Extending the Enterprise

By IDDO HADAR

Conventional wisdom about how to forge a winning company in the electronics industry has fallen by the wayside. The key to success is innovation—not so much in product design as in managing relationships with suppliers, customers, subcontractors and even competitors.

THE ELECTRONICS INDUSTRY has always challenged conventional management thinking due to its rapid pace of technological change, its global scope and its growing effect on business and personal life. BUSINESS MANAGEMENT experts must regularly rethink and update their "common wisdom" to address the unique aspects of the electronics industry, such as the dramatic economies of learning and scale in component manufacturing and the industry's inherent need for ongoing innovation in product design. The time for another update has clearly come. Recent events in the electronics industry may very well be the catalyst for a giant shift away from traditional management principles toward new ways of doing business. SUCCEEDING IN THE ELECTRONICS industry once seemed like a no-brainer. In an industry defined by technology, the recipe for success was to maximize technological innovation and get it to market first. What could be more simple? The scenarios for electronics success stories—typically involving late-night product designs scribbled on napkins in fast-food restaurants—further reinforced this notion. But the history of the semiconductor market proves that the first-to-market, technological leapfrogging strategy doesn't ensure success. For example, after being first to market with its 16-bit microprocessor in 1975, Texas Instruments Inc., Dallas, failed in this venture due to a lack of supporting software. Similarly, despite technological superiority, Motorola Inc., Schaumburg, Ill., failed to capture the IBM PC motherboard because of an incompatibility with the 8-bit infrastructure.

Illustration By Gary Tanhauser

Success in electronics hinges more on developing a broad perspective of one's competitive position than on getting new technology to market first. For example, industry leader Intel Corp., Santa Clara, Calif., has focused on aggressively driving technological transition by creating new generations of its products. The key has been religiously maintaining backward compatibility with earlier versions—often, however, at the expense of performance.

In the early days of the personal computer, Intel—like Motorola—was forced to build second-sourcing relationships to establish its technological architecture. While accepting this as a necessary evil, Intel has followed the "next wave" model—initiating a new technology wave as soon as competitors seem to be catching up with the last one, and managing the entire product line to control technological transition.

On the other hand, Advanced Micro Devices Inc., Sunnyvale, Calif., has focused on delivering performance upgrades—higher speed, improved packaging and lower voltage—within Intel's design, and has sought to extend existing product generations. For example, AMD strengthened the 286 with CMOS versions, math coprocessor support and highly integrated MPUs. With solid skills in production and market access, AMD has excelled as a fast follower. After introducing its 386 chip in March 1991, AMD achieved a 30 percent market share within nine months.

Although these two strategies seem different, both have their roots in the same premise—the realization that microprocessor manufacturers typically control a very small fraction of the total value added by the time a device reaches end users. End-user value is generated throughout the chain by providers of application software and integration services. As a result, success in this industry seems to revolve around building a solid "extended enterprise," encompassing suppliers, customers, end users, third-party vendors and even direct competitors, to support new technologies. (See Exhibit 1.) Within the x86 extended enterprise, both Intel and AMD successfully pursued their distinct strategies—market-driving innovation as opposed to fast follower—and efficiently concentrated on a subset of capabilities. This duality has given strength and resilience to the entire extended enterprise, allowing second- and third-tier PC suppliers to expect a steady flow of components at rapidly declining prices.

In this context, Intel's recent rift with AMD may prove a liability to both companies, requiring them to become more alike to survive. For example, with a potentially weaker AMD, Intel has had to commit to dual-pronged technology spending on both product line proliferation—to satisfy niche markets—and accelerated product life cycles—to fend off new entrants. As a result, Intel—which faces challenges to its entire extended enterprise from alternative architectures like Unix-based workstations, Windows NT machines and the PowerPC alliance—has committed itself to a very fast, and possibly unsustainable, pace of technological change.

The experience of Intel and AMD suggests that, counter to common wisdom, success in semiconductor markets should be linked primarily to effective management of the extended enterprise, not to technological wizardry or fast time to market per se. The most dramatic threats and opportunities emanate not from individual direct competitors, but from new architectures and their extended enterprises. And this is not unique to the semiconductor industry. Close examination of other technology companies uncovers many instances where success did not result from singular excellence in product technology, but from an ingenious redefinition of the supply chain.

Most of the dramatic high-tech successes in the United States in the 1980s—like Intel, Microsoft Corp. and Sun Microsystems Inc.—stemmed from evolutionary technologies offering a low-cost standard that fueled standardization and unbundling. Such a strategy lies at the foundation of many Japanese success stories, including the automotive, consumer electronics and machine tool industries. Many product and service providers have found that their most effective strategy lies in establishing standards and opening up their architecture. So far, most of the examples of this shift can be found in the electronics industry. Once again, electronics is at the forefront of management challenges, as rapid technological change and complex interactions force the players to view industry structure and competition from a new perspective—the extended enterprise.

Traits of the Extended Enterprise

LET'S TAKE A CLOSER look at the characteristics of the extended enterprise. Described simply, it consists of a set of firms in a supply chain bound together by strategic vision—not just transactions, licenses and agreements. It is the most important and fastest growing of the various models of supplier/competitor relationships in a value-added chain of firms. (See Exhibit 2.) These models include part supply/technology transfer, subcontracting, copartnering/integrated supply chain and extended enterprise.

Part Supply/Technology Transfer: All managers are familiar with part supply/technology transfer relationships. They exist in virtually all industries and are distinguished by specific contract terms, such as performance, delivery, price, duration, market coverage and technology application. They may be developed by manufacturers with their suppliers or with their competitors. For example, most companies purchase semiconductor components through such relationships.

Subcontracting: Subcontractor relationships frequently run for longer terms than supply agreements, but are similarly the result of arm's-length negotiations on product/material quality, delivery and cost. In many of these relationships, the buyer maintains a high degree of control over the technology and even the manufacturing process. Most of the responsibility for innovation rests with the buyer, who provides suppliers with detailed specifications and requirements.

Copartnering/Integrated Supply Chain: Copartnering or integrated supply chain management differs from the subcontractor relationship model in the role the supplier plays in advancing technology. In a true copartnering relationship, the supplier develops technological elements that are incorporated into the buyer's product or service. The buyer is then free to eliminate entire components

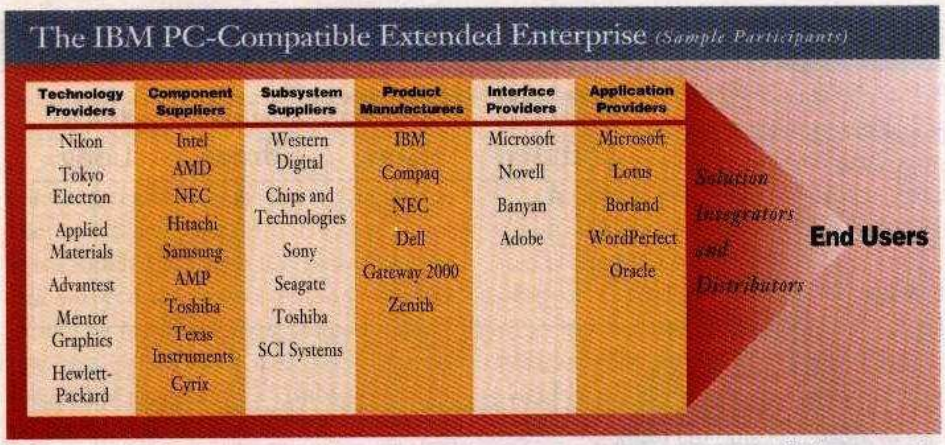

Exhibit 1 *provides an example of how the participants in an extended enterprise interact to support the creation of end-user value.*

of its business system, such as incoming inspection, thanks to the depth of services the supplier provides. An example would be long-term foundry relationships, where the fabless buyer makes a capital investment in the foundry and guarantees long-term volume purchases in return for dedicated capacity and ongoing process innovation.

The distinct advantages of a copartnering relationship include a significant reduction in time to market and an optimized configuration of business systems, leading to a reduction in the combined costs of production, sourcing and relationship management. Successful execution, however, demands a high degree of trust, an acceptance of mutual interdependence and a recognition by both buyer and supplier that they are bound together for the long haul.

Extended Enterprise: How then is managing the extended enterprise distinguishable from the copartnership model? While the extended enterprise exhibits every characteristic of a copartnering relationship, it adds several more:

1. The lead firm in the extended enterprise retains only a small fraction of the value created for the final customers through its innovation processes. Intel, for example, sells its microprocessor chips in the range of $100 to $400, representing, at best, 5 percent to 10 percent of final system value. Yet Intel's technology is one, if not the primary, factor driving the PC/workstation market.

2. The extended enterprise structure is based on vision and economic self-interest, with formal agreements, if any, in a supporting role. The structure is typically sustained by true economic interdependence—one firm's success depends on another's, as in the dependence of the x86 extended enterprise on the success and innovation of Microsoft.

3. The extended enterprise seeks to build a competitively advantaged and secure position for all of its participants, not just for the lead firm or for any one supplier. Success for Intel is not defined by the ability to charge extremely high prices for its microprocessors. Rather, success often requires prices low enough to broaden the PC market and expand the base of available PC software packages. This makes the PC product preferable to other architectures and platforms across a variety of applications.

4. The leader of the extended enterprise exerts control not through majority ownership or contractual instruments, but through shaping the enterprise's innovation efforts and tailoring its delivery systems to meet end users' needs. This leadership may come from either a major component supplier, such as Intel in PCs, or a final assembler, such as Hewlett-Packard Co. in laser printers.

5. To a surprising degree, competitors often play important roles in the same extended enterprise. For instance, the existence of both an innovator and an efficient fast follower, as a result of the competition between Intel and AMD or between Texas Instruments and Cyrix Corp., Richardson, Texas, ensures the entire extended enterprise of rapid technological advancement at competitive prices. In turn, this drives the emergence of a large number of system manufacturers, software developers and end users, reinforcing the viability of the extended enterprise against competitors.

Increasingly, competition in the global marketplace occurs among extended enterprises. Complex industries, such as electronics, require a combination of distinct capabilities—yet no single company can master the entire spectrum. Fast-paced technological change, as well as market and industry extensions brought about by each new technology family, make it enormously difficult and prohibitively expensive for any one firm to develop all the capabilities required to compete effectively in most electronics and information-technology businesses.

Learning How to Play the Game

THE CONSUMER electronics industry provides an interesting example of the way companies need to evolve their strategies in this environment. Historically, Sony Corp. has been the commercialization leader, employing an aggressive R&D strategy, bringing several new technologies to market first and enjoying an upscale market position and premium pricing. On the other hand, Matsushita/JVC has been a fast follower, excelling in delivery skills, employing a defensive R&D strategy—which earned it the nickname *Maneshita*, or "imitator"—and often becoming market-share leader through lower pricing at later stages in the product life cycle.

Today, general technological trends—like digitization and miniaturization—have brought issues such as standards, compatibility and complementary software to the consumer electronics world. This has forced both Sony and Matsushita Electric Industrial Co. Ltd. to battle each other in establishing industry standards and building their own extended enterprises. Being first to market can no longer ensure success, nor can technological superiority do the trick. Sony was first to introduce a consumer VCR in the mid-1970s. Its technologically superior Betamax format and first-to-market status established a de facto standard. Sony, however, kept its technology proprietary by refusing to license it, sell components or provide systems to other companies.

Conversely, although Matsushita/

JVC came late to the market with its VHS format, it corrected a major deficiency in Betamax by offering longer tape-recording time, making the product more appropriate for delivering movies. Matsushita/JVC then established VHS as the standard by licensing it extensively to about a dozen Japanese companies. Sony conceded defeat in 1988, marking one of the most dramatic demonstrations of the imperative for high-tech firms to include issues such as incentives for end users, distributors and third parties in their technology planning.

Ironically, Sony internalized the lesson and completely reversed the situation in the camcorder market. Matsushita created the video camcorder market with VHS and VHS-C formats—while Sony was three years late with an 8mm format incompatible with all video decks. Sony's technology, however, overcame important technological barriers to the adoption of camcorders: size, weight and recording time. Sony drove market penetration by forming an international consortium of 100 manufacturers to set standards, and by making its technology widely available through licensing and selling components to competitors.

Such recent experiences in the consumer electronics industry demonstrate that the differentiating success factor in today's market is the ability to create and maintain a strong extended enterprise built around core technology: establishing a standard (by licensing, selling key components and accepting OEM arrangements) and using open, not proprietary, architectures.

Such an approach stands in stark contrast to what is sometimes the knee-jerk approach of management to harmonizing different value-added components, namely, increasing equity control of the supply chain. Indeed, attempts by the very same players to do just that by acquiring software capabilities—Matsushita bought MCA Inc., Universal City, Calif., and Sony bought Columbia Pictures Entertainment Inc., New York—have been of questionable success, attesting to the new realities. This is a lesson worth remembering, especially today, when most industry players are weighing their options to respond to the convergence of computing, communications and content.

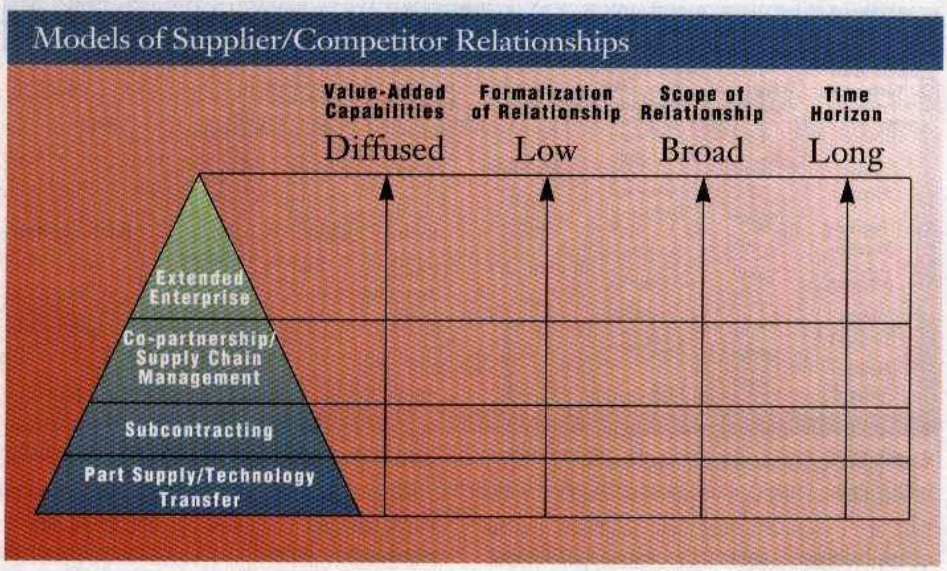

Exhibit 2 *illustrates the characteristics of various models for supplier/competitor relationships. As the relationships become more like an extended enterprise, their value added becomes less concentrated and their relationships less formalized, broader and longer-term.*

New Approaches

AS THE CONSUMER electronics industry's experience shows, this new environment has important implications for the way business is conducted.

Partnering: Alternative approaches to the extended enterprise may result in radically different strategies and incentives. Consider, for example, the various plans for wireless communication using low-earth-orbit satellites. On the one hand, Motorola's Iridium project attempts to capture most of the value-added potential by establishing a sophisticated satellite design that essentially displaces the current long-distance telecommunications infrastructure. On the other hand, proposals such as Odyssey (by TRW Inc., Cleveland) or Globalstar (by Qualcomm Inc., San Diego, and Loral Corp., New York) share more of the value with others by relying on existing long-distance phone systems to carry the bulk of the transmissions. While Motorola's approach may seem more profitable and more functional, it is also more expensive and more technologically challenging than Odyssey or Globalstar. Not surprisingly, the latter projects have acquired major allies, namely, the telecommunications companies, by virtue of their design—while Motorola's project is still struggling to raise sufficient funding.

This all serves to highlight the nature of extended enterprise–based competition: a high-risk, high-reward opportunity, which, if successfully implemented, can create a thriving market with strong barriers against new entrants. But successful implementation requires well-orchestrated cooperation by all extended enterprise participants, often at the expense of a good portion of the value created. Success in this environment entails more than merely renaming otherwise standard arrangements (such as purchasing, subcontracting and distribution) as "strategic alliances." Success instead requires changing the way managers think about their businesses.

Innovation: Successful companies must have a crystal-clear understanding of user needs coupled with the ability to develop complementary capabilities throughout the extended enterprise to meet those needs. They must create and foster motivation among other chain participants. Time to market is rarely the primary issue; too early an introduction may prove counterproductive. Innovators usually must create standardization (to drive the breadth of applications) and compatibility (to minimize switching costs). The need to reconcile divergent needs may mean adopting lessrevolutionary technological standards.

The spread of key technologies over

time tends to reduce the potential value of new technology—favoring the establishment of business/technology infrastructures that enable useful integration of available technology. Those with proprietary technologies must anticipate the emergence of alternative architectures; often they find it's better to ride the wave than to face it. Specifically, providing broad access to a key technology and establishing it as the platform for a new architecture could be a very powerful strategic move.

A good example is the way Sun Microsystems, Mountain View, Calif., successfully established its architecture as a standard to dominate the engineering workstation market. With its SPARCstation, Sun established a clear set of core technological standards in microprocessors, operating systems, user interface, network management and development tools. It aggressively displaced its old technology—SPARCstation accounted for 90 percent of Sun's shipments in only 15 months—to build volume for the extended enterprise. Sun has encouraged fierce competition among CPU suppliers, allowing it to reap cost and performance benefits by leveraging the technological and manufacturing know-how of Texas Instruments, Cypress Semiconductor Corp., Fujitsu Ltd. and others. It also encouraged cloning, within tightly specified niches, at the system level.

The net effect was a strong, standard architecture embraced by software developers who responded with no less than 3,000 different applications within 24 months following the SPARCstation's introduction. Such a rich application base allows Sun to dominate the workstation market.

Processes: In much the same way that the extended enterprise environment requires managers to rethink their external relationships with their partners, it also requires them to realign their organization's internal capabilities. Managers within each extended enterprise participant must adapt to the new environment by building and deploying the appropriate capabilities for the benefit of the entire chain.

One technology firm realized significant gains in engineering effectiveness and efficiency by using this approach. An investigation revealed that the same engineering organization was forced to serve a broad range of projects, while the demands placed on its management processes varied dramatically by segment.

To alleviate the complexity, the manufacturer segmented the engineering work into appropriate categories, determined each category's optimal process, and set clearly differentiated performance and tracking guidelines. Differentiating across technology programs and optimizing processes produced dramatic advances in engineering productivity—improving cost, time and quality performance—and established the infrastructure required to drive markets in an increasingly complex and interdependent environment.

The Work Has Just Begun

THE ELECTRONICS industry is in the midst of a major transformation. This shift into competing within the realm of extended enterprises presents industry managers in nearly every segment—including computing, telecommunications, consumer electronics, instrumentation, software and multimedia—with very significant challenges. These challenges are not insurmountable, however, as several success stories indicate.

It will be important for executives inside and outside the electronics world to observe and learn from the changes under way in this industry. In the future global marketplace, far more businesses will operate on the principles of extended enterprises. There will be few industries in which the most successful firms will be independent, isolated players. Instead, successful firms will gain and maintain their positions by participating as supportive, productive members of an effective extended enterprise. ■

Iddo Hadar is a San Francisco-based senior associate with Booz Allen & Hamilton, a global management and technology consulting firm.