesting aspect of the Dell manufacturing system was the number of lines in operation at any one time. While an individual may stop their cell or manufacturing line until a problem was worked out, it was independent of the rest of the manufacturing operation. Each cell was a "whole within a whole."

Another example of the holonic structure was found at the business unit level. Each of the 12 business divisions within Dell were run like "a business within a business". Each had responsibility for a set of customers, and had the authority to make decisions that best service their customers. In order to keep every employee focused on the goals of the business, in addition to those of their customer, Dell had an incentive system based on overall company performance. A large portion of the bonuses all management receive were based on how well Dell had done overall. And Dell had a corporate culture that forced out "silo" thinking. According to Greenawalt,

> *The values of this organization are set up in a way that encourage*
> *individuals to act in the best interest of the whole. We do not tolerate*
> *individuals who strive for personal success at the expense of others.*

Meredith further elaborated, "Whenever we saw a group of customers emerging, we segment it to serve them better." The company's segments were an organizational form which included a fully integrated business unit set up to serve a specific type of customer. Therefore, segments were more encompassing than their competitor's typical market or product segment. Dell's segments had specific products, customers, and business objectives. Michael Dell elaborated,

> *Most of the companies in this business segment themselves by product. We do it*
> *by customer. Every segment is about a $1 billion business, with a shared set of*
> *products and a mandate to use the direct model. But at the same time, the people*
> *in that segment know the products which relate to their customers. And the*
> *segment has growth and operating margin targets as well as service level targets*
> *which are relevant to them. And we have found that a segment can be much*
> *more responsive to the customer because of the basic learning that takes place.*

A key challenge at Dell was how to keep every individual, team and business moving in the same direction. Keith Maxwell, Vice President of America Operations, and head of Dell's largest operations group, explained,

> *I believe that through strong communications, Dell is able to transform*
> *a team of champions into a championship team. We use devices such*
> *as brown bag lunches, e-mails from the chairman's office, and company*
> *performance incentives to send the message about the direction*
> *everyone should be going. It has been an effective set of tools for us.*

Zero-process-gaps

A Zero Time organization successfully removes barriers to operations so that what ever needs to happen can happen in a minimal amount of time. At Dell, a model of "supply on demand" was used to fulfill customer orders. Maxwell elaborated,

> *We currently have less than 30 strategic suppliers, which represent the majority of the materials we use. When an order comes in, these strategic suppliers are alerted. Traditional organizations use the supply-demand management organization or the "push-philosophy", but at Dell, we use the demand-supply management organization or the "pull-philosophy" in order to reduce resistance. As a result, the transformation costs, as a percent of revenue, can be driven lower and lower.*

Another example of Zero-process-gaps found at Dell On-Line was the use of the Internet platform for providing technical, marketing, and management information to customers. Platinum accounts, for example, had dedicated web pages that inform customer-managers of the inventory of systems purchased from Dell, the status of pending orders, and provide a current technical support system tailored to the information of interest to the customer. In this way, customers could track down whatever information they needed instantaneously, without any intervention by employees at Dell. Dell managers, then, handled the exceptions and enhancements rather than the routine information requests.

Zero-process-gaps was clearly illustrated through the build-to-order strategy. There was no downtime, or wait time, in the process. It was possible to fill orders as soon as they were received. Suppliers get the order when Dell gets the order; there was no resistance to transmitting the orders. Since manufacturing had all the parts needed to build the order, there was no resistance to making it happen.

Zero-inclusion-gaps

A Zero Time organization automatically involves customers, suppliers and other stakeholders in their business processes. Two examples at Dell were the manufacturing floor, and the order process cycle. On the manufacturing floor suppliers unloaded directly onto the floor, rather than into inventory storage areas, and they were partners in the manufacturing operations Dell carries out. At the other end of the line were trucks from shipping companies waiting to take away the completed goods and deliver them to end users. They, too, were partners in this operation. Forecasts for new systems were based on orders, and sent to the partners to assist them in their planning. Meredith called this an *ecological* rather than a *holistic* approach. An *ecological* approach was an external approach where all entities involved in the process were informed of issues relating to the process. A *holistic* approach, on the other hand, kept the bulk of the issues internally, only telling the external partners what they need to know to satisfy Dell's requirements. An *ecological* approach forced the entire partnership to focus on the customer needs. On the other hand, a *holistic* approach forced the external partners to focus on Dell's needs and lets Dell focus on the customer needs. Through an *ecological* approach, the

boundaries between Dell and its customers were blurred. Even customers were included at Dell, since the Premier page gave a customer access significant parts of Dell's IT infrastructure.

Relationships with suppliers were critical to the "build-to-order" concept. Suppliers were able to know what parts were needed when the order was taken˜messages were sent to them if supplies were needed that were previously unanticipated. Short cycle times were possible because the suppliers were included in the process. Similarly, the delivery vendors were part of the process. Their shipper provided logistics services that go beyond simply picking up the package and delivering it to the customer. Their shipper actually stocked components such as monitors. When a system was ordered, the shipper was sent a message to begin the process of shipping the required components to customers, resulting in delivery of all needed system components at the same time. Finally, even the customer was part of the process. New Internet-enabled technology allowed Dell to offer its customers access to the systems that help them configure their desired purchase. Customer orders over the web added significantly to sales, further pushing the direct marketing model.

Lessons from Dell Computer

There were several lessons to be derived from a Zero Time view of Dell Computer. The benefits Dell Computers achieved can, in some sense, be viewed as advantages of a Zero Time organization. Described in this section are the following:

- Knowing the customer is the foundation for creating value
- Going from the physical to the virtual world creates barriers to entry
- Explosive growth highlights the paradox of simultaneous empowerment and alignment
- Continuous reinvention is critical for continued velocity

Knowing the customer is the foundation for creating value

It is no longer good enough to simply *meet* customer expectations. It is not even good enough to delight the customer. These goals are often one-time goals. Continued success, particularly at a fast pace means it is getting increasingly important to KNOW the customer. Knowing the customer means having knowledge that lets Dell constantly add value. Knowing the customer means Dell can design new products, new services, and new pricing schemes that constantly meet and exceed customer expectations. Dell achieves this through creative use of their information systems as well as through their people. Their information systems attract, store, manipulate, and report information on customers. Their people used this information to respond immediately to changes in market conditions, changes from competitors, and changes in customer preferences. The Customer Experience Initiative was a further example of a way to get more intimate with the customer perspective. Internally, Dell managers were continuously evaluating their share of the market *within a customer*, as compared to industry statistics that were in terms of share of the overall market. The goal was to increase Dell's position with each customer. Michael Dell explained, "If we have say a 99% share a customer's systems, the question to us is how do we improve customer satisfaction in order to get that additional 1% share." And knowledge of the customer drives different solutions and services for each customer segment. For example, Premier accounts such as GE, Boeing and GM find value from Dell in

the predictability and consistency of Dell's guaranteed delivery date and quality. On the other hand, consumers find value in Dell's lower total cost. Michele Moore, VP Chairman's Communications, described it as,

> *Transaction customers buy systems infrequently and generally need a high volume of relatively low-value support. But large customers who buy repeatedly from us often only require limited support, but support that is customized and high-value add.*

Going from physical to virtual creates barriers to entry

Barriers of entry and switching costs are created when an organization operates in a virtual environment. Meredith explained,

> *I would rather plan in a non-physical world because it will create huge barriers of entry, huge switching costs and massive competitive advantages for us. The basic infrastructure for the non-physical world consists of speed (time), intangibles (knowledge) and connectivity. The advantage is increased because these objects can be manipulated more easily than their physical counterparts.*

Compression of time brings value to all stakeholders, and therefore creates barriers of entry. Being virtually connected with both customers and suppliers created a competitive advantage that was difficult to duplicate. Virtual integration and connectivity with customers means that the customer has invested in organization and technical connections with Dell's IT infrastructure and vice versa. The cost to the customer of switching from Dell involves decoupling from Dell's IT infrastructure, which is much more costly to most than the savings to be gained from a competitor with slightly lower per-unit costs. The tight coordination achieved through the virtual integration provides customers with the benefits similar to those achieved through actual physical acquisition.

Explosive growth exasperates a paradox of achieving both empowerment and alignment

Dell Computers is growing at such a fast pace that it is a challenging task to bring on people fast enough. The hiring process, itself, must be an education and training process, so individuals are knowledgeable and ready to be productive in the Dell environment. But the integration of a large number of individuals in a short time brings the problems of both empowerment and alignment at the same time.

Traditional companies have the "luxury" of empowering only those employees who are trained, trusted, and able to make appropriate decisions for the organization. Dell must empower individuals from the beginning in order to continue to operate at the rapid pace they have set for themselves.

At the same time, traditional companies have the "luxury" of alignment using time to teach their employees the values, traditions, and goals of the business. Dell must achieve

alignment for a large number of new employees who may not have had much training in the "Dell way".

Zero Time organizations have built a culture that both aligns and empowers employees. Dell has done so through extensive communications, through selective hiring, through Dell University and their training programs, and through the use of systems such as linked incentives that both align workers and empower them. For example, production people have linked objectives which are graded through metrics and incentives based on team as well as individual performance.

Continuous reinvention is critical for continued velocity

At some point, every strategy and every goal is outdated. Dell Corporation has the keen sense to identify possible new strategies and goals early, and to reinvent themselves in order to move in the new direction. This was true when Dell made their entry onto online service over the Internet. The Dell Direct Model was extended to allow customers access to systems which let them tap directly into Dell's service and support databases. Dell has already reinvented themselves again by viewing their business as one of integration and distribution, rather than simply as a hardware manufacturer. Maxwell described the current vision of Dell as "we sell solutions, not systems." And the competitive environment shifts again as PC manufacturers target Dell as a primary competitor. Business units increase the acceleration of reinvention, as each business unit evolves as necessary as they gain knowledge of their customers.

Dell's Future?

Where does Dell go from here? To further its path towards a Zero Time organization, it would continue to seek new ways of providing instant customerization. One executive commented that inventory might be counted in "hours" rather than "days". Since parts arrive on one side of the plant, are immediately available for the assembly line, then shipped out the other side of the plant, it is conceivable that Dell would only have inventories of parts for a few hours, while the systems were being made. It is clear to us that Dell will continue to drive inventory down by increasing velocity in its relentless pursuit to retain its " build-to-order" leadership position in the industry.

The real advantage is for Dell to position itself as an information systems solution provider, rather than a hardware vendor, providing customers with entire systems, which integrate Dell hardware and Dell's internal capabilities. This is already beginning to happen utilizing the Internet. Dell's top customers use a web page to configure, place, and track orders, as well as to obtain technical and sales information. This web page resides on Dell's internal IS system, but appears to the customer as an automated internal IS procurement process. In other words, in 1998, Dell offered a solution to the information systems department for the procurement process of ordering Dell equipment. Why stop there? Why not offer customers an entire procurement process for equipment supplied by both Dell and others? Why not offer a series of electronically based systems for handling other IS processes, such as service requests for the equipment? Dellware was, to some extent, a way to provide this service. Dellware

provided a means for customers to request special software and peripherals. Michael Dell suggested that the company's next step would be to get closer to buyers[2],

> *Our industry has generally neglected the customer. I want to take the customer experience to a whole new level.*

Finally, as the experience base of the Dell organization grows, they might become the services outsourcer for the entire customer IS organization. In 1998, Dell was providing a similar service to Boeing. The advantage to Dell is the increased opportunity for revenue and the increased access to information, which potentially translates into new product and service offerings. The advantage to the customer is the traditional one-stop-shopping arrangement for products and services, offloading these tasks from information systems organizations, and freeing the IS management up to concentrate on core business issues rather than procurement and services. Would using the direct-model to deliver expanded customer services provide Dell a sustainable advantage?
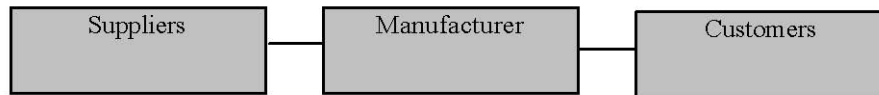
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[2] Quoted in "What Does No. 1 Do for an Encore," Business Week, November 2, 1998, pgs. 112-113.

# Exhibit 1. Three Models of Personal Computer Industry Value Chains[3]

Model 1: Dominant Model (Arms length transactions from one entity to the next)

| Suppliers | Manufacturer | Distribution Channels | Customers |
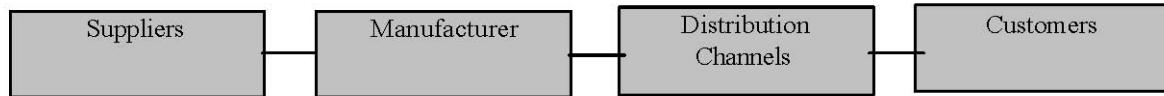
Model 2: Dell's Direct Model (Eliminates time and cost of third party distributors)

| Suppliers | Manufacturer | Customers |

Model 3: Virtual Integration Model (Blurs traditional boundaries and roles in the value chain)

| Suppliers | Manufacturer | Customers |
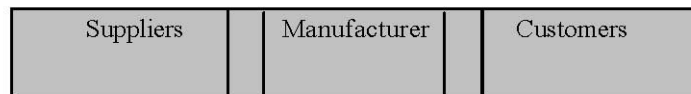
[3] This Exhibit was adapted from J. Magretta, "The Power of Virtual Integration: An interview with DELL Computer's Michael Dell". *Harvard Business Review*, vol. 76(2), March-April, 1998, pp. 72-85.

Exhibit 2: The Dell Direct Model (Source: Dell Corporate Web Site, May 1998)

Dell's award-winning customer service, industry-leading growth
and financial performance continue to differentiate the
company from competitors. At the heart of that performance is
Dell's unique direct-to-customer business model. "Direct" refers
to the company's relationships with its customers, from home-
PC users to the world's largest corporations. There are no
retailers or other resellers adding unnecessary time and cost, or
diminishing Dell's understanding of customer expectations.
Why are computer-systems customers and investors
increasingly turning to Dell and its unique direct model? There
are several reasons:

- Price for Performance. By eliminating resellers, retailers and
other costly intermediary steps together with the industry's most
efficient procurement, manufacturing and distribution process Dell
offers its customers more powerful, more richly configured systems
for the money than competitors.
- Customization. Every Dell system is built to order.
Customers get exactly, and only, what they want.
- Service and Support. Dell uses knowledge gained from direct
contact before and after the sale to provide award-winning, tailored
customer service.
- Latest Technology. Dell's efficient model means the latest
relevant technology is introduced in its product lines much more
quickly than through slow-moving indirect distribution channels.
Inventory is turned over every 10 or fewer days, on average, keeping
related costs low.
- Superior Shareholder Value. During the last fiscal year, the
value of Dell common stock more than doubled. In 1996 and 1997,
Dell was the top-performing stock among the Standard & Poor's 500
and Nasdaq 100, and represented the top-performing U.S. stock on the
Dow Jones World Stock

Exhibit 3. G2 Architecture

The G2 Architecture is based on 3 levels: Data Engine, Server, and Application.
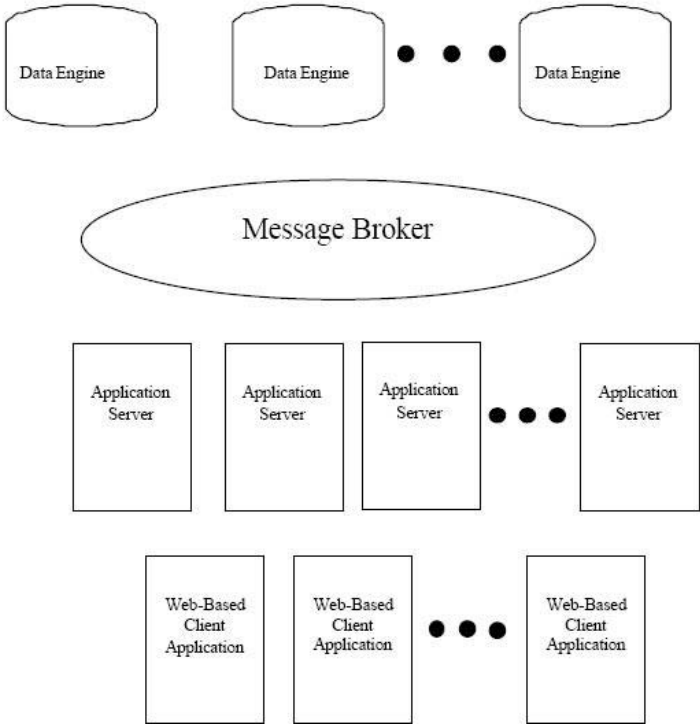broker links the server level with the data engine level.

Exhibit 4: Summary of Zero-Time Disciplines

Discipline	Description
Zero-value-gap	Core values of company are based on customers' values and these values are shared across entities.
Zero-learning-gaps	Capacity to continuously learn and create knowledge, then convert it into customer value instantly.
Zero-management-gaps	Every part of the organization is in itself a whole, complete entity with the ability and authority to function independently.
Zero-process-gaps	The property in which there are no obstacles to completing any required tasks, processes, or activities.
Zero-inclusion-gaps	All individuals and groups who need to be involved are automatically included when the process takes place.

Exhibit 5. Models of Instant Customerization

Model	Description
Emergency Room Model	Everything necessary to satisfy the customers' needs and choices is waiting, accessible whenever needed.
Disneyland Model	A bounded set of choices is available, from which each customer selects whatever he or she wants.
Hybrid Model	Reasonable set of choices is available, coupled with a way to customize these choices, to meet whatever need customer has.

Time for Zero Time

"Zero Time is about the ability to react instantaneously, to provide value for every customer at every opportunity. Without the Internet, you can't be Zero Time -- period."

A busy executive, his day filled with meetings, phone messages, and emails, rises each morning at 5 am to spend a quiet hour in his garden, practicing the art of bonsai. His goal: to focus his mind so totally on the bonsai that he creates a void. That way, whenever a problem arises during his business day, a solution will arrive instantaneously. According to Keri Pearlson, 41, and Ray Yeh, 60, professors in the business school at the University of Texas at Austin, this executive is working and living in "Zero Time." "Zero Time means that when something needs to happen, it can happen immediately," Pearlson explains. Adds Yeh: "Zero Time is not only about the compression of time. It's about the ability to react instantaneously, to provide value for every customer at every opportunity. Without the Internet, you can't be Zero Time -- period." Pearlson and Yeh are pioneering the Zero Time Project at the UT-affiliated IC2 Institute, where they conduct case studies on Zero Time competition. Becoming a Zero Time company, they argue, means mastering five critical disciplines.

Zero Value Gap

The world of Zero Time actually starts with negative time. "Recently, I was working with a mortgage company," Pearlson says. "Like most mortgage companies, this one takes weeks to handle the paperwork on an application. A Zero Time mortgage company would anticipate what needs to happen on a mortgage -- before a customer applies for one. But most mortgage companies don't start the approval process until a customer asks for a mortgage. They don't operate in negative time." In fact, Pearlson says, companies can extend the Zero Value Gap discipline even further: "If you know what your customer's customer wants, then you know what your customer wants," Pearlson explains. "If you know what your customer wants, then you can anticipate that want and be prepared to satisfy it."

Zero Learning Lag

Real learning ability, say Pearlson and Yeh, enables companies to convert knowledge into customer value instantly. That means mastering three types of learning: stealth learning, just-in-time learning, and rapid learning. "Stealth learning happens when learning is built into the work process itself," explains Pearlson. "Just-in-time learning comes when you realize that you need to learn something specific, and you go and get that learning. Rapid learning happens when you attend a course or training session to get information that you'll need to improve your general performance."

Zero Management

The concept of Zero Management comes from holography. "If you look at a hologram, you see a two-dimensional picture," explains Pearlson. "If you slice the hologram in half, each piece will contain all of the information in the original picture." The same principle applies to a Zero Management company: Every part of the company will contain the entire organization's information, knowledge, and capacity for action.

Zero Resistance

"Not long ago, I was scheduled to fly from Taipei to Singapore on Singapore Airlines," says Yeh. "When I got to the ticket counter, the service representative asked which frequent-flier program I wanted to assign my miles to. I thought that this was an exceptional piece of service. But when I mentioned it to the company's vice president of operations, he told me it was standard operating procedure." The work processes in that company are designed so that there is zero resistance to serving customers.

Zero Exclusion

A Zero Time company includes all relevant parties in its key planning and decision-making processes. "You involve your suppliers, your customers, and your customers' customers," says Pearlson. "You share information both internally and externally." Yeh cites Intel as an example of a Zero Exclusion company. "Intel considers its entire market as an ecosystem," he says. "It shares information with its distributors and with the CIOs of large companies -- in other words, with its customers' customers. Intel realizes that its customers' customers aren't buying computers -- they're buying a technology direction." What makes Zero Time a compelling new business model? "In the 21st century, time is the independent variable -- the variable that drives everything else," Yeh says. "It used to take 20 years to become a $1 billion company. Now it takes as little as 3 years. How do you capture this compression of time in a way that enables your organization to evolve? By becoming a Zero Time company. There's no other choice. Things are moving too fast."