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Marshall Industries

In the end, business all comes down to supply chain vs. supply chain.

—Robert Rodin, CEO, Marshall Industries

As 1998 drew to a close, Robert Rodin, CEO of Marshall Industries, had every reason to celebrate. Marshall, the fourth largest global distributor of industrial electronic components, had logged annual revenues of $1.4 billion, the sixth consecutive year the company had reported record net sales. But more important, Rodin believed, the company had, in the same six-year period, successfully reinvented itself as what he called a "virtual distributor." Not only was Marshall one of the first companies to conduct electronic commerce on the Internet, but it had also created one of the most robust and widely used business-to-business Web sites. The industry had taken notice. Marshall had been named best business-to-business Web site two years in a row by *Advertising Age.* In 1997 and 1998, *Business Marketing* named Marshall the top business-to-business marketing Web site.

The 52-year-old company, based in El Monte California, distributed industrial electronic components such as semiconductors, connectors, and computer peripherals. It worked with more than 150 suppliers, **including Advanced Micro Devices (AMD) and Toshiba,** and served more than 60,000 customers, including IBM and computer contract manufacturer Solectron. **One of its largest customers was Web TV**, which made set-top boxes that enabled television sets to provide Internet access. In addition to selling and delivering hundreds of thousands of electronic parts, Marshall offered customers value-added services like component testing and programming, just in time (JIT) inventory management, and kitting.

Marshall almost single-handedly had disproved the notion that the Internet would kill the distribution business. Yet despite its successes, Rodin eyed the future with trepidation. True, he was a self-described worrier, but his concerns were not just a figment of his imagination. The industry had always felt chronic margin pressures, and customers were squeezing distributors harder than ever, resulting in declining margins across the industry. Then there was the competition. Though midsize Marshall had successfully differentiated itself as the pre-eminent virtual distributor, there was no denying that size still mattered. The industry had long been dominated by two 800-pound gorillas, Arrow and Avnet, who together controlled more than 40% of the electronics distribution market. Meanwhile, many nontraditional competitors were emerging, threatening to make the struggle for market share ever more intense.

Finally, Rodin continued to worry about the Byzantine politics of the industry. For years, major U.S. semiconductor makers like Motorola had followed an unwritten policy of preventing their major distributors

Research Associate Cathy Olofson prepared this case under the supervision of Professor Jeffrey F. Rayport as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

from carrying Japanese parts. The ban had effectively prevented Marshall, which had franchises with several leading Japanese suppliers, from carrying any major U.S. chipmaker lines. Quite unexpectedly, in 1998, the "us or them" policy was modified to "us and one of them," as Motorola and other large U.S. chipmakers each agreed to share distributor shelf-space with one Japanese semiconductor supplier. The top industry players had already begun scrambling to find a Japanese partner; after the dust settled, Rodin wondered, what would the industry look like—and how would Marshall be affected?

Amid these distractions, Rodin believed the company had to focus on the major forces that had and would continue to reshape the industry: increasing bandwidth, globalization, demographic population shifts, super-compressed product life cycles, and customized services. Marshall's ability to ride these trends and take advantage of emerging opportunities lay in what Rodin described as the company's four core "intellectual property" assets: supply chain management services, engineering design services, a deep understanding of the .com space, and expertise in what Rodin characterized as the "plumbing" of distribution, i.e., transporting goods.

Marshall Industries Background

Marshall Industries was founded by Gordon Marshall in 1946. Marshall, who had been a ham radio operator in his youth and a decorated B-24 pilot in World War II, started the company when he was unable to get a job in manufacturing after graduating from college. In its early years, the company was a general distributor, selling anything from poker chips to army surplus goods. But in the early 1950s, as television sets, portable radios, and other mass-produced consumer electronics were beginning to enjoy widespread demand, the company made the decision to specialize in electronics components. The company went public in 1959.

Marshall, who built the company on a foundation of aggressive selling and exceptional customer service, earned a reputation as an innovative leader. The company was one of the first distributors to carry semiconductors, a move that helped lift Marshall to $100 million in revenues by the late 1970s. Marshall was also the first to make Japanese parts widely available to American customers.

In 1992, Robert Rodin, who had joined the company nearly a decade before as a sales manager, succeeded Gordon Marshall as CEO. Rodin soon began to distinguish himself as an innovator and risk-taker in his own right, upending the traditional sales force compensation and structure building a Web presence as early as 1994, well before the rest of the industry.

In 1997, Marshall acquired $360-million Sterling Electronics Corporation. Sterling's expertise lay in serving smaller customers who bought in limited lot sizes. Marshall also had stakes in electronics overseas distributors, including Sonepar Electronique International (SEI), which distributed primarily in European markets, and Serial Systems, which was based in Asia. In 1998, Marshall employed approximately 2,300 people and offered coverage and support in 36 countries from 164 locations.

A Cultural and Technological Revolution

By 1992, when Robert Rodin succeeded Gordon Marshall as CEO, Marshall's sales had topped $600 million. The company had a good track record of growth; customer base and volume were both growing steadily. Its motto, "Satisfaction Through Service, " and a mission of "Number One in the Marketplace" that employees enthusiastically embraced.

Like most distributors, the company was a sales-driven organization, with a complicated compensation system on a complex system of management by objectives (MBOs). People were reviewed and rated on individual performance: division managers' were evaluated on their division's profits and losses; salespeople on gross profit dollars; and product marketers on sales versus forecast and inventory budgets. Internal sales contests and supplier-sponsored promotions—sometimes 20 at a time—ratcheted up the internal rivalry, encouraging employees to aggressively outsell each other with the promise of cruises, TVs, VCRs, and other prizes.

On the surface, the system bred a spirit of high-energy fun and camaraderie among employees, particularly salespeople. Programs like "March into March," a month-long series of rallies and prizes, did increase sales and generate excitement. But Rodin worried about the downside: the system bred fierce internal competition and gamesmanship—often at the expense of customers. Marshall kept running into the same vexing, though not dire, problems. Among them:

> The company was consistently shipping 20% of total sales in the last three days of each month, resulting in a desperate scramble to get product—any product--out the door.
>
> Salespeople would ship ahead of schedule to make a number or win a prize in a contest, even though customers measured delivery in a window of one day early to zero days late.
>
> Divisions would hide inventory from one another to make sure their own customers got parts that were in short supply; managers would often ship the product out of state so they could honestly tell other divisions they were out of stock.
>
> Divisions also argued about cost-allocation, often delaying important capital investments and improvement. While everybody could agree that a new computer system or new training programs were critical, no one wanted these costs allocated to their P&L.

Though the compensation system had been part of the company for years, Rodin believed it bred short-term thinking: it rewarded people for closing sales, not for creating solutions. There was no brand development or long-term relationship building; instead of penetrating the marketplace, the sales staff was simply going after the easiest orders to book. What's more, Rodin believed, the current system was ill-equipped to deliver on increasing customer requests for just-in-time delivery and rising expectations of quality and service. Inspired by a Deming quality seminar he attended, Rodin decided to scrap the system—and to reinvent the organization. Rodin explained:

> "Marshall had become a web of conflicts; a company of 40 different fiefdoms. Every time a supplier or customer asked us for something more, we'd try to jump, hoping that luck and skill would hold it all together and keep us from falling flat. Our only chance for the future was to present a common front, a unified identity that made doing business with Marshall different from doing business with anybody else."[1]

Rodin concluded that the only way to pull off such a major cultural transformation was to go the heart of what motivated people: namely, money. And so Rodin and his management team company targeted a major overhaul of compensation and performance-evaluation systems. To start with, they eliminated contests, and prizes, commissions, and most radically, individual performance-based bonuses. Under the new system, everyone at Marshall would be paid the same way and share in a companywide bonus pool. Eventually, Rodin eliminated commissions, as well.

Out too went performance evaluations based on P&Ls, forecasts, budgets, and monthly numbers. Employees would be evaluated, instead, on a matrix of fundamental business skills: business skills, communication skill, product knowledge, system knowledge, personal development, and knowledge of the company.

At first, Marshall employees greeted the changes with mixed feelings. On the one hand, there was no denying that some salespeople would see their pay decline, their salary no longer padded by big bonuses and commissions. On the other hand, the new system would not penalize the sales force for "missing" targets or even losing customers. After the initial shock, most employees were receptive to the new system, though eventually, a few top salespeople left the company.

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[1] From *Free, Perfect, and Now*, by Robert Rodin with Curtis Hartman (Simon & Schuster, 1999).

Outside of Marshall, the reaction ranged from bewilderment to derision. Industry insiders and competitors regarded the changes with skepticism; one critic even labeled the system "communistic." Suppliers were uncomfortable with the no-promotions policy, since they had long regarded promotions as an important incentive for encouraging distributors to push their products over a competitors'.

But Rodin thought differently. The system overhaul was not some radical political experiment; it was a strategic decision that would give Marshall a competitive edge in an era of increasing customer demands. Rodin was simply designing the right incentives that would eliminate counterproductive competition and create a culture based on teamwork and a common mission—serving the customer. Most important, the new system would allow the company to transform itself from a sales-based to a service-based organization. Salespeople would no longer be motivated to simply make sales and ship product, in short, to chase numbers. Instead, they would be encouraged to invest as much time as necessary to develop and nurture new business relationships, to provide solutions to customers, to form long-term partnerships. In the company's new mission statement, written to reflect the emerging organization, the word "distribution" was conspicuously absent: "Marshall Industries serves our business partners by adding value with a commitment to continuous improvement, innovation, and mutual satisfaction."

Organizationally, the new system effectively broke down barriers between Marshall and the customer, dismantled the bureaucracy, and created an awareness of internal mutual independence. (See the company's new organization chart, **Exhibit 1**.) Looking back, Rodin argued that the new organization also gave the company a distinct advantage as the industry increasingly went virtual:

> "We have a structure that can deliver on the promise of virtual supply chain management. I'm not saying a competitor can't do what we do, but they may be doing it with horsepower instead of with systems. Maybe the customer doesn't care, because they don't peel back the onion, but I believe you can't manage that kind of complexity with old systems."

In 1994, only 90 days after Rodin first saw a demo of the Web browser Mosaic, Marshall had a digital strategy. In short order, the company launched "Marshall on the Internet," which replaced the company's bulky product catalogs, and MarshallNet, an intranet system that enabled customers to check order status. Marshall installed Lotus Notes across the company and gave laptops to the entire sales force—at that time almost as radical a notion as abolishing bonuses and commissions. Marshall also began designing software to do time-phased order planning, supply management, and demand modeling for its customers.

As changing expectations of quality and service had pushed Marshall to rethink its relationship with the customer, so did the Internet push the company to reconsider how it viewed the customer. If the Internet ethos was free-flowing information, available anytime and anywhere, then the Marshall Web site would embrace, not resist, this ideal. The company made most of its Web features free and accessible to anyone, no registration required. As Robin explained:

> "The Internet hasn't changed what customers want; it's just given them more freedom to find it. Marshall's definition of a customer changed as soon as we went online. We weren't doing business with this division of IBM or that department at HP anymore. Instead, we were dealing with individuals, often engineers, sitting before a screen, exploring for ideas....Now Jack in purchasing needed inventory details, Sonya at the plant needed order status, and David, a hobbyist from Nevada, was looking for tips on sale parts. Our homepage had to make them all feel welcome and give them what they came for.[2]"

By 1998, Rodin described the company as a "high-speed junction box" that connected suppliers with customers. The company was not simply connecting people to they goods they wanted; it was connecting people to information. It was no longer just selling parts; it was selling solutions. Marshall's network of branch locations served more than 60,000 customers and delivered sales and technical support 24 hours-a-day, 7 days-a-week. Sales per person had more than doubled since 1991, from $360,000 to $740,000.

[2] Ibid

Industry Trends

The electronic components distribution industry developed in the 1940s and 1950s when the consumer electronics industry emerged. Early on distributors traded in capacitors, resistors, and vacuum tubes, and later connectors and semiconductors. With the rise of the computer industry, distributors also began carrying computer peripherals and components.

While many suppliers sold directly to their high-volume customers, they relied on distributors to reach myriad small and midsize customers. Distributors, for most of their history, provided a straightforward service: they bought in volume and acted as an extension of their suppliers' sales forces, which alone could not reach a broad market as cost-effectively. In return, suppliers often provided technical support and sales referrals, allowed a certain percentage of returns, and some price protection.

In the 1950s and 1960s, suppliers and distributors began formalizing their relationships. Companies like Texas Instruments offered price and inventory protection as well as buying privileges to their distributors. Throughout the 1980s and 1990s, as competition increased, companies sought to expand nationally; they also began to more fully automate their operations and services.

Shelf-Sharing Restrictions

From the early days of the industry, large electronics companies had often imposed some form of shelf-sharing restrictions on distributors. The 1990s were no different. U.S. chipmakers Motorola, Intel, and National refused to make their products available through distributors that carried competing Japanese semiconductor lines. While most of the leading distributors complied with the ban and distributed no Japanese chips, **Marshall went in the other direction, providing a wide array of products from Japanese, European, and domestic suppliers. Though the company was restricted from carrying the three major U.S. chipmakers, in 1995, Advanced Micro Devices unilaterally abandoned the shelf-sharing ban and franchised Marshall as a distributor.**

The restrictions had other consequences. In 1997, Marshall was on the verge of entering into a joint venture with competitor Wyle Electronics. But major chipmakers objected to the deal and exerted pressure on the companies to comply with the ban: either Marshall would have to give up its Japanese lines, or Wyle its U.S. chip line. The deal was abandoned.

By early 1999, soon after relaxation of the shelf-sharing ban, major distributors had begun aligning themselves with Japanese partners. Arrow announced that it had signed a deal for exclusive distribution of Toshiba's high-power semiconductor products in North America beginning in April 1999. Avnet's Hamilton-Hallmark Electronics unit struck a deal to carry Hitachi products. Distributors Pioneer-Standard and Future were expected to follow suit.

The Digital Revolution and the Changing Face of the "Middle Man"

In the 1980s and 1990s, several accelerating forces converged to reshape the electronics and distribution industry. Product design and manufacturing grew in complexity; products went from containing hundreds to thousands of parts. Parts proliferation increased, too, as more low-cost competitors entered the market, and the result was an often bewildering selection of components with the same functionality. At the same time, product cycles were shortening as companies scrambled to get products to market faster. As a result, companies began outsourcing parts of their value chain in an effort to capture efficiencies, save costs, and stay focused on core competencies.

Managing the supply chain was never so crucial—or difficult. As middlemen, distributors were perfectly positioned to help their customers coordinate supply chain activities and reduce manufacturing costs. They had expertise in inventory management; they had vast product knowledge and availability; they had deep relationships up and down the supply channels. And so by the mid-1990s, most distributors had begun offering an array of services: inventory control, assembly services such as kitting, logistics planning, design solutions,

and materials management. Value-added services as a percent of sales for the industry were about 25% in 1994, up from 15% in 1989. The figure was expected to reach 40% in 1999. [3]

Many observers predicted that the Internet would render obsolete distributors and other so-called middlemen. The Web would enable suppliers of services and products to skip the intermediaries—from retail stores to distributors—and go directly to the customer. In reality, there had been few casualties. Electronics distributors had so far survived the disintermediation threat by stepping up their offering of value-added services and, most important, leveraging the Internet to offer new, as well as enhance existing, value-added services. Distributors' Internet-based services typically fell into one of four categories: 1) logistics, including auto-replenishment capabilities through electronic data interchange (EDI) systems; 2) information, including downloadable supplier data sheets and other design support; 3) service, including easy access to customer support and order tracking; and 4) e-commerce, including parts ordering and payment.

Suppliers and Customers

Distributors supplied services and components to a variety of markets, including auto manufacturers, consumer product companies, medical device makers, and networking and telecommunications companies. Estimates suggested that Fortune 1000 customers accounted for about $8 billion, or about 30% to 35%, of distribution sales. Midsize companies, with sales around a few hundred million dollars, as well as smaller companies, with sales under $100 million, each accounted for $6 to $8 billion of distribution sales.[4]

Experiencing cost and cycle-time pressures, large OEMs (such as Hewlett Packard, IBM, Cisco, and Ericsson) were increasingly looking to outside sources to perform non-core activities as a way to better utilize their own asset bases. Just as OEMs handed off manufacturing to contract manufacturers, they had also begun to rely on distributors to manage supply chain logistics and procurement.

Suppliers, from semiconductor makers like Intel and Motorola to industrial manufacturers like 3M, were also focusing on core competencies. Most typically didn't have the resources to offer design expertise and support, except for their major customers to whom they sold direct. But because products and components were more complex than ever, being able to provide design expertise and support was essential to making a sale. Complicated products also raised legacy issues. Once designers and engineers learned about and felt comfortable with a part, they were likely to want to use it for as long as possible—reducing the possibility of replacement sales. Thus it was particularly important for suppliers to get their parts *designed* into original products. (**Exhibit 2** shows at what stage in the design process engineers typically used distributor Web sites and which services they favored.)

Industry Consolidation and Growth

Over the previous two decades, the industry had been consolidating to an unprecedented extent. The top 25 distributors had increased their market share to more than 85% in 1998.[5] Part of this was a response to globalization. As supply chains spread across the globe, distributors sought to extend their reach. Most companies made investments in or acquired at least one European and Asian distribution partner. Consolidation was also a response to new competitive anxieties, as distributors sought to round out their line cards and service offerings by acquiring specialty distribution partners. Acquisitions had also helped distributors reduce operating costs and spread SG&A costs over a larger revenue base.

Distributors were also profoundly affected by the cyclical nature of the electronics industry. In 1998, the Asian economic crisis and an oversupply of semiconductors put pressure on low average selling prices and

[3] Merrill Lynch report, "Electronics Distribution," February 1999.

[4] Merrill Lynch report.

[5] Ibid.

already declining gross profit margins. For example, average gross margins of the top five distributors declined from 24% in 1990 to 15% in 1998.[6] (See **Exhibit 3** for margins of leading distributors, as well as other industry benchmarks.) Despite the squeeze on profits, analysts noted that component suppliers increasingly turned more business over to distributors, while OEM customers relied on distributors for products and other value-added work. Analysts expected that these factors would help average dollar sales growth increase slightly for 1998, to just under 1% industrywide. In 1985, approximately 25% of electronic components sold in North America were sold through distributors. In 1995, about 31% were sold through distributors.

Marshall Industries Service and Operations

Marshall differentiated itself through exceptional customer service, an innovative and aggressive approach to e-commerce, and a semiconductor line card that offered more Japanese semiconductor products than any other North American distributor. In fiscal 1998, semiconductors accounted for 64% of Marshall's sales. (See **Exhibit 4** for Marshall's income statement.) Marshall was the only distributor that provided manned 24 by 7 customer support, via call centers as well as online chat sessions.

Sales and Marketing

"No one ever asks for a salesperson: they ask for someone to help them. "

—Rob Rodin

Rodin believed that Marshall's unorthodox compensation structure and heavy investments in information technology systems allowed the company to move from a sales focus to a service focus. Information technologies simplified and speeded routine activities such as order tracking and billing, freeing up salespeople to spend more time with customers, learning about technologies, and crafting custom solutions. IT advancements also made possible new value-added services, such as auto replenishment.

Where once the sales mandate was to close sales, the new sales mandate was more complicated: provide customized solutions. Salespeople, no longer driven by bonus competition or commission to pursue only sure-thing deals (known as SWAT, or "sell what's available today), had the freedom to commit themselves to long-term customer relationship management. Rodin recalled:

> "There was a firm in Palo Alto, called Artemus Research. It was a 30-person operation, doing no business when we first visited the company. We put a salesperson on the account for two years, during which time Artemus didn't book a single order. Then the company became WebTV, was bought by Microsoft, and now it's our biggest customer. We couldn't have been that patient if we hadn't eliminated commissions."

The company formalized this service philosophy through its Marshall Process, a training program designed to help salespeople develop stronger business relationships with customers. **[Rob—I will see how quickly HBS word processing can recreate the Marshall Process Chart on page 150 in your book. If they can do it by end of the day tomorrow we'll include it.]** The Process guides employees toward an understanding of each customer's needs, teaching the key questions to ask: Who are the target customers? Do they have supply-chain problems? How does the customer define quality? The goal was to enable each salesperson to create custom solutions that address long-term and short-term needs, in short, to form partnerships with customers. The program emphasized equally each step of the business process— market research, marketing, prospecting, qualifying, presenting, commitment (which replaced "closing"), and following up—and captured strategic customer data in a database. Salespeople were awarded and promoted according to how well they executed the Process.

[6] Ibid.

Internet and intranet technologies, in combination with database management systems, also enabled companywide access to key corporate knowledge management tools: a Marshall dictionary and performance matrix. Both tools were repositories for accumulated company knowledge and best practices, and the information was available to all employees. The dictionary provided definitions, how-to information, and guidance for a variety of business tasks and functions; for example, it showed how to use sales reports to analyze sales to budget. The matrix provided detailed information on customers, suppliers, products, and market activity. Users wanting to learn more about a customer's chip market, for example, could find information about competition, suppliers, trends, demand projections, even daily product activity, down to the last fax sent.

About 46% of Marshall's work force was in sales. Despite its unusual compensation structure, Marshall's sales structure did not break the mold: VP, branch manager, sales managers, area managers, salespeople. The sales force included field applications engineers, who had design and engineering expertise and were crucial to technical sales to customers.

Value-Added Services

Marshall offered a range of supply-chain management services in manufacturing, materials and logistics management, and design and engineering. The company estimated that 35% of its revenues were derived from its value-added services. Marshall performed the majority of these services in-house.

Manufacturing programs helped customers reduce inventory and accelerate manufacturing cycles. Kitting services aggregated multiple sub-components, destined for the same final product, into a pre-sorted parts kit. Marshall's turnkey programs offered comprehensive supply chain management, from part procurement, assembly, and project management, to relationship management.

Component services comprised semiconductor device programming, systems integration, and PC system solutions, and cable and connector assembly. Marshall's three in-house semiconductor facilities programmed and tested memory and logic chips, as well as performed bundling activities such as "tape and reel." In 1998, Marshall signed an exclusive agreement with Comit Systems, an engineering firm, which strengthened Marshall's custom design capabilities.

Logistics and materials management services helped companies manage their just-in-time manufacturing activities. Marshall offered handling, procurement, and pipelining services, as well as component stores based on forecasts. Through an electronic data interchange (EDI) system, Marshall offered auto-replenishment systems, which allowed customers to send its stock status directly to Marshall. The system would order automatically as supplies neared depletion. The EDI connected customers' computers directly to Marshall's and allowed for seamless data transmission. Marshall also developed proprietary software packages that generated forecasts and helped minimize part shortages and oversupplies.

Finally, Marshall offered design and engineering services, many of them through the Web. While most value-added services targeted customers like OEMs and contract manufacturers, services that supported suppliers' products—including assembly, design expertise, programming, and testing—also generated demand for them.

Virtual Services

For two years, Marshall had been named by *Business Marketing* as the top Web site; no other leading distributors made the list of 200 sites. (See **Exhibit 5** for Marshall's home page.) Its Web site boasted not only the most comprehensive feature set of any distributor's site but also a transparent, uncluttered, and easy-to-use interface. Its open architecture gave it unsurpassed connectivity.

Marshall was exceptional in its ability to integrate its value-added supply chain services with its information systems. Its intranets/extranets connected suppliers, customers, and its own distribution operation,

allowing it to offer a wide range of electronic customer services. These included parts searching, ordering, tracking; round-the-clock customer support; auto-replenishment; and training and education. The system processed over 750,000 daily transactions. Descriptions of Marshall's key Internet-based services follow:

Macro.Link An ambitious virtual supply chain management tool, Macro allowed supply chain partners to streamline communication, automate decision-making, and remove administrative inefficiencies from the system. In some cases, decisions that used to take weeks could be made and executed in a day. Using Internet technology and data-warehousing techniques, Macro connected computers up and down the supply chain--from supplier to manufacturer to value-added reseller. The system was programmed according to rules established by a steering committee of the supply chain partners; the rules set certain specifications any design change had to meet, for example, and also dictated the kind of orders that could be processed automatically.

A product engineer considering replacing one part with another, for example, could initiate a engineering change order (ECO) and get immediate information from partners on the replacement part availability, functionality, revised sales, and delivery forecasts, and estimated costs. If all the information met design specifications, the order would be executed automatically. (See **Exhibit 6** for a diagram of the supply chain management via Macro.Link.)

Order Center With a purchase order account or credit card, customers could order and track parts at any time of the day. Marshall's "order agent" tool resided on suppliers' Web sites and allowed them to hand off customers with smaller orders directly to Marshall. The agent transparently took users to the Marshall site where Marshall would fulfill the order through its own system. In 1998, about 10 suppliers used the order agent. A single click direct-linked users to UPS's package-tracking feature.

Electronic Design Center The EDC featured parts-number and manufacturer searching, as well parametric searching, which allowed users to plug in parameters like voltage and dimensions. (Parts searching was also available from Marshall's home page.) Users could then view side-by-side comparisons of similar parts from different manufacturers. (See **Exhibit 7.**) Through XML connections with suppliers, users could review supplier product information, such as data sheets, without appearing to leave the Marshall site. (See **Exhibit 8** for a sample data sheet.) The EDC also contained links to technical resources as well as industry news.

Marshall Connection This login/ID extranet maintained customer accounts and profiles. Customers could access as backlog and order status, inventory status, and contract pricing information. The Connection also featured an automated quote process, as well as the ability to cross-reference and track multiple part numbers.

@Once A Marshall subsidiary, this sales lead-management and follow-up service supported demand-creation efforts for suppliers. It also provided marketing services.

Help@Once This chat service offered online support, 24 hours a day. Visitors could log on and chat in real time with a Marshall engineer, who provided assistance with product availability, pricing, order status, and using the Marshall Web site.

Education News & Entertainment Network ENEN, a subsidiary of Marshall, was a leading provider of Internet broadcasting services for the electronics industry. ENEN's Web site incorporated real-time video, audio, and interactive chat to deliver live, interactive training sessions, product announcements, and other events via the Internet. ENEN offered three core services. NetSeminars were live broadcasts over the Internet that featured audio and chat interactivity among participants. NetPresentations were streamlined versions of NetSeminar that delivered on-demand presentations, available to audience members any time of the day. NetInterviews used audio feeds and digital photography to broadcast live reports from trade shows or other events.

ENEN also offered related event management and marketing services, including audience development, real-time transcription, and multilingual capabilities, fulfillment and real-time audience reporting. Marshall marketed the service to its own suppliers, as well as competitors' suppliers, who paid a fee to use the technology and to provide technical support and training for their products. The service was free to customers.

Quotecart This virtual service streamlined quoting. Customers uploaded or pasted in a bill of materials or parts list in spreadsheet form, reviewed quotes, and could then directly order parts.

Suppliers and Customers

Marshall served approximately 60,000 customers, the majority of which were small and midsize computer companies, capital and office equipment companies, and systems integrators. **One of the company's largest customers was Web TV**; no single customer exceeded 4% of total sales. Marshall also worked with contract manufacturers, which built and shipped computers and other electronic products for OEMs. Rodin believed that as contract manufacturers took on more manufacturing and purchasing functions for their customers, and as their role in the supply chain became more complex, they would comprise a growing market for Marshall's customized forecasting and materials management software solutions.

The company's line card represented about 200,000 products, and its average product selling price was $5.00 The distribution of electronic components accounted for approximately 95% of total fiscal 1998 sales.

Marshall's key suppliers included AMD, Toshiba, AMP, and Lucent. Its ten largest suppliers accounted for approximately 51% of the company's total sales in fiscal 1998. (See **Exhibit 9** for a list of Marshall suppliers.) **The standard supplier distribution agreement was a non-exclusive agreement with a 30-day cancellation clause. As a result, Marshall competed with other distributors that sold the same or similar products, as well as with its suppliers, which tended to sell directly to their larger customers.**

Physical Operations

Marshall had 77 sales and distribution facilities and six corporate support and distribution centers. Its main distribution center was 258,000 square feet, and it owned and leased several hundred thousand more square feet for warehousing.

Competition

The electronics distribution industry comprised hundreds of competitors, but a handful dominated the field. (See **Exhibit 10** for the top ten distributors by revenue.) In 1997, total industry sales reached nearly $27 billion.

By the late 1990s, electronics distribution companies had transformed themselves into service organizations that provided a package of services to help customers reduce the time it took to bring a product to market. As the industry consolidated and the distributor profile became more complex, a once-undifferentiated industry had begun to look slightly more heterogeneous. Competitors sought to differentiate themselves according to a number of factors: size and reach of its distribution coverage, selection of components, combination of services, ease and quality of customer service, and their Internet and information technology offerings.

All of the large distributors, including Arrow, Pioneer-Standard, Marshall, and Avnet, had extensive Web sites. Though few offered parts ordering and other e-commerce options, most featured a standard set of features: company information, line card details, technical information, and parts availability and pricing information.

Arrow Electronics

Arrow was the world's largest distributor of electronic components and computer products, with 1997 sales of $7.8 billion and average inventory of over $1 billion. The company, based in Melville, New York, worked with more than 600 suppliers and 160,000 original equipment manufacturers and commercial customers. It had a massive global presence, with distribution centers in 32 countries. Throughout the late 1990s, Arrow had been on a buying spree, which allowed it to supplant rival Avnet as the leading global distributor. In 1998, Arrow acquired two competitors, Bell Industries, one of the ten largest distributors in North America, and Richey Electronics, a specialty distributor of interconnect devices.

Arrow was the largest distributor for most of the world's semiconductor suppliers. Semiconductors accounted for more than 60% of sales in 1998, while computer products accounted for an additional 25% of sales. Intel topped the supplier list, accounting for 16% of products purchased.

Arrow was increasingly offering sales, service and technical support, as well as value-added services such as materials management, which helped customers reduce their time to market and cost of ownership; automated inventory management; and business-needs analysis. To improve service, the company in 1997 realigned its North American components operations by customer segment. The seven new business groups included Arrow's Supplier Services Group and the Semiconductor Group.

The company had not completely found its footing on the Internet. Customers could search for part availability, though the search could only be done by part number and/or manufacturer. Other Internet features included package tracking and industry news alerts. While the Gates/Arrow division, which distributed computer systems and software to value-added resellers, featured a more fully featured parts search and order tracking system, as of early 1999 it was not available from Arrow's main Web site. (See **Exhibit 11** for Arrow's home page.)

Avnet

The number two distributor, founded in the 1950s, had 1998 sales of $5.9 billion, up from just over $2 billion in 1993. The Phoenix-based company distributed parts from 250 manufacturers to more than 100,000 customers, including Eastman Kodak, AT&T, and Hewlett-Packard. About half of the company's 1997 sales came from its Hamilton Hallmark unit, which distributed semiconductors for top chip makers such as AMD, Intel, and Motorola. In 1998, 54% of its sales came from semiconductors, 27% from computer products, and 19% from connectors and other items.

In the 1990s, Avnet had pursued acquisitions aggressively. The company outbid Wyle Laboratories for Hall-Mark Electronics in 1993, and it acquired Penstock, the top U.S. distributor of microwave radio-frequency products, the next year. Between 1992 and 1998, the company purchased a total of 20 firms, most of them based outside the United States.

The company's feature-rich Web site was the closest rival to Marshall's. It offered parts searches (again by number and/or manufacturer only), order tracking, downloadable catalogs and data sheets, and technical resources. In 1998, both Avnet and Marshall were among the top ten in *Information Week* 's ranking of the most innovative users of information technology. As of early 1998, however, customers could not order parts from the site. (See **Exhibit 12** for Avnet's home page.)

Other Traditional Distributors

Though other competitors, including Future and Pioneer-Standard, lacked the depth and breadth of Avent and Arrow, they too offered a range of value-added services, many increasingly through the Internet. Pioneer-Standard's Web site provided technical data, product availability, and pricing information; the site also allowed buyers to purchase parts with a credit card or by setting up a line of credit. For large, established customers, Pioneer Standard set contract pricing on the system.

Pure Internet Distributors

Newly formed "vortex site" Internet companies—including Digital.market, Netbuy, and Fast Parts—aggregated inventory from multiple electronics distributors and made it available through the Web. At Netbuy, for example, online buyers could search for and order components, which Netbuy typically would then acquire from one of its 29 distributor partners, who actually held the inventory. (When Netbuy sold a part, it did not disclose the name of the distributor.) By early 1999, Netbuy had more than $1.4 billion in virtual inventory. QuestLink, the second leading e-distributor, had more than $1 billion in inventory available on-line and partnerships with leading distributors and semiconductor vendors. These sites targeted professional electronics buyers. (See **Exhibit 13** for NetBuy's home page.)

Emerging Competitors

Contract manufacturers and freight forwarders were slowly grabbing pieces of the supply chain management territory. Freight forwarders like FedEx and UPS, with extensive transportation fleets and logistics expertise, were poised to compete with distributors in services like logistics management and aggregation of bills and materials. Contract manufacturers had massive manufacturing infrastructures and could supply low-cost component purchasing and other manufacturing services.

Conclusion

Marshall had prospered in the first stage of industry dis-intermediation and emerged at the beginning of 1999 with a reputation for exceptional customer service and technology innovation. Looking ahead to 2000 and beyond, Rob Rodin suspected the industry would continue to feel the same constraints it had in the last several years: margin pressures, ever-more demanding customers who wanted everything "free, perfect, and now," and fickle supplier policies. **Rodin believed that Marshall would be successful only to the degree that it addressed these "time bombs"—and that the best strategy for doing this lay in what he described as "dynamic alignment:" the process of bringing the company's products, services, strategies, and partnerships in line with the market's constantly changing needs and capabilities. He summarized: "The Marshall mandate is to find new ways to connect ~~products to the marketplace~~, people to people, people to technology, products to market, answers to questions, solutions to problems, and order to chaos."**