MAKING MONEY THE NVO WAY

1
issue no

THE BRIDGE

2003

CONNECTING BUSINESS and TECHNOLOGY STRATEGIES

CISCO SYSTEMS

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CONNECTING BUSINESS AND
TECHNOLOGY STRATEGIES

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Printed in the USA

INSIDE THE BRIDGE

AN INTRODUCTION TO NVO

OVER THE LAST FIVE YEARS Cisco and its Internet Business Solutions Group (IBSG) have worked with hundreds of the world's leading companies, helping them become more competitive by honing their business strategy, sharpening their operations, and deploying technology more effectively. In the past, many of these consulting engagements focused on how to use the Internet to enhance functions such as customer care, supply chain management, and workforce optimization. Based on these experiences Cisco developed an approach called the Net Ready Assessment, building on a methodology that in 2000 was published in the book *Net Ready*.

Cisco continues to deploy the Net Ready approach, and the range of consulting activities IBSG is now engaged in has expanded into new areas such as multi-channel commerce, business process outsourcing, and shared services models. Most of these projects involve the Internet, but their scope goes beyond it to include issues such as consumer centricity, core versus context, and partnerships.

Naturally, Cisco's customers began to ask, "Is there an overall framework and methodology like "Net Ready" that can help us develop a strategic approach to these new business issues and projects? Can you increase our understanding of why companies like Wal-Mart, Cisco Systems, and Southwest Airlines are outperforming the rest of the companies in their industries in spite of such tough economic times?" and, "Why are some governmental organizations such as the country of Singapore and the province of Ontario able to offer superior services at lower cost?"

While many factors contribute to the success of the best performing organizations, Cisco found that successful organizations had several things in common. Each had a culture and structure focused on improving the end-customer experience. Each focused its own operations on functions where it could excel, and relied on partners to take on tasks that did not differentiate it with customers. And each was standardizing its business operations, data, and information technology, allowing it to operate more efficiently, internally, with outside partners, and especially with customers. Those organizations that pursued all three of these strategies in parallel were often the most effective. Cisco, having used this three-pronged strategy long before consulting firms gave each part a variety of names, came to call it networked virtual organization (NVO).

Some companies have deployed NVO strategy more broadly than others, but no organization is yet an NVO. It is an approach that every organization can use, not just a select few. It is a strategy that works for governmental agencies as well as businesses. Cisco has found that most organizations are already pursuing some elements of the NVO strategy.

The concept of an NVO is still embryonic, so new that many of the ideas have not been fully discussed before, let alone compiled into a body of knowledge that could be shared with others. That is why, in December of last year, Cisco brought together 40 of the firm's top consultants from around the world with a simple but profound goal—to create a series of articles that explain why some organizations are breaking away from the pack, and how other organizations can do the same.

This, the first issue of *The Bridge*, is the result. These six articles are some of the first to address big and important questions such as these: "How can we and our business partners react to changing markets in a fraction of the time at a fraction of the cost? How can I capture the cost reduction of outsourcing while retaining control of my differentiating business processes? How can I leverage our existing ERP, HR and CRM applications to eliminate cost and enable self-service?"

These articles are just the beginning of the discussion. Every working day more than 200 business consultants from Cisco are in the field working with leading companies and other organizations that are striving to find better ways of doing business. We will share the results of that work and the ensuing discourse in future issues of *The Bridge*.

THE NVO WAY OF DOING BUSINESS

IN SPITE OF THE TOUGH ECONOMIC TIMES, SOME COMPANIES ARE OUTPERFORMING THEIR PEERS. Wal-Mart, Charles Schwab, and Cisco Systems sit atop their industries because each has adopted a new way of doing business—the networked virtual organization (NVO). The same is true in the public sector, where Singapore and the province of Ontario are offering better services for lower costs. NVOs have three key strategies. An NVO responds rapidly to customers' needs, putting the customer at the center of the value chain, not at the end. An NVO concentrates on those elements of functions where it adds the most value or has the greatest skills, and turns over to multiple partners who compete to provide those elements that are not core. NVOs adopt standard business processes, standard sets of data, and standard IT systems throughout the organization. Groups of NVOs that partner to bring products and services to the customer operate in a networked virtual ecosystem (NVE).

For many organizations the economic boom of the 1990s was the best of times. Growth and profitability came easily for many companies, and government agencies were often awash with tax revenues. That is no longer true. Today, executives search for any edge that will help boost revenues, pare costs, or increase productivity. The dramatic slowdown of the world's economy is responsible for some of the difficulties businesses and governments face. But for many, the challenges go much deeper. Rapid changes in technology, the globalization of trade, and deregulation, have turned many industries and governments inside out. Entire sectors of the economy—airlines, telecommunications, and financial services, to name only a few—are in the throes of dramatic and often painful change.

These are tumultuous times. But as tough as the current economic climate is, some organizations are performing demonstrably better than their peers. Wal-Mart, Charles Schwab, BP, and yes, Cisco Systems, have emerged as leaders in their respective industries. Whether measured by revenue growth, profitability, market share, or productivity gains, each of these companies is breaking away from its competitors, sometimes dramatically so. In the public sector, Singapore and the province of Ontario are distinguishing themselves by offering better services for lower costs.

In many respects these breakaway organizations are quite different from one another. Some manufacture goods while others offer services; some sell directly to the consumer while others sell to business; and some are dependent on scientific research while others have no R&D budgets at all. Despite these differences all of these organizations share several key

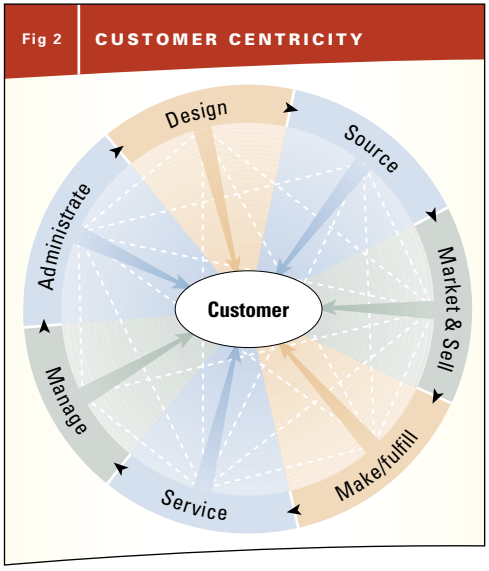
Fig 1 **TRANSITION TO BECOMING AN NVO**

TRADITIONAL		LEADING		IDEAL FUTURE
Centralized	➤	Distributed	➤	Collaborative
Organizational size	➤	Organizational value	➤	Constant core focus
Positional power	➤	Information power	➤	Intellectual power
Vertical integration	➤	Extended integration	➤	Virtual integration
Predictability	➤	Responsive/flexible	➤	Proactive
Long-term planning	➤	Near-term planning	➤	Adaptive planning
Labor/management	➤	Workforce	➤	Intellectual capital

characteristics that set them apart from many of their peers, strategies that can be summarized as: customer-centricity; core versus context; and continuous standardization. Taken together these strategies make up what can be called a networked virtual organization, or NVO for short (Figure 1).

As efficient as companies such as Wal-Mart, BP, Cisco Systems, and Charles Schwab have become, they all have a long way to go. None of them can claim to be an NVO, yet. And none of them may ever be able to do so. In fact, it may be more useful to think of the journey to an NVO as setting strategies rather than achieving a near-term goal. It is a journey that every organization can embark on.

CUSTOMER-CENTRICITY



One of the key strategies of an NVO approach is that it responds rapidly to customers' needs, and changes in customer demand. Companies that can respond quickly to consumers often sell more products and services at a higher profit margin. Companies that respond slowly to consumers often fall behind their competitors, losing market share and profitability.

In the past, a typical value chain for a business was linear, starting with the raw materials, working its way through the design and manufacturing process, proceeding through the distribution and sales, and finally arriving at the customer. In this model the customer was not at the center of the process, but at the end, making it difficult to respond to the customer in a timely manner. The customer was seen as a consumer of the product or service, not an active participant in the entire process of creation. There was little room for customer feedback in this model, except after the fact, as in, "I do not like the choices you have given me."

The new NVO approach places the customer at the center of the network, effectively making him a partner in the process (Figure 2). Call it a

customer-centric view of the world. Sometimes the customer might be a consumer, and other times the customer might be a business. Still other times, in the case of a public school for example, the customer might be a child and the family. Regardless of who the customer is, the important thing is that he is at the center of the planning and operation of the organization.

The province of Ontario, Canada, is inventing new services by taking a customer-centric approach by developing a strategy dubbed "My Lost Wallet." When someone lost a wallet in the past, it was up to him or her to go to each public agency to file the necessary reports and request new documents. Ontario is working toward a time when all someone will have to do is notify the police. If the citizen agrees, the police report will then automatically notify other government agencies, regardless of jurisdiction, as well as generate orders for items that were lost, such as a driver's license, passport, and health insurance card. This will speed up the process and reduce the hassle the customer will have to go through in order to get his official documents replaced.

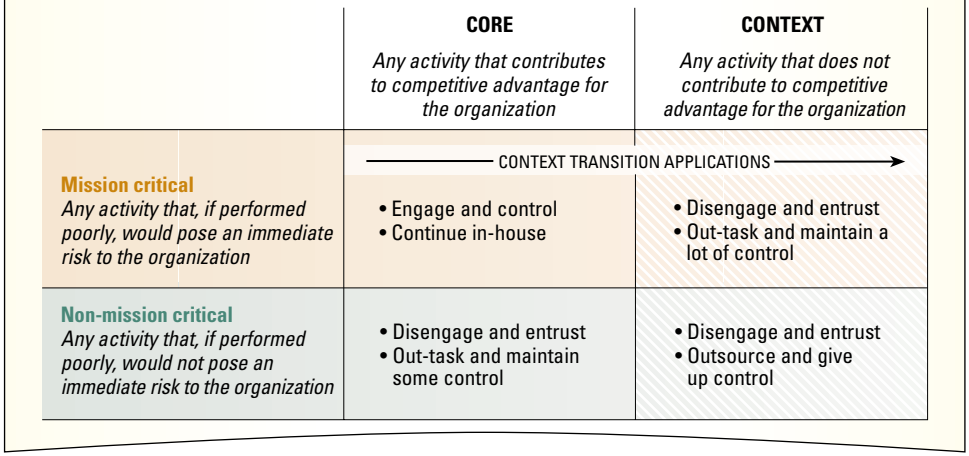
In a customer-centric model, organizations continually ask the question: "What does the customer need, how can we respond rapidly to those needs, and what can our organization do that is unique to add value for the customer?" This frame of reference plays a key role in helping organizations chart their strategy, and decide what tasks they are best at performing, and what tasks would be better handed over to partners.

CORE VERSUS CONTEXT

The second key strategy of an organization that has taken an NVO approach is that it concentrates on those elements of functions where it adds the most value. An NVO approach relies on multiple partners who compete to best perform the elements of the functions that are required to deliver products and services, but are not core. By partnering with other organizations that have complementary cores, an organization can achieve the benefits of industry scale and innovation that it could not achieve if it tried to do everything by itself.

Any activity that is not "core" to the organization is considered "context," an activity that is important to the overall process, but one that could be better performed by another organization for whom that activity is core. In the case of Cisco, manufacturing is an essential part of the business, but the company turns over most elements of that function to several

Fig 3 CORE VERSUS CONTEXT MODEL



contract manufacturers, such as Solectron, that specialize in assembling electronic equipment for other firms.

The definition of what is core and what is context for any particular organization is dynamic, and changes over time. In the early years, Cisco manufactured most of its own products, but over time the company has out-tasked more elements of this function as manufacturing became more context and less core.

Deciding what is core and what is context is just one of the factors an organization considers when deciding what tasks to perform itself, and what tasks to turn over to a partner. For Cisco, providing technical support to customers is a mission-critical function because its customers rely on networking equipment to run their businesses. Janitorial services, on the other hand, are not a mission-critical function. NVOs map the functions of their business against these four areas. Functions that are mission critical and core should generally be performed by the organization itself. Functions that are not mission critical, and therefore context, can usually be handed over to partners (Figure 3). Large scale e-business application investments transition mission-critical activities from core to context. Non-mission-critical activities can generally use a simpler, portal approach.

Turning over elements of business functions, such as manufacturing or distribution, to partners is not new. What is new is the way that NVOs

manage that relationship. In the past, many organizations simply outsourced the function, letting the partner manage and oversee the process. When an NVO turns over an element of a function to a partner it plays a much more active role in defining and overseeing the function by using shared systems, hence the need for a new term to describe the process: out-tasking. Dell, for example, relies on its partners to manage the inventory that supplies Dell's PC assembly line. It is a mission-critical function, but one that the suppliers are better able to do than Dell. To ensure that the entire process functions smoothly, Dell's computer systems are tightly integrated with its suppliers' computer systems, exchanging the latest information, and providing Dell with a view of the entire process. Dell has out-tasked the inbound inventory management process.

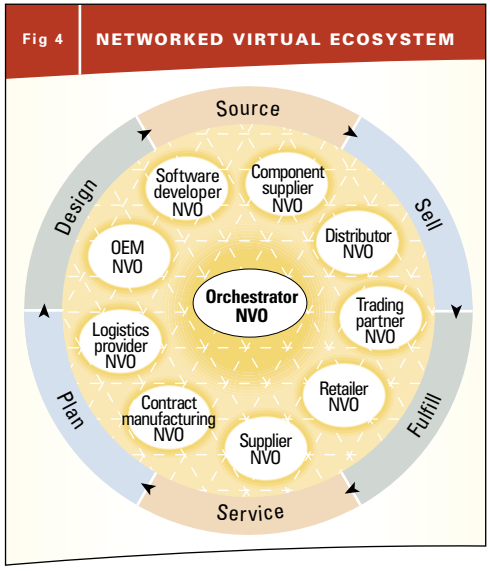
CONTINUOUS STANDARDIZATION

The third key strategy of an organization that has adopted an NVO approach is that it has settled on standard business processes, standard sets of data, and standard IT systems—in short, continuous standardization. These standards allow the organization to operate much more efficiently than it otherwise could, and allows groups of NVOs to operate more efficiently and function essentially as one.

NVOs need to establish standard business processes inside their organizations as well as with partners on the outside. Some companies, for example, might have different ways of handling customer orders depending on whether they came in over the Web, over the phone, in the mail, or in a store. This makes it difficult for the company to quickly gauge customer response to new items or sale prices. And it makes it next to impossible to create a just-in-time inventory management system run by the company's suppliers.

Having a standard set of data inside and outside the organization is also critical to becoming an NVO. Shell, BP, and ChevronTexaco are collaborating on oil exploration in the North Sea. Shell will build and maintain the oil platform in return for a fee. The size and complexity of the project requires not only real-time collaboration on the design and engineering of the platform, but also accurate financial reporting on a near-real-time basis to monitor the costs of constructing the platform. The only way this can happen is if all three oil companies agree on a common set of data definitions for engineering design and financial reporting.

Creating a seamless web of partnerships to bring products and services to customers can only happen when the information technology systems that each of the partners has are themselves integrated. And the only feasible way to integrate disparate IT systems is for all the organizations involved to adhere to standards. Consider the evolution of computer networks. In the past, each company had its own private data network that was often incompatible with the networks operated by its business partners. That made it very difficult and time-consuming for the two organizations to exchange information. With the Internet, companies can for the first time collaborate in real-time with their suppliers and customers. There are many other areas of information technology where standards need to be agreed upon to make it easier for companies to collaborate.



NETWORKED VIRTUAL ECOSYSTEM

What is created by this web of organizations, each focused on what it does best, yet cooperating to bring products and services to the customer, is a networked virtual ecosystem, or NVE for short (Figure 4). Regardless of what role each of the organizations plays in the ecosystem, all share a common goal—serving the customer. Similar to a biological ecosystem, the success of each organization in an NVE is dependent on the health of the whole.

There are several factors that make up a healthy NVE. Participants must share a common vision to ensure that they are all acting in parallel and moving in the same direction. Mutual trust between organizations is critical if intimate business information is going to be shared. And all participants, not just a few, must gain economic benefit from the relationship.

Healthy NVEs have a distinct competitive advantage in the market. By focusing on its core, each organization in the NVE is highly efficient. A group of highly efficient organizations, operating as one, can offer the

customer more value than any single organization can hope to. The operating efficiencies that used to be achieved only when all functions operated within a single organization, can now, with the use of continuous standardization, be surpassed by an NVE. Consider the efficiencies of Cisco, one of the largest networking equipment suppliers in the world, or Wal-Mart, the largest retailer in the world.

ORCHESTRATOR

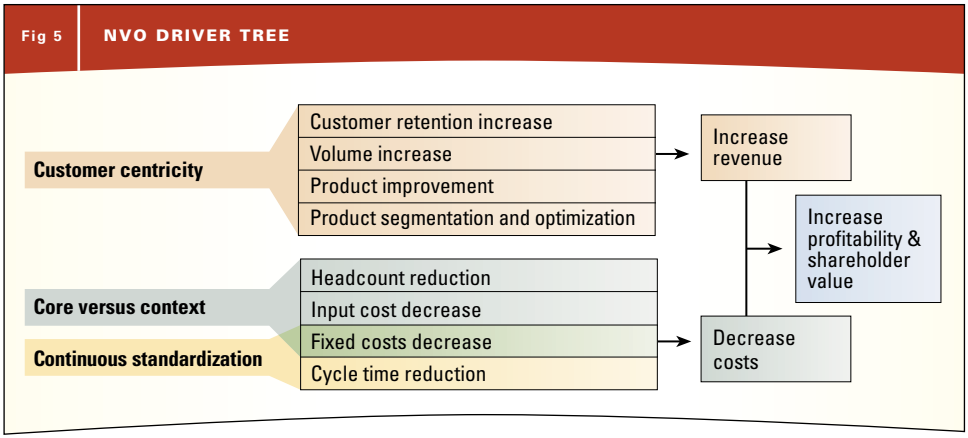
In each NVE there is one organization that plays the dominant role in forming the ecosystem, establishing the standards, and having the dominant relationship with the customer. This organization is the orchestrator. Cisco, for example, is the orchestrator for its router business. Cisco has the direct relationship with the customer; it organizes the call centers, manages the component suppliers, and strikes deals with the shipping firms. Cisco also plays a contributing role in other ecosystems, such as those that deliver computing software and services to Cisco customers.

PLAYER

Organizations that play a contributing role in NVEs are called players. Their role may be secondary to the orchestrator, but it is not unimportant. Every step of the value chain, and hence every player, is important. For an ecosystem to be successful, players must be every bit as agile and efficient as orchestrators. Their ability to learn, adjust, conform, collaborate, and maintain quality standards is key to the success of an NVE.

THE JOURNEY TO NVO

In the mid 1990s, Intel's former CEO Andy Grove said, "By 2000 there will be no 'Internet companies,' there will just be companies that use Internet technology." The same could have been said when electricity was first invented. The first companies to use electricity might have been called 'electric companies,' but electricity became so integral to business that soon every company had to use electricity. The Internet, like other key technologies before it, is becoming part of the fabric of doing business. Today, no successful company can make do without electricity or the Internet. Tomorrow, the same will be said about networked virtual organizations—the principles will become so widely adopted that no successful company will be able to make do without them.



Implementing an NVO strategy is an ongoing process, not a one-time event. Organizations must continually revisit questions such as: what is core and what is context; which business processes should be standardized and which should remain unique; and what is the nature of the NVE that it is a part of. How an organization answers these questions will determine the best way to increase shareholders' value. Each of the NVO strategies generates bottom-line value, but as a general rule, you can imagine the NVO driving shareholders' value as shown above (Figure 5).

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MAKING MONEY THE NVO WAY

HIGHER REVENUE GROWTH, LOWER OPERATING COSTS, AND IMPROVED ASSET MANAGEMENT ARE JUST A FEW OF THE FINANCIAL BENEFITS GARNERED BY NETWORK VIRTUAL ORGANIZATIONS (NVOs). These gains arise directly from the three main strategies of an NVO. Customer-centric organizations show increased revenue growth and higher profits by responding faster to customer needs. Organizations that focus on core are vastly more efficient. Those that use standard business processes, sets of data, and technology, operate more efficiently and have an easier time linking their operations with their business partners. Case studies of Wal-Mart, Royal Philips Electronics, Charles Schwab, Lockheed Martin, and BP demonstrate in detail the wide variety of financial benefits that NVOs are gaining. The five areas where NVOs are getting the most gains today are: sourcing and supply-chain management; manufacturing and distribution; customer acquisition and retention; new product development; and internal back-office functions.

The first question every executive should ask about networked virtual organizations (NVOs) is this: What are the financial benefits of embarking on the NVO path? Because only real, quantifiable economic returns justify undertaking the changes that are required as part of the NVO approach. The good news is that there is clear and growing evidence that companies using NVO strategies do outperform their peers on a wide variety of economic metrics. Wal-Mart's revenue growth is 20 percent above the industry average. Lockheed Martin has reduced design costs on its new fighter aircraft by 50 percent. And Dell Computer's return on invested capital is triple the industry average. These world-leading companies all used NVO strategies to help achieve these gains. Higher revenue growth, lower operating costs, and improved asset management are three of the key benefits of taking an NVO approach.

These financial benefits are not incidental. They arise directly from the three key NVO strategies—customer-centricity, a focus on core, and continuous standardization. Customer-centric organizations show increased revenue growth because they can respond faster to changes in customer demand. They are also more profitable—customers are more willing to pay a premium for the goods and services that they want. Organizations that focus on their core, and partner with other organizations to do the rest, are vastly more efficient, benefiting from the economies of scale their partners can achieve. They make better use of their own capital, assets, and human resources. Organizations that use standard business processes, sets of data, and technology, operate more efficiently internally, and have an easier time linking their operations with their business partners.

NVO FINANCIAL BENEFITS

As yet, no organization is a pure NVO, adopting these new strategies throughout the entire operation. Instead, organizations are applying NVO strategies to different parts of their operations, and to different degrees. A recent study by the management consulting firm, NerveWire, found that just 14 percent of organizations surveyed qualified their level of integration with partners as "very high." NerveWire also found that organizations that had embarked on this path showed demonstrable financial gains. In fact, the gains often increased dramatically as organizations moved from "high" to "very high" levels of external integration with partners and customers (Table 1).

Table 1 BENEFITS COMPARISON FOR DIFFERENT INTEGRATION LEVELS

Benefits created	External integration: High *Majority of interactions involve automated transactions between partners' databases and computer applications*	External integration: Very high *Majority of interactions involve tightly integrated or shared databases and applications. Processes are significantly redesigned, redundancies eliminated, and activities shifted to the appropriate partner*
Revenue increase	14%	40%
Cost decrease	12%	30%
Cycle time reduction	30%	37%
Quality increase	19%	36%
Headcount reduction	15%	23%
Product improvement	29%	24%
Customer retention increase	18%	35%

Source: NerveWire, Inc., April 15, 2002

LEVELS OF NVO

The reasons that organizations experience such a significant jump in benefits as they increase their level of external integration are varied. One reason is that out-tasking functions to business partners allows organizations to drastically reduce the capital and people that are needed in those areas. Tighter integration between partners and customers reduces the time it takes to respond to customer demands, design new products, and move the products through the distribution channel. Increased customer satisfaction affects both revenues and profits (Table 2).

NVO INDUSTRY ADOPTION

While all organizations can benefit from adopting an NVO strategy, some have more immediate potential than others. The following three criteria are indicators of the types of industries where one is most likely to have significant success:

- Industries that have a large number of transactions and associated transaction costs, both within the enterprise and between the enterprise and its suppliers and customers, such as retailing.

Table 2 IMPACT OF INTEGRATION LEVEL ON ENTERPRISE ECONOMICS

Level of external integration	Business process changes	Impact on enterprise economics
Moderate	Customers, suppliers, and business partners view information on-line (e.g., product information, manufacturing schedules, engineering schedules)	Productivity increases (less headcount) as communication is avoided Out-of-pocket expenses decrease (e.g., phone, fax, courier) Better coordination of production schedules, shorter delivery times, improved quality, faster cycles, less inventory, increased customer satisfaction
High	Most interactions with customers and trading partners are automated transactions between databases and computer applications	Productivity increases even further as people are taken out of the process Automated nature avoids human errors (quality improvements), allows real-time coordination, shortens cycle time, optimizes process Automated processes allow 24-hour availability, resulting in revenue and customer retention increase, acquisition of new customers Standardization of automated processes, resulting in lower cost of ownership
Very high	Companies remove activities that duplicate those performed by customers, suppliers, and business partners	Processes are out-tasked to specialist firms which perform activities more efficiently Significant headcount reductions or redeployment can be achieved as activities are stopped internally, resulting in sharp rises in sales per employee Capital utilized is far less as processes go external (e.g., assets, working capital) Dramatic reductions in cycle time to fill orders, invent and develop new products, manufacture or procure supplies (e.g., time to deliver a custom order car has dropped by 50% since 1995 to 35 days) Customer satisfaction increases as customers participate in processes, can share in value creation, can do more one-stop shopping if desired and align partners with customer needs Reduced investments speed up time to go after new markets

- Industries where the organization, its partners, and its customers are heavy users of information technology, such as brokerage services.
- Industries that are dominated by a handful of leading organizations that can credibly take on the role of an orchestrator, such as automobile manufacturing.

Organizations in the financial services, high-technology, and automobile manufacturing industries are among the most progressive adopters of NVO strategies. Based on the above criteria for success, organizations in the banking, public sector, travel, and retail industries are adopting NVO strategies as well.

IMPLEMENTING NVO STRATEGIES TO BUSINESS PROCESSES

Which business processes show the most potential? Currently, the greatest impact is in sourcing and supply chain management. That is one reason NVO strategies are being adopted first in high technology and automobile manufacturing, two industries that rely heavily on sourcing and supply chain management. But other business processes can also gain from NVO strategies, as the following case studies show. The five areas where the NVO is delivering the highest returns today are:

- Sourcing and supply chain management
- Manufacturing and distribution
- Customer acquisition and retention
- New product development
- Back-office functions

SOURCING AND SUPPLY CHAIN MANAGEMENT

Wal-Mart has become the world's largest retailer due in large part to the sophisticated information network the firm has developed. This network links its suppliers directly with customer sales information from its thousands of stores. Retailers such as Wal-Mart have long been dependent on a network of companies to supply them with the wide variety of products carried in their stores. What Wal-Mart has done is use information technology to integrate those suppliers so tightly with its stores that the entire networked virtual ecosystem (NVE) operates as one entity.

Coming from a fairly traditional supply chain model, Wal-Mart created the RetailLink program. It is made up of electronic data interchange (EDI) networks, as well as an extranet used by Wal-Mart buyers and 10,000

suppliers to cull sales information and inventory levels in the stores. Wal-Mart operates 1567 Wal-Mart stores, 1243 Supercenters, 522 Sam's Clubs, and 39 Neighborhood Markets.

Every day some 10 million customer transactions are recorded and analyzed, and this information is shared, in real time, with Wal-Mart's suppliers. This data exchange allows Wal-Mart to react rapidly to what customers are buying, helping to keep inventory costs down and sales up. Wal-Mart has also launched a private, Internet-based electronic trading hub, integrated with RetailLink, that facilitates online reverse auctions.

With this system in place, Wal-Mart is going a step further—implementing "scan-based trading," a process that requires suppliers to retain ownership of all goods until the customer buys them upon checking out. When this process is fully in effect, Wal-Mart will not have any inventory of its own. Ownership of the goods will pass directly from the supplier to the customer, and Wal-Mart will be one step closer to a pure orchestrator.

WAL-MART USES INFORMATION TECHNOLOGY TO INTEGRATE ITS SUPPLIERS SO TIGHTLY WITH ITS STORES THAT THE ENTIRE NETWORKED VIRTUAL ECOSYSTEM OPERATES AS ONE ENTITY.

Wal-Mart's innovation shows up partially on the bottom line, with the balance being invested in driving gains in market share. The company posted a record $58.8 billion in sales in the third quarter of 2002. Sales per employee are $175,000, far ahead of any major competitor. Inventory turnover is 7.6 vs. the industry average of 6.4. Return on invested capital is 13.7 percent vs. the industry average of 8.0 percent. Return on assets is 8.7 percent vs. the industry average of 4.8 percent.

MANUFACTURING AND DISTRIBUTION

Royal Philips Electronics is Europe's largest electronics company, employing 184,000 people in 60 countries. It sells everything from shavers and steam irons to semiconductors and medical imaging systems. A company this large has significant internal manufacturing and distribution capabilities, but even Philips is changing how it does this part of its business. In response to global competitive pressures, and a rapidly changing electronics

industry, Philips increasingly focuses its internal resources on functions such as design and marketing, while out-tasking to partners functions such as assembly and distribution.

Philips is one of the largest consumers of printed circuit boards (PCBs) in the world. To make sure its PCB operations were efficient the company spun-off that business, creating Philips Contract Manufacturing Services (PCMS). Over the years PCMS expanded into other electronics manufacturing service (EMS) areas, and took on other firms as its customers, becoming one of the 10 largest EMS firms in the world. As big and efficient as PCMS had become, assembling electronics gear was no longer one of Philips core activities. In 2002, Philips sold PCMS and all of its global facilities to Jabil Circuit, a firm who's core is EMS.

Under a four-year agreement Philips will buy about $4 billion worth of goods and services from Jabil. Jabil will not only provide PCBs, but also prototyping services, product testing, component procurement, and design and engineering services. Among the products Jabil will handle are set-top boxes, DVD and audio systems, televisions, and storage and display products. Jabil took over plants in Austria, Belgium, Brazil, China, Hungary, India, Poland, and Singapore. This agreement allows Philips and Jabil to each focus on what it does best.

CUSTOMER ACQUISITION AND RETENTION

Charles Schwab has used information technology and a network of outside financial advisors to create one of the world's most customer-centric organizations. The results of its efforts have been dramatic. In 2001, one of the toughest years ever for the financial services industry, Charles Schwab added 940,000 new customer accounts and $74 billion in net new assets.

Over the last decade, Charles Schwab has transformed itself from a discount broker, offering limited customer services, to a full-service financial services firm, serving both institutional and individual customers. It has done much of this by fashioning an NVO strategy, focusing on customers and their needs. From the beginning, Charles Schwab has styled itself culturally and organizationally after customer-focused retailers like Wal-Mart, rather than traditional brokerage firms. Performance is measured by customer retention, satisfaction, and share of wallet, rather than basic profit and loss.

Over the years, Charles Schwab has launched many customer care programs in direct response to customer feedback. One of these programs is the integration of all the customer contact points into a unified contact repository. Whether a customer contacts the company in person at a branch, over the phone at a call center, or over the Web, all of the information that is generated is available in one place, making life much easier for the customer, and for Charles Schwab. This required integrating numerous databases and information systems into a seamless network—in other words, continuous standardization.

CHARLES SCHWAB PARTNERED WITH OUTSIDE FIRMS AND ADVISORS TO PROVIDE SERVICES FOR AFFLUENT INDIVIDUALS, BECOMING IN EFFECT THE ORCHESTRATOR OF THIS NEW SERVICE.

Realizing that it lacked the expertise that was required to serve affluent individuals and institutional clients, Charles Schwab decided to partner with outside firms and advisors to provide those services. In effect, Charles Schwab became the orchestrator of this new service. The Schwab Advisor Network (and its predecessor, AdvisorSource) has been key to building the company's presence in the affluent market. The outside advisors help these customers make investment decisions, while Charles Schwab provides the technology and financial infrastructure needed to make the actual investments. In 2001, Charles Schwab referred 16,500 clients to its Advisor Network, with total potential new assets of $22 billion. Charles Schwab also relies on partners to provide more than 3100 different mutual funds that are offered to Schwab's customers.

NEW PRODUCT DEVELOPMENT

Lockheed Martin used NVO techniques to create an entirely new way of designing fighter jet aircraft that has speeded up development while cutting costs. Lockheed Martin was the lead contractor of a consortium of companies that was awarded one of the largest military contracts in history—a $200 billion program to design and build as many as 3000 Joint Strike Fighter (JSF) aircraft for the United States, United Kingdom, and other countries.

Lockheed Martin approached the problem as an orchestrator, creating an NVE to design and build the jet fighters. Instead of using conventional

design software and outsourcing pieces of the contract to other companies, Lockheed Martin took an out-tasking approach. The company deployed a new collaborative software system called the Integrated Management Framework (IMF). Using the Internet, IMF links 10,000 people from 27 different companies in a secure, real-time environment. Engineers, designers, government officials, and others have immediate access to the latest plans and test results from anywhere in the world. After the JSF program is fully under way, it is expected to be able to link up to 50,000 users in 30 countries around the world.

Using the new system, the prototype fighter was designed 33 percent faster than it would have been using conventional design methods. The prototype was 50 percent less expensive to build.

BACK-OFFICE FUNCTIONS

In 1999, **BP** fundamentally changed the way it managed its employees, saving millions of dollars annually while increasing overall employee satisfaction. The $174-billion-a-year company decided that managing employee payroll, staffing, relocation, and training was not one of its core activities, nor was it a mission-critical function that had to be done internally. BP turned to Exult, a global provider of human resources services with a core in managing employee relations.

The new electronic human resources (e-HR) system has cut BP's HR costs by 20 percent, saving the company $100 million annually. Employee satisfaction with HR functions has increased from 50 to 65 percent.

BP takes responsibility for setting HR strategy, policy, and professional resources for its 110,000 employees, while Exult assumes management, ownership, and accountability for the global HR process. Under the out-tasking arrangement, Exult handles:

- Compensation, benefits, and payroll
- Organizational development, performance management, training, and employee development
- Recruiting and staffing
- Expatriate administration and domestic relocation
- Employee relations
- Policy and legal compliance
- Employee data and record management
- Vendor sourcing

The migration to the new e-HR system was gradual. It was implemented first at BP Amoco locations in the United States and United Kingdom, and was then expanded to the rest of the world. The e-HR system allows employees to track their benefits, follow company job listings, and update their records—all on the Web. A single salary payment system for BP employees around the world, linked by the Internet, will soon replace the seven different systems currently used in different geographies. One of the cornerstones of Exult's system is "myHR," a self-service Web portal for employees and managers that allows them to actively monitor work performance, career opportunities, and other employment issues.

DIVIDING THE GAINS

Companies can gain substantial financial returns by adopting NVO strategies. What may be less clear is how to divide these gains among the various organizations that are part of the NVE. The organization that plays the role of the orchestrator has a great deal of control over how those financial benefits are divided. They can share it with their suppliers and business partners, creating win-win situations and providing incentives for these players to continue to participate and invest in the partnership. The orchestrator can choose to turn over much of the economic benefits to the customer, as they may have to do in highly competitive industries, like automotive, in hopes of gaining market share. The orchestrator can also choose to keep much of the financial gain for itself. In most cases, the division of wealth will be some combination of all three alternatives, with the orchestrator accruing more of the financial benefits than the individual players.

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BREAKING AWAY

CISCO SYSTEMS PROVIDES ONE OF THE BEST EXAMPLES OF A COMPANY IMPLEMENTING NETWORKED VIRTUAL ORGANIZATION (NVO) STRATEGIES and of the financial and productivity benefits that can be gained from adopting such an approach. Cisco not only saved $1.94 billion in fiscal 2002 from its various NVO programs, but also increased customer satisfaction and increased market share even while growth was slowing. The roots of Cisco's NVO strategy go back to the mid-1990s when the company had to find new ways of doing business to keep up with unprecedented demand. Today, every existing business process and every new project is held up to the NVO lens. Supply chain management is the business process in which NVO strategies are most evolved at Cisco. The system includes all of the processes required to receive a customer order, procure the materials needed to build the product, turn the materials into finished goods, and deliver the finished goods to the customer.

The last two years have been some of the most challenging ones that Cisco has ever faced. Corporate spending on information technology (IT) declined, as did Cisco revenues and profits. To align the company with new market conditions, its management was forced to lay off employees and write down assets. In spite of this turmoil, Cisco has done something remarkable—it posted some of its best financial results ever in a number of key areas. The company is generating more than $1 billion in cash per quarter and now has $21.2 billion in cash and investments—its highest level ever. Gross margins have increased steadily over the last year. Customer satisfaction now stands at 4.63 out of a possible 5.0—another all-time high for Cisco.

Cash up, profit margins up, and customer satisfaction up—how did Cisco make this happen in the current economic climate? Much of it was because Cisco focused on developing a networked virtual organization (NVO) approach, a strategy that is paying dividends even now. Cisco saved $1.94 billion in fiscal 2002 from its various NVO programs. The benefits go beyond cost savings. Cisco's NVO programs have helped the company increase its overall market share even when growth was slowing. In short, Cisco is breaking away from its competition, and the NVO strategy has a lot to do with it.

ROOTS OF THE NVO

"The NVO is the most fundamental and significant change in organizational structure we have ever experienced…"

—John Chambers, CEO, Cisco Systems (August 2002)

Cisco CEO John Chambers began articulating his vision of turning Cisco into an NVO only recently. The roots of that vision, however, took hold in the mid-1990s, when Cisco confronted a dilemma—the company simply couldn't keep pace with all of its opportunities. There was no way that Cisco was going to keep up with demand with a business-as-usual approach. Cisco needed new ways of operating, and many of those became the basis for the NVO.

Consider the Cisco approach to managing IT. Until 1994, IT was a centralized function reporting to the finance department. Technology was a cost center, not a way for the company to achieve its strategic goals. IT was not able to scale to keep pace with growth. All that changed when the bulk of IT was moved out of finance and into the various business units.

Because the business units were now responsible for funding most of the new IT projects, IT became more closely aligned with the business needs of the company. Decentralizing IT also made growth easier. Just as importantly, IT now reported to the customer advocacy group within each business unit, helping ensure that the customer was at the center of any new IT investment.

Another key decision made at that time was to abandon proprietary IT solutions in favor of widely adopted industry standards—standard databases, servers, PCs, protocols, and the like. This new architecture helped the company scale its systems more rapidly and reduce costs, and made it much easier to integrate Cisco IT systems with those of its partners. The emergence of the Internet as a significant part of IT programs only confirmed that the new standards-based approach was the right one.

Information technology was not the only function that changed in response to rapid Cisco growth. For Cisco to grow its internal manufacturing operations to keep pace with demand would have required a significant amount of resources and management attention—efforts better focused on areas where Cisco has a competitive advantage, such as product design. Cisco then turned to outside partners to help make its products, and at present, has turned over most of its manufacturing to business partners.

Customer centricity, core versus context, and continuous standardization are concepts that have now become embedded in the Cisco culture. Every existing business process and every new project is looked at through this lens. The following case studies provide detailed examples of how Cisco has implemented these NVO strategies in many parts of the company.

CUSTOMER CENTRICITY

Much of the success Cisco enjoys can be attributed to its relentless focus on the customer. The company's business processes, applications, and systems are all designed to create value for the customer. This focus benefits both the customer and Cisco. Allowing customers to place sales orders and requests for service over the Web, for example, puts the customer in control, speeds the entire process, and reduces Cisco transaction costs. Many of the benefits of a customer-centric approach are intangible, but the consistent increase in Cisco customer satisfaction, now at 4.63 out of a possible 5.00, demonstrates the impact of this approach.

SERVICE AND SUPPORT

Cisco has developed several online tools that allow customers to resolve many technical problems themselves. These tools save Cisco hundreds of millions of dollars annually and provide better customer service. Customers can often find the answer to their problem online, by going to a Web site that helps them diagnose the problem and provides the appropriate solutions (created by top engineers within the Cisco support organization). In fiscal 2002, about 2.5 million technical issues were resolved this way, resulting in estimated savings of $455 million for Cisco. The Networking Professionals community site offers Cisco customers an online forum to discuss various networking topics. About 75 percent of Cisco users visit the site to troubleshoot problems, resulting in further cost savings for Cisco.

Customers that need live technical support can use the Web to input their requests and check the status of their support cases. Cisco has modified its service agreements to give priority to cases that are opened online instead of over the phone. In fiscal 2002, Cisco saved $20 million from this application. The benefits of self-service technical support extend beyond cost savings. Customer satisfaction and loyalty has steadily increased as Cisco has moved more tools to the Web. Resolving routine technical problems online also allows Cisco technicians to spend more time resolving more interesting and complex problems, which has improved employee morale.

COMMERCE

Cisco has put customers firmly in control of the sales process by providing them with a suite of online tools for ordering new products and services. The tools use the same underlying ordering process, but the user interface is tailored to the needs of each customer. Large business customers and distributors that are familiar with and purchase many Cisco products have tools that streamline the order process. Smaller resellers that buy from many vendors have tools that help them find the right Cisco products. Consumers with limited knowledge of networking technology are presented with a smaller selection of products and are provided with more guidance.

In the 2002 fiscal year, Cisco customers placed 500,000 orders online, representing 94 percent of all orders placed. This saved the company $91 million through reduced transaction costs. The online order process has other benefits. Initial orders are more accurate, resulting in fewer product returns. That is because customers have more information when placing

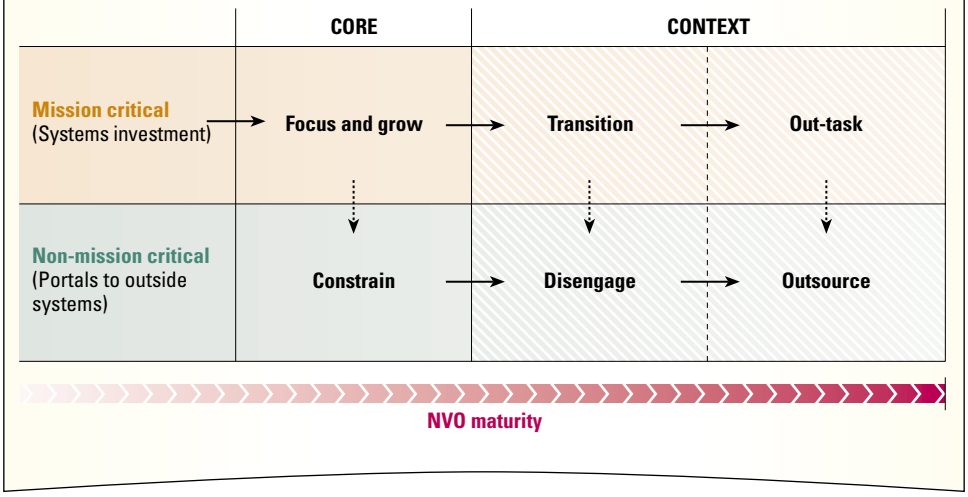
the order, and are required to validate their system configurations before finalizing an order. Customers also get their orders faster because the time it takes to process an order has been shortened.

CORE VERSUS CONTEXT

As a general rule, Cisco focuses its internal resources on those areas of each function or process that are core to differentiation and mission critical to the business, such as product design. With enterprise class applications, Cisco can maintain control over the mission-critical process that becomes context to Cisco while transitioning toward the ability to out-task the execution, such as order fulfillment. Those areas that are context and non-mission-critical processes, such as employee benefits processing, are generally turned over to a partner to manage in a focused outsourcing arrangement with access to data through portals (Figure 1).

In Cisco's experience, how processes are handled under the NVO model will change over time. As a process evolves, and as Cisco and the technology industry mature, activities may move from core to context, or from mission critical to non-mission critical. In the early years of the company, for example, more elements of manufacturing were core than are

Fig 1 CORE VERSUS CONTEXT DYNAMICS AT CISCO



today. Cisco enables its partners to handle the out-tasking by sharing applications capabilities and data and process standards across its ecosystem.

OUT-TASKING SERVICE AND REPAIR

Making sure that Cisco products are serviced and repaired on a timely basis is a critical concern for most customers, and is mission-critical for Cisco. However, service and repair are not Cisco core activities. In the company's early years, Cisco technicians performed the bulk of service and repair work. By 1996, this had become a large operation. Cisco promised to have its technicians on site in eight to 10 days; or within 48 hours for preferred customers. This was adequate, but to differentiate itself from its competitors Cisco wanted to decrease the response time. To do this by itself, Cisco would have had to hire many more people, disperse them to many more locations, and increase its inventory of spare parts. The alternative was to work with service partners.

BY USING WEB-BASED APPLICATIONS TO EXCHANGE DATA AND DISPATCH PARTNERS TO CUSTOMER SITES, CISCO NOW GUARANTEES SERVICE IN FOUR HOURS FOR MOST CUSTOMERS, AND TWO HOURS FOR CUSTOMERS WITH PREMIUM SUPPORT-SERVICE CONTRACTS.

Cisco created a network of 600 service partners, ranging from small firms in Brazil to large ones such as IBM, that send their own technicians out to the customer. Cisco forged tighter working relationships with logistics companies such as Federal Express and DHL to ship returns and spare parts. And Cisco teamed with repair companies to receive, repair, and ship the refurbished parts directly to the service companies. Together, these companies manage more than $300 million in inventory.

The benefits of this new approach have been dramatic. Cisco has cut back nearly all of its warehousing for service repairs, eliminating 200 positions in that area, and saving tens of millions of dollars in warehouse and inventory costs. Customers have also benefited. By using Web-based applications to exchange data and dispatch partners to customer sites, Cisco now guarantees service in four hours for most customers, and two hours for customers with premium support-service contracts.

OUT-TASKING E-LEARNING

In some instances, such as service and repair, out-tasking an entire process makes sense. With other functions, out-tasking only a portion of the process may be desirable. That is the case with e-learning. Cisco plays an active role in creating much of the content for its online courseware, but relies on partners to design and produce the materials. In 2001, for example, the Cisco sales organization launched a major initiative to train its 3000 account managers on new products and technologies. Cisco created the course requirements and material, but relied on an outside vendor to perform the authoring and design. The partner used a Cisco application, OutStart Evolution, to author the content, and followed Cisco guidelines to create reusable learning objects. Cisco then integrated the online courses into its systems, which are based on a standard architecture, and made the courses available to its sales force.

Using the NVO model eliminates the need for Cisco to maintain a large instructional design and authoring staff. Relying on an outside firm that specializes in authoring and design also speeds up the process. In turn, the partner firms benefit by getting more business from Cisco.

CONTINUOUS STANDARDIZATION

There are two key elements to the Cisco approach to continuous standardization. The first is creating standardized business processes and from it standardized sets of data. The second is linking those same processes and data to a standardized IT infrastructure.

STANDARDIZED PROCESSES AND DATA

One of the problems most organizations face when launching an NVO strategy is that their internal business processes are poorly organized. Instead of having just one way of handling incoming sales orders, for example, a company might have a different process for each of its product divisions. Each of these divisions might also have its own set of sales data, even though they may share some customers. Having different ways of handling incoming orders and multiple sets of sales data makes fully automating the process, let alone integrating the process with outside partners, next to impossible.

Organizations must first create a standard way of performing key business processes, using a standard set of data. Cisco was no exception,

but has so far made this transition in numerous parts of its business, including accounting and procurement.

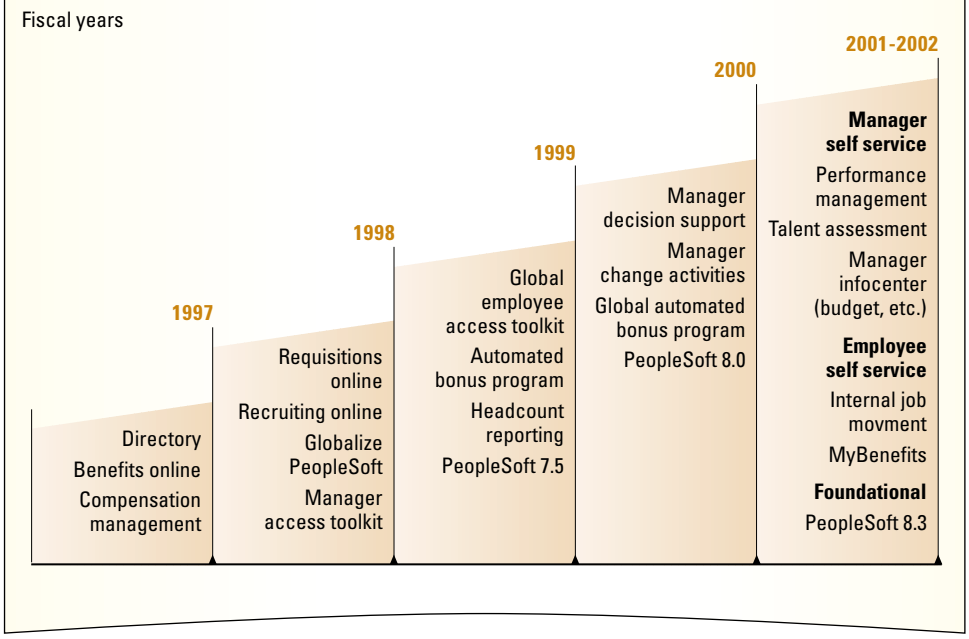
VIRTUAL CLOSE Cisco has honed its financial reporting systems to produce daily, or even hourly, reports on everything from bookings to profit margins and expenses. The key to doing this was standardizing the process of reporting financial information, and creating a standard set of financial data. This took time. In 1995, Cisco took 14 days to close its books on a worldwide basis, because the company had not settled on a standard way of reporting. To speed this up, Cisco standardized the process, and settled on one enterprise resource planning (ERP) system and a single set of data for the entire company. By 1998, Cisco had reduced the close cycle to two days. Further standardization now allows the company to close its books on a daily basis, hence the name "virtual close."

The virtual close gives Cisco executives insight into the operations of the company that they never had before. An old business adage says, "You can only manage what you can measure." Access to accurate and timely information helps Cisco executives react quickly to changing business conditions. This is one of the main reasons why the company's gross and net profit margins have improved so dramatically. Standardization has also helped Cisco reduce what it costs to manage its financial operations, from 2.0 percent of revenues in 1995 to 1.4 percent today.

ELECTRONIC PROCUREMENT In 1996, Cisco launched a program to standardize the procurement of non-production goods and services—items such as office supplies and furniture. The company spent tens of millions annually on these sorts of items, but had little control over what was purchased. The first thing Cisco did was to standardize the process, creating a single purchase requisitions process and limiting the number of suppliers. Cisco then used Ariba software to automate the process. Once this was in place, all purchases had to go through this system. There was one point of entry for all orders, providing a central repository of data on all requisitions.

As adoption and integration grew, so did the benefits. In fiscal 2002, the procurement system yielded $150 million in benefits. This included lower prices from volume discounts and lower costs to process requisition requests. Cisco has also avoided having to hire additional people to manage

Fig 2 **NVO EVOLUTION OF CISCO ONLINE HR**

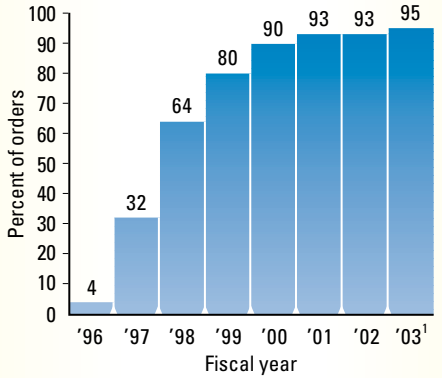


the procurement process—even as the company grew. Employees in the purchasing department now focus on strategic buying issues, rather than routing documents.

STANDARDIZED IT INFRASTRUCTURE

Creating standard business processes and sets of data is critical, but having a standardized IT infrastructure is equally essential. And one of the key elements of a standardized IT infrastructure is to have one that operates in real-time. That is because, unless information can be accessed quickly, it loses some of its value. As a result, Cisco has made creating real-time information systems a high priority. The exchange of real-time data enables Cisco and its supply chain partners, for example, to quickly determine how best to fulfill a customer order. This ability translates into increased gross margins, reduced cost of sales, increased market share, and higher customer satisfaction.

Fig 3 **HISTORY OF CISCO ONLINE COMMERCE**



August 2002

Registered users	158,836
Orders-per-day run rate	$37 million
Annualized run rate	$13 billion
Percent of orders	94%

[1]Year to date

MANAGER SELF-RELIANCE Managers are much more effective if they have timely access to information about the employees that work for them. For many years, Cisco managers did not have this sort of information. It could take four to six weeks to transfer an employee, and several weeks to receive approval to terminate an employee. To solve this problem, Cisco began putting employee information online (Figure 2); starting with an online benefits directory in 1997, and progressing to a complete series of applications called the Manager's Toolbox in 2001.

With the Manager's Toolbox, managers can instantly change the status of employees as they leave the company, transfer to another department, or get a promotion. Requests for raises are instantly sent to the appropriate person, where they are approved (or denied) and confirmations are sent back to the manager. The result is better decisions, faster. The Manager's Toolbox can also help Cisco allocate people where they are most needed. The talent assessment process, for example, identifies the employees who are best suited to work in the company's top priority areas. The ability to quickly identify talent and deploy it across the organization has become a competitive advantage for Cisco.

E-SALES PORTAL E-Sales was developed as a technology service and business process re-engineering platform designed to increase the productivity of Cisco worldwide sales organization. As such, there are three key drivers that all services and processes it supports are based upon: efficiency, effectiveness, and a true 360 degree view of the customer, defined as customer intimacy. Value added services that are dynamic, personalized and actionable such as opportunities, forecasts, bookings, news about customers, and

alerts about service needs are made accessible via a portal. These services provide the salesforce with valuable aggregated information to help them help their customers solve business problems while reducing time spent on non-selling activities. With today's business climate, delivering this information in real time is essential and a true competitive advantage.

CISCO SUPPLY CHAIN

Cisco has implemented NVO strategies in many parts of the company, but the area where it is the most evolved is in its supply chain management system. This system exemplifies the three key NVO attributes—customer centricity, core versus context, and continuous standardization. The system includes all of the processes required to receive a customer order, procure the materials needed to build the product, turn the materials into finished goods, and deliver the finished goods to the customer.

ORDER MANAGEMENT

The process begins with the customer's order. In 1996, just four percent of customer orders were placed online; that number has increased to about 94 percent today (Figure 3). The order management system has resulted in lower costs for Cisco, and faster and more accurate service for the customer.

PROCUREMENT, MANUFACTURING, AND FULFILLMENT

After a customer places an order, the information moves electronically to all of the appropriate networked virtual ecosystem (NVE) partners—component manufacturers, sub-assembly manufacturers, final assembly and test manufacturers, and order fulfillment partners (Figure 4). This tightly integrated network reduces costs and speeds the time it takes to build and ship an order.

Fig 4 CISCO MANUFACTURING NVE

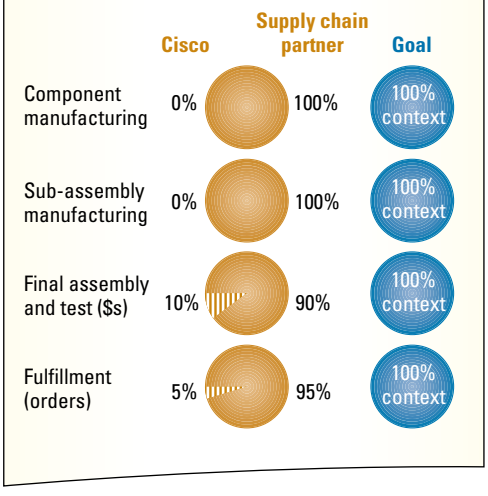
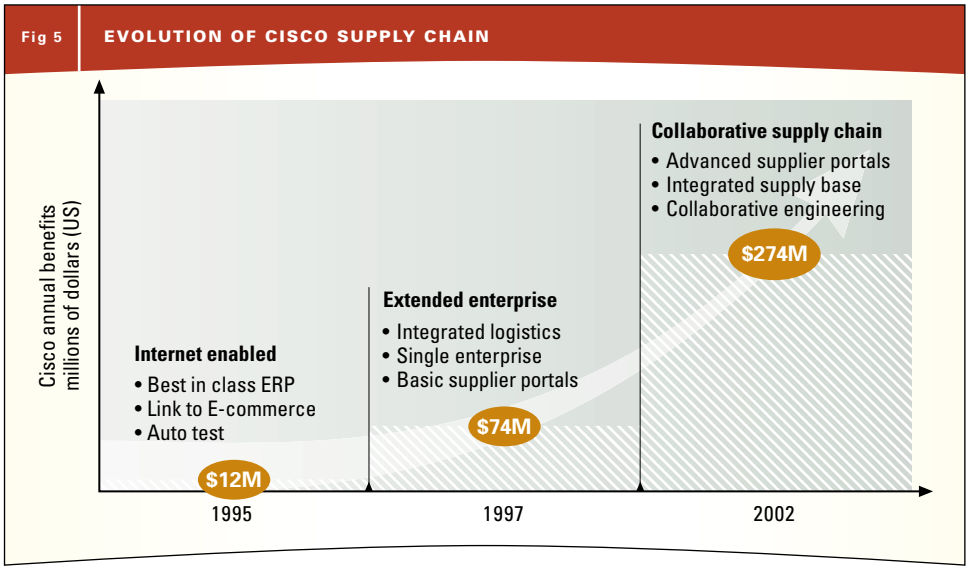


Fig 5 EVOLUTION OF CISCO SUPPLY CHAIN



COLLABORATIVE SUPPLY CHAIN

Moving from a simple Web-enabled ordering system to a collaborative supply chain system has taken Cisco almost 10 years. During this time the financial benefits have increased from $12 million annually to $274 million (Figure 5). While the system has been greatly improved, it is far from finished. To streamline the process and make it even more responsive, Cisco is halving the number of partners that are involved. Cisco cut the number of component manufacturers from 1350 in 2000 to 650 in 2002. And Cisco recently cut the number of final assembly manufacturers from nine to four. Cisco expects to retain a small assembly line inside the company to develop optimum assembly processes which Cisco will own and share with its partners.

LESSONS

Cisco has implemented numerous NVO projects within the company and has learned much in the process. Three lessons stand out:

PROCESS

One of the most important steps an organization can take toward becoming an NVO is to simplify and standardize its business processes. Standard business processes and standard sets of data are prerequisites for any NVO

project. Without standardization, it is very difficult to out-task business processes to partners. Getting the most effective use out of an organization's own internal automation systems is also difficult unless these steps have been taken.

TECHNOLOGY

Becoming an NVO without having a robust IT infrastructure that can link an organization's systems with those of its partners and customers is not possible. Out-tasking is only effective if the organization can monitor and track its partners' activities as if they were their own. Cisco has implemented various systems throughout the company—from a standard ERP system to a networked quality test system—to gain knowledge about key business processes on a real-time basis.

PEOPLE

The most difficult thing to change when implementing an NVO strategy is not the business processes or the technology—it's the people. People are often slow or reluctant to change the way they think of their job, their department, or the organization as a whole. If fundamental changes are going to be made, this is a necessary step. This issue has to be addressed not only within the organization, but also with the business partners in an NVE. To be effective, business partners must work differently with one another in an NVE, and that means changing people's behavior—and the culture of the organizations themselves.

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LEADING YOUR ORGANIZATION TOWARD AN NVO

THIS ARTICLE SUMMARIZES THE EIGHT BASIC STEPS THAT ORGANIZATIONS ARE TAKING TO BECOME A NETWORKED VIRTUAL ORGANIZATION (NVO). The key to success lies with the CEO, who actively champions the process and assembles an executive team to carry the NVO program out. That team first uses NVO principles to assess the entire organization, paying particular attention to its business processes, IT infrastructure, and partnerships. Next, the team creates a vision for the organization that can be expressed simply and achieved quickly. A portfolio of NVO programs is then identified and prioritized—ones that can be implemented within six months. To insure that the NVO programs are on track, metrics are to be devised to measure results. The CEO and executive team stay involved to visibly demonstrate to employees its importance. Because business conditions change, the entire process is regularly revisited.

Creating a how-to guide for something as complex as organizational change may seem presumptuous. After all, no two organizations are the same—each has its own unique history, culture, structure, products or services, people, and challenges. A step-by-step guide implies that there is a recipe for the process; that changing an organization is like baking a cake. In fact, changing something as complex and unique as an organization is more akin to medicine—as much art as it is science.

Nevertheless, for those that want to become a networked virtual organization (NVO) there are many broad principles to follow. Cisco Internet Business Solutions Group developed the following eight steps, culling them from their early experiences in working with companies and executives over the years. Also, at the end of these eight steps is a framework for creating an implementation plan for your organization (see pages 50-51). Once customized to an organization, the actual process is much more complex than can be fully conveyed here.

1. ENERGIZE YOUR TEAM

Becoming an NVO starts with the chief executive. If he or she is not championing the process, it is doomed to failure. That is what Jack Welch did at General Electric when he launched the company's "Digitization" initiative—putting business processes online and creating a real time enterprise. Embarking on an NVO strategy requires a willingness to revamp the entire organization. It often results in major changes in the way the organization works with its customers, suppliers, and employees. It often requires the development of new metrics to measure the performance of individuals, departments, and the entire organization. None of this can happen without the CEO's leadership.

The first thing the CEO does is to gain the full support of the executive team. The core NVO team should be composed of senior executives in the organization who thoroughly understand and support the NVO strategy. This team will be responsible for guiding the implementation of the plan. These executives have full authority to make changes in the organization, and the organization understands that these individuals have the full responsibility to be change agents.

It is critical that the core team embarks on its mission with a strong sense of urgency and energy. One of the characteristics of an NVO is its

ability to act quickly and decisively. The core team approaches its task with that same speed and decisiveness.

2. ASSESS YOUR ORGANIZATION

The core team initiates a top-to-bottom assessment of the organization as it exists today. It includes a frank look at the organization's capabilities in key areas such as marketing, product development, manufacturing, and sales. DaimlerChrysler undertook such an analysis of its ability to assemble Jeeps, before turning one of its oldest plants in Toledo, Ohio into what is now its most efficient operation. It should examine the organization's business processes, information technology (IT) infrastructure, partnerships, and physical assets.

The assessment quickly catalogs those areas where the company has the majority of its people and capital invested, and understands who the internal and external customers are for its major processes. An examination of the organization's culture is also important—its ability to react quickly, its willingness to change, its ability to make and follow through on decisions, and its style of management. Management also takes care to note where it has multiple versions of similar processes, critical enterprise data, and infrastructure spread across business units and geographies.

The purpose of this assessment is to be able to answer, at a later stage, questions such as: What are the company's core capabilities in the eyes of its customer? What value does the organization add to the final product or service? What is the current business ecosystem, what data changes hands between partners, and what role does this organization play in it? Where are the internal and external opportunities for greater process scale?

3. CREATE YOUR VISION

Once the team assesses the current state of the organization, they are ready to develop a vision for the future. This is not the time to get caught up in the tactical details of implementation—it is the time to set the broad direction for the organization. John Chambers did this when he announced that Cisco would be the Internet leader, and achieve revenues of $1 million per employee. Use NVO concepts to help guide the vision—core versus context, customer centricity, and continuous standardization. Overlay these NVO principles and concepts on the organization's current strategy to discover the similarities and differences. Challenge traditional thinking, and

encourage people to be creative. Be careful not to confuse the processes that it does the most or does the best, with the processes that most differentiate it with customers.

Don't spend large amounts of time producing a vast strategic plan. Think of this as dynamic strategic planning, a vision that leaders will refine on a regular basis. One is creating a direction for the organization, not an ideal end state. Conditions change too rapidly and unpredictably to know with any certainty what an organization will look like far in the future. Don't create a vision that takes five to 10 years to implement. Instead, set a vision that the organization can achieve in two to three years. Focus on the one or two key points which will lead to competitive advantage. It is best to create a simple vision, one that can easily be expressed by a goal such as: "We want to increase sales per employee by 200 percent." These are broad goals that employees can easily understand. These are also goals that stretch the organization, ones that the organization can only achieve by radical changes to sacred processes rather than incrementalism.

BECOMING AN NVO STARTS WITH THE CHIEF EXECUTIVE. IF HE OR SHE IS NOT CHAMPIONING THE PROCESS, IT IS DOOMED TO FAILURE.

4. IDENTIFY YOUR OPPORTUNITIES

Having completed an assessment of the organization as it exists today, and a vision of how the organization can become an NVO, it is time to identify the range of opportunities that exist to transform the organization into an NVO. The state of Arizona, for example, had a vision to bridge the digital divide that existed between its urban and rural schools, and developed a program to overcome the inequities. To do this, it is important to look at the organization from three different perspectives—external, internal, and the ecosystem—and find the areas where value is created, to discover how the overall process could be improved using NVO principles, and to devise projects that could achieve the desired results.

Opportunities will fall into three main categories. The first category is initiatives to reduce cycle time for core processes, such as product development. The second is efforts to develop applications to remove headcount and capital investments from mission-critical processes that are no longer

core, such as customer service, finance and commerce. The third category is in identifying redundant processes and data where the organization can substantially reduce costs by moving to shared services and standardized data. Leaders should develop five to 10 opportunities in each category before narrowing them down to the most promising set.

5. SET YOUR PRIORITIES

It is not possible, or desirable, to embark on all of your NVO projects at once. You can set priorities. A good way to do this is to appoint an enterprise team representing a cross-section of the organization that will be affected by the NVO process. This enterprise team is responsible for evaluating all of the various projects to determine which should be first. The team should prioritize the portfolio of projects based on the value they will return to the organization and how difficult they are to implement, not based on the cost. The team also considers how important each project is to achieving the overall vision for the organization.

Once the projects have been selected, the enterprise team develops a six-month action plan, composed of a series of short pilot projects that can be completed within six months. At the end of this six-month period, the team selects the projects that are going to be implemented. It is important that the projects then be done quickly. This means that the project is finished in just 60 to 90 days, with clear success metrics and clearly defined accountability.

6. DESIGN YOUR METRICS

It is critical to have ways to measure the results of your NVO projects, both while the projects are being implemented, and after they are completed. Ways should be found to measure the financial impact of the changes, as well as impacts that are less tangible ("soft benefits"). Toyota Motor took this approach when it developed metrics to measure the success of revamping and automating its HR process. There are six steps in this process. First, assess the overall needs of the business to determine what should be measured. Second, define the changes in performance that are expected from making the changes, and develop metrics to measure them. Third, decide who is accountable for meeting the new metrics. Fourth, perform periodic reviews to make sure that the goals are being met, and that they are having the desired results. Doing this

periodically will allow leaders to readjust the metrics and goals. Fifth, reward those teams that are meeting their goals. Sixth, go back to the first step.

One of the challenges of devising these metrics is that some of the areas being tracked are ones that an organization may not have experience measuring. For example, the level of collaboration that exists between business partners in the networked virtual ecosystem (NVE) is central to the success of NVOs. New ways need to be found to measure the extent of cooperation between organizations in the NVE, and the results of such cooperation. Some possible metrics include calculating the number of cross-enterprise teams that are formed, the number of representatives from each organization, or the teams that identify the most NVE-specific process changes.

7. LEAD YOUR EFFORT

The CEO and other top executives should continue to stay involved even after the NVO projects have launched, playing the role of evangelists and reinforcing their vision and strategy on a regular basis. That is what happened in the state of Texas. After passing legislation that equalized health and human services throughout the state, political leaders continued to meet with the heads of non-profit organizations to convince them to help implement the new program. Once a fiscal quarter, the executive core team should provide employees with an update of what was accomplished, what remains to be accomplished, how well the project is going, and what benefits have been achieved.

Special attention should be paid to managing the relationships between the organization and its partners. Managing a partner in an NVE is more complex than managing a simple outsourcing relationship. Partners are often asked to take on greater responsibility. Executives tend to micromanage these relationships to make sure the partners are doing what they are supposed to do. But the resources required to do that are too high, and limit the partner's ability to innovate. Instead, partners should be given more flexibility to implement the process, while being held to even higher standards for their results. For NVO partnerships to work, both parties must be willing to share more information than ever before, requiring a greater degree of trust between them.

Executives must also embrace IT as an agent of change within the organization. Too often, IT departments are seen as impediments to change. Like business partners, IT departments often respond best when

given explicit and measurable goals and standards, and are left to implement them in their own way.

8. RESTART YOUR JOURNEY

It is more useful to think of the path to becoming an NVO as a journey, not a destination. New competitors, new technologies, changing customer preferences, new governmental regulations, even acts of terrorism, can affect an organization's direction and cause a change in its NVO strategy. Which business processes are core and which are context will change over time. What role an organization plays in a particular NVE will change over time. The ecosystem itself will certainly experience changes over time. It is precisely because the world is so unpredictable that strategic visions and goals have a useful life span of just two to three years. Successful organizations adapt rapidly with instantaneous tweaks, quarterly adjustments, and 18-month reinventions.

EXECUTIVES MUST EMBRACE IT AS AN AGENT OF CHANGE WITHIN THE ORGANIZATION.

It is important for the organization to learn from its past experience, and to use the gains of the past to achieve new gains. Cisco found that at the initial stages of change, one-third of employees understand its vision, one-third wish they did (they may understand the concept but do not understand how it applies to them and their area of work), and one-third do not. The key is to use the successes of the first third to motivate the next set of leaders. A successful NVO project in one part of an organization can be used to help initiate a new project in another part of the organization.

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CREATING AN NVO IMPLEMENTATION PLAN

IDENTIFY CURRENT BUSINESS MODEL, AND EXISTING AND POTENTIAL NVO PROCESSES Cisco has developed an "NVO Readiness Survey" to assist in this process, using four pillars:

- ***Leadership Pillar*** *Measures how outward looking and focused the enterprise is on competitive business requirements and customer needs.*
- ***Governance Pillar*** *Evaluates how well the enterprise has identified escalation procedures, recourses and penalties, within the organization and with its partners.*
- ***Competencies Pillar*** *Assesses the enterprise's resources and supporting business culture to adapt and collaborate with partners in an NVE.*
- ***Infrastructure Pillar*** *Considers if the enterprise has strong business operations and oversight capabilities in areas like manufacturing, warehousing, and transportation.*

ASSESS TODAY'S BUSINESS PROCESSES Analyze all aspects of your current business model.

- *Identify what business operations are core processes and define the company's value-add.*
- *Identify what business operations are context but mission-critical.*
- *Identify what business operations are context and non-mission critical.*

DETERMINE CUSTOMER SERVICE NEEDS AND DESIRES Develop a view of the customer's future needs.

- *Who will the customer be in the future, and what impact will that have on distribution?*
- *How will quality issues impact the organization?*
- *How will product innovations impact our market share and our ability to react?*
- *How will materials shortages and prices impair our ability to meet customers' expectations?*
- *How will customers' perceptions of style and seasonality impact our business?*

LOOK AT FUTURE BUSINESS PROCESSES Imagine what the enterprise would be like if it could be re-created from scratch as an NVO.

- *How would the new organization react to future customer needs and desires?*
- *Define the core and context business processes and how they are different from those of the current enterprise.*

- *Evaluate the competitive advantages of the new business model and the competitive threat from other businesses deploying an NVO model.*
- *How would the organization collaborate with partners and allow them to be part of the NVE, yet be held to the same performance standards and quality metrics that are used in your own business?*
- *Identify what capabilities the NVE could deliver to create an "unfair competitive advantage."*

FOCUS ON TECHNOLOGY THAT BENEFITS THE CUSTOMER Develop a strategy to drive continuous value creation for the customer.

- *How will the future NVO provide value and an improved experience to customers?*
- *How will the NVO create a link between customer experience and innovation?*
- *How will the NVO provide the right product or service to the customer at the right time?*

DETERMINE MATURITY STAGE OF NVO INFRASTRUCTURE The NVO's future success hinges on its ability to manage trusted information across the NVE.

- *Are we experienced in selecting and implementing new technologies and gaining significant near-term payback?*
- *Do we have experience applying external logistical assets?*
- *Do we have strong internal business operations and oversight capabilities in areas such as manufacturing, transportation, warehousing?*
- *Have we identified the accountability and roles for business activities within our organization and those of our partners?*
- *Is the organization prepared to deploy an Intelligent Network?*

SELECT AND DEVELOP A PORTFOLIO OF NVO IT PROJECTS Choose a portfolio of NVO projects to implement and manage them with a value-centric outlook; evaluating the number, size, age, performance, and risk of each process.

- *What will be the strategic alignment of IT initiatives with business goals?*
- *Identify ROI components and strategic benefits, not just reduced costs.*
- *Assess the risk of doing and not doing the project.*

PRIORITIZE IMPLEMENTATION PROCESS An NVO deployment process begins with a series of consensus-building facilitated sessions, evaluating the resources needed to implement the envisioned NVO processes:

- ***People*** *What are the workforce competencies required to implement the NVO processes?*
- ***Processes*** *What are the work processes employed by those charged with carrying out newly deployed NVO processes?*
- ***Enabling Infrastructure*** *Evaluate the IT infrastructure requirements, as well as required warehousing, transportation, and other logistical requirements.*

At the end of this process one should develop a six-month action plan to deploy a series of NVO pilot projects.

THE NEW FACE OF INFORMATION TECHNOLOGY

NETWORKED VIRTUAL ORGANIZATIONS (NVOs) REQUIRE AN INFORMATION TECHNOLOGY SYSTEM THAT MIRRORS THE NEW BUSINESS PROCESSES that the organization is creating. This new service architecture has several key components. To reduce costs and make it easier to integrate disparate systems, NVOs should adopt open technology standards throughout the entire organization—standard computing architectures, standard networks, and standard application interfaces. Software applications should be modular, operate in real-time, and be easy to link together; these are increasingly being called Web services. The foundation of the service architecture is an intelligent information network; one based on standards, operating in real-time, and capable of delivering packetized data. Fortunately, the service architecture is not a radical departure from the past. It builds on what already exists at many organizations: the enterprise applications, the Internet-based applications, and the technology standards.

Many executives greet calls for a new approach to information technology (IT)—one that asks organizations to spend millions of dollars revamping existing systems—with skepticism. The "Y2K crisis," for example, was much ado about nothing. And the threat of being "Amazoned" by an unknown "dot com" turned out to be mostly wishful thinking on the part of some venture capitalists and entrepreneurs.

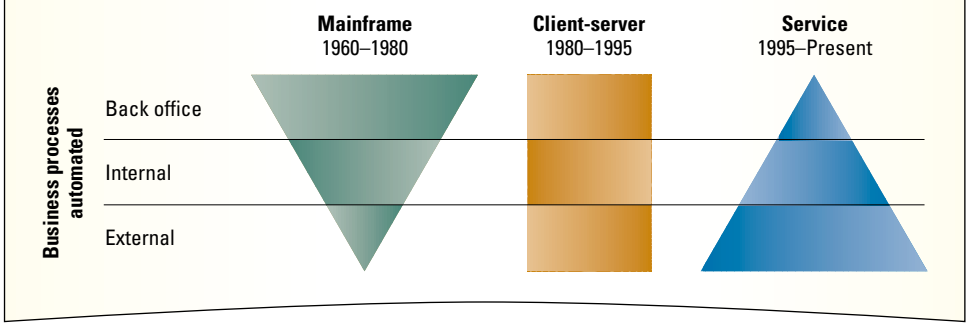
Executives that remain cautious about the "next new thing" will be happy to hear that while a networked virtual organization (NVO) does require a new approach to IT, many of the changes are already well under way. The changes that are needed often offer quick financial payback.

These changes are an evolutionary step along the path many organizations are already on, not a revolutionary break from the past. The move to an IT platform that supports the NVO has been happening at most organizations for some time. It builds on the enterprise applications that automated so many internal operations, the Internet-based applications that extended the organization's reach beyond its four walls, and the technology standards that have been adopted by organizations and IT vendors alike.

The new IT model must be fully embraced to become an NVO—companies must adopt standards-based IT in all parts of the organization, adopt single data models (a standard definition for data like "profit" or "customer") throughout the entire organization, and extend connectivity and application interchange to all partners and customers.

The new IT model must be extended throughout the entire organization because NVOs are flexible and adaptable, able to change business

Fig 1 THE EVOLUTION OF IT



partners or refashion products quickly. NVOs are responsive to their customers and partners as they are to their own employees. NVOs shift key functions to their partners, while continuing to monitor those functions on an ongoing basis. NVOs require an IT infrastructure that makes that all possible—one that mirrors the new business processes.

Before launching into the details of the new IT model, it is worth looking back at the evolution of information technology to understand how it evolved to the state it is in today.

EVOLUTION OF IT

There are three eras in the history of IT, each representing not only an IT architecture, but also the types of business processes that were automated (Figure 1). These are the mainframe era (1960-1980), the client-server era (1980-1995), and the service era (1995-the present).

MAINFRAME ERA

The mainframe era was characterized by low labor costs, high computing costs, and very high networking costs. Only critical functions were automated; mostly back-office processes such as payroll, accounting, and inventory management. The applications were difficult to use, difficult to integrate, and benefited relatively few users. The computing and networking systems were largely proprietary, and the software applications were often internally developed, making it difficult for organizations to share information. Data was stored in a manner that made it difficult to retrieve and manipulate. IT departments were centralized, and often not responsive to the demands of the business.

CLIENT-SERVER ERA

The client-server era began with the birth of the PC, which provided users with computing autonomy. IT labor costs rose while computing and networking costs fell. The client-server era saw the emergence of standard hardware and software like the PC and UNIX. Off-the-shelf applications became more widely used. Organizations began automating departmental and customer-facing functions, such as sales and marketing. Data became more accessible and easier to manipulate with the emergence of relational databases and the Standard Query Language (SQL). IT departments became more decentralized, responding more effectively to the needs of different groups within the organization.

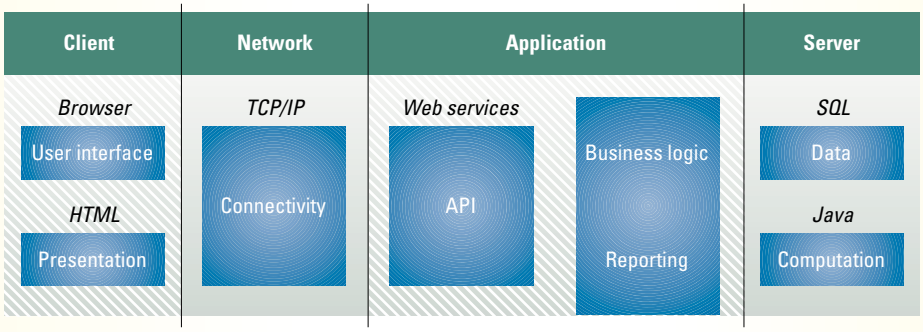
SERVICE ERA

The popularization of the Internet and the development of the World Wide Web launched the service era. Web browsers were initially seen as simple ways to gain access to documents on the Internet, but the same technologies were quickly adopted by organizations as a way to increase the functionality of client-server computing. Computing costs continued to fall rapidly because of the affordability of microprocessors, memory, and storage. Networking costs fell significantly as service providers initiated large-scale expansions of their networks in response to the Internet boom.

Standards became de facto in the service era—standard computing architectures, standard networks, and standard application interfaces (Figure 2). The standardization and simplification of the user interface and the Web browser, combined with broader and less expensive network connectivity, made it possible to deploy applications to every employee in the enterprise, as well as to partners and customers. This enabled the development of self-service applications for employees, customers, and partners. It was an advance over previous applications, but they were often standalone solutions that did not interact with one another.

The focus of innovation shifted to the business process level with the wide adoption of technology standards. One of the best examples of this is the development of Web services—software that encapsulates discrete pieces of business functions (order status, for example). With Web services,

Fig 2 THE NEW SERVICE ARCHITECTURE



organizations can interconnect business partners and customers into a networked virtual ecosystem (NVE).

NEW SERVICE ARCHITECTURE

A service architecture makes it possible for NVOs and NVEs to emerge, but it will only happen if organizations adapt their entire IT infrastructures to this new model. Standard technology is not effective if the data is not standardized. It is not enough to develop new applications if the business processes are not changed. And it is not enough to develop new ways of managing IT if the people working in technology are not willing to change. What follows is a look at the impact the new service architecture will have on five aspects of the organization—business process, applications, data, technology, and people.

BUSINESS PROCESS

When organizations installed monolithic enterprise resource planning (ERP) software in the 1990s, they were often required to "hard-wire" their business processes to match their applications. It was difficult to tailor the ERP applications to the unique needs of the organization. With Web services, organizations can use discrete business-process modules, mixing and matching them to their own needs. Web services make it much easier for an organization to change its business processes. Web services also make it much easier for organizations to integrate their business processes and create NVEs.

Organizations need to create stronger partnerships between their business units and their IT departments to gain the benefits from new technologies such as Web services. Although most companies claim to do this, few create the internal incentives and processes that foster such a partnership.

APPLICATIONS

NVOs place new demands on software applications, requiring that they operate in real time and that they can be easily distributed across multiple organizations. Applications that supply up-to-the-minute information are critical—NVOs need to be responsive and agile. In addition, these applications must be easy to distribute because NVOs rely on partners to perform many vital business functions. To better understand these requirements, consider the following three applications.

The first enabling application is the collaborative supply chain. Metro AG, Germany's largest retailer, is working with SAP and Intel to develop a system that tracks the movement of goods in real time from factories to warehouses to stores. As goods move from place to place, radio-frequency ID tags communicate their location to software agents, giving Metro AG precise information.

The second enabling application is product life-cycle management. Airbus has installed software that links engineers, manufacturers, and assemblers across operations throughout Europe. A recent study by Giga Group found that this type of collaboration can result in a decrease in travel expenses of up to 80 percent, reduction of design errors by 50 percent, and improvement of development cycles by 40 percent.

The third enabling application is customer and channel management. Maytag wanted to sell its home appliances on the Web, but the company didn't want to take business away from the retailers that already sold Maytag products. Maytag designed the site to allow customers to buy on the Web, and pick up their appliance at one of the 10,000 stores.

DATA

Developing a consistent set of data for business processes and organizations is critical, as Hershey Foods found when it simultaneously implemented an ERP system, a supply chain management system, and a customer care solution. The three systems were not designed in concert with one another, and as a result, produced three different sets of data on the company's inventory, orders, and revenue. Hershey is not alone. According to the 2001 Global Data Management Survey conducted by PricewaterhouseCoopers, "75 percent of respondents reported significant problems as a result of defective data." This problem has existed for some time, but is magnified when organizations attempt to share business processes and data in an NVE.

In an NVE, the business process extends across different organizations. Having a standard set of data that all organizations work from is critical. A good example of this is a supply chain, where partners perform different but interrelated tasks—such as order taking, component manufacturing, final assembly, and shipping. If the data that underlies the supply chain is not consistent, the partners will be forced to introduce additional steps such as exception management and data reconciliation, adding time and

introducing errors to the process. Without consistent data, much of the value of automation and out-tasking is lost.

Data has one of the longest life spans of any organizational asset. New data may be added, and old data may lose its relevance, but data doesn't change over time. Take revenue, for example. New revenue data will constantly be added, and over time old revenue data will lose its importance, but the revenue data itself will never be obsolete. Contrast this with technology, for example, which over time will become obsolete. Any investment in developing a consistent set of data will pay off over the long term.

One of the problems most organizations face is that data is distributed across the organization, residing in different databases tied to different applications, such as human resources, ERP, and customer relationship management. This is in part a technical challenge, and there are technical solutions to the problem. The greater challenge is to overcome the organizational structures and barriers that have built up over time, making it difficult to blend this information.

TECHNOLOGY

Open standards are the first step to success. Communication, data exchange, and linking of applications are possible only if different organizations have agreed on a standard business process, a standard set of data, and a standard set of technologies. Without technology standards, it is impossible to become an NVO, or to create an NVE. Fortunately, most organizations and technology vendors have realized this, and support for standard protocols and technologies is widespread (Web services, for example).

What are the reasons for this unprecedented collaboration? It is largely because of the success of the Internet, the greatest standards-based IT initiative ever. The Internet is possible because of the widespread adoption of Transmission Control Protocol/Internet Protocol (TCP/IP) as the core Internet transport protocol. We now have a global communications medium that has replaced a collection of incompatible networks, and everyone is cognizant of the benefits.

Like the Internet, the key to making Web services work is for all parties to agree on standards. What HTML and HTTP did for content, Extensible Markup Language (XML) and Web services protocols such as Simple Object Access Protocol (SOAP) will do for data exchange and application-to-application communication. Metcalfe's Law states that

"the value of a network scales as the square of the number of people connected to it." The more people that use the Internet, the more powerful it becomes. The opportunity with Web services is the same.

With these opportunities also come challenges. Managing the exponentially increasing number of applications and Web services is difficult. Change management alone is a big issue. If one of the Web services modules is modified, how is that change propagated to all of the other applications and modules that use the affected module? Ownership is a contentious issue as well. Who owns the modules or functions that are common across an NVE?

Security is another challenge. As data and process are shared across an NVE, it becomes more difficult and more essential to provide security. The traditional approach of building a virtual wall around the organization and its IT infrastructure does not work. Instead, the NVE must adopt an airport-like security model, one that allows many different groups of people (passengers, baggage handlers, pilots, etc.) to have different levels of access to different areas.

In an NVE, the people who use the IT system can be located anywhere in the world—in the office or at home, at a desk or in a car. As a result, the IT system has to support a wide variety of devices, from PCs to cell phones. This is another reason standards (in this case, user interfaces) are critical. With such a diverse yet mission-critical information network, end-to-end manageability becomes even more important to ensure performance and reliability. In short, what is needed is an intelligent information network.

PEOPLE

As IT departments are called upon to create the applications and infrastructure needed to support an NVO strategy, new skills, organizational structures, and management techniques will be required. Skills such as collaboration, facilitation, and business problem solving are needed. In some cases, these new competencies are extensions of ongoing trends in IT. Business professionalism, for example, is a skill that CIOs have been developing for some time. But the demands of an NVO accelerate this trend, requiring CIOs to be as familiar with business issues as they are with IT issues.

The new NVO environment demands some revolutionary changes in the skills that IT organizations offer. Collaboration is essential. The new technologies and applications that are required to support an NVE cross organizations and even industries. New, coordinating bodies such as program management offices or enterprise architecture groups are being formed or bolstered to handle these issues. Today, these groups operate mostly inside an organization, but some are collaborative groups that interconnect applications. Interorganizational test laboratories are making a comeback, as organizations struggle to understand how to adopt new business processes and their supporting technologies.

Many of the functions that an IT department performs today can be out-tasked. Companies are emerging to service the IT needs of NVEs, and these same companies could take over many of the functions now performed by internal IT departments. Functions that span organizations—such as network management, security, and Web services—might be better managed by these new service providers.

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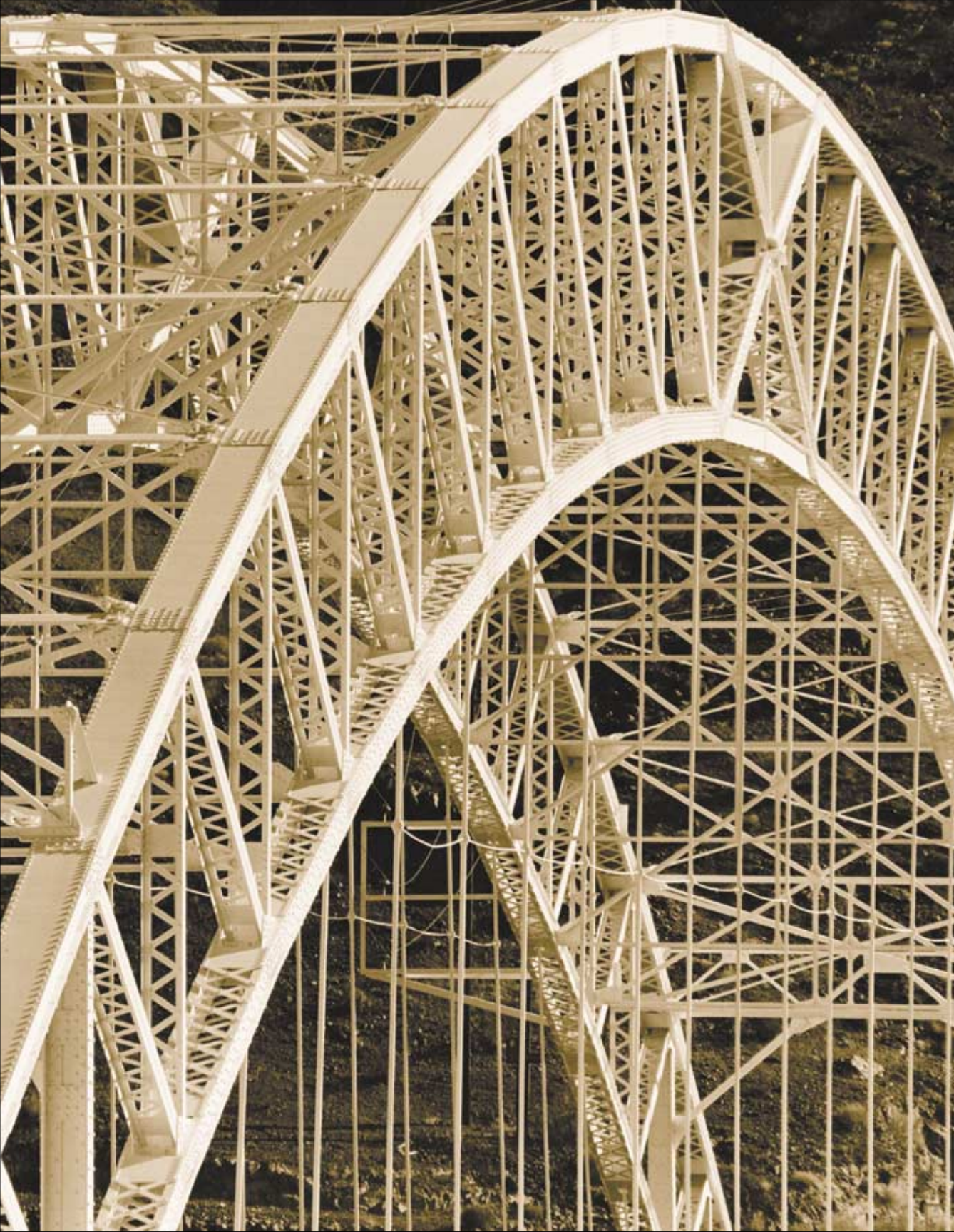


PROVIDING IT SERVICES FOR THE NETWORKED VIRTUAL ECOSYSTEM

ONE OF THE MOST DIFFICULT STEPS IN CREATING A NETWORKED VIRTUAL ECOSYSTEM (NVE) IS CONSTRUCTING AN IT INFRASTRUCTURE that integrates the dozens of different organizations comprising an NVE. What is needed is a new type of service provider, one that can supply the computing, networking, and software services that NVEs require. Telecommunication firms such as AT&T, computing service providers such as EDS, and software companies such as PeopleSoft offer partial solutions. But none of these firms can yet provide all of the pieces of the new service architecture. The foundation of the new service architecture is the intelligent information network, capable of delivering packetized voice, video, and data applications to anyone, anytime, and anywhere. The intelligent information network must support traditional computing and communications devices such as PCs and servers, as well as new devices such as cell phones and video game machines. It must also support collaborative business applications and Web services in real time.

The benefits of a networked virtual organization (NVO) are clear. What could make more sense than creating a tightly integrated web of business partners, each focused on what they do best, yet cooperating to provide products and services for the customer? The challenge is in creating the networked virtual ecosystem (NVE). One of the most difficult steps in creating an NVE is constructing an information technology (IT) infrastructure that can support it.

While it is a challenge to develop IT solutions for one's own organization, it is exponentially harder to create IT solutions for a vast network of organizations. Getting dozens or more organizations to share a communications infrastructure, data, and applications is difficult—and then to manage this infrastructure so that it functions in top form, 24 hours per day—is a challenging task, even for organizations as technologically savvy as Cisco.

THE FOUNDATION OF THE NEW SERVICE ARCHITECTURE IS THE INTELLIGENT INFORMATION NETWORK. IT IS THE GLUE THAT HOLDS THE NETWORKED VIRTUAL ECOSYSTEM TOGETHER.

What is needed is a new breed of service provider, one that can provide some or all of the computing, networking, and software services that NVEs need; in effect, out-tasking IT for the entire NVE. Many kinds of companies are competing for this role—telecommunications service providers such as AT&T and SBC, computing service providers such as IBM and EDS, and software service providers such as Microsoft and PeopleSoft. Each of them can solve part of the problem, but none can yet take on the delivery of the entire infrastructure for the new service architecture.

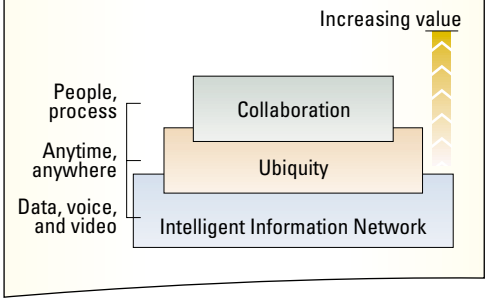
THE NEW SERVICE ARCHITECTURE

There are three basic elements to the new service architecture—the intelligent information network, ubiquity, and collaboration. Each builds on the others (Figure 1).

The foundation of the new service architecture is the intelligent information network. It is the glue that holds the NVE together—connecting partners, people, locations, applications, and data, regardless of geography.

This network must be able to deliver packetized data, voice, and video applications to anyone—anytime and anywhere. It must support traditional computing and communications devices such as PCs and servers, as well as new devices like cell phones and video game machines. It must also support collaborative business applications and Web services in real time.

Fig 1 THE NEW COMMUNICATIONS NETWORK



Today's Internet backbone is a converged network capable of carrying packetized data, voice, and video. Because of economic constraints, highly reliable broadband services are not yet ubiquitous down to the "last mile"—the end points of the Internet that reach out to individual homes, businesses, and public-sector organizations. And collaborative applications and Web services are, in most cases, still in the early stages of evolution.

There are four key elements of the new service architecture that NVEs require, and that service providers must be capable of delivering: shared communications; shared data; linked applications; and management and control.

SHARED COMMUNICATIONS

Even though the NVE is a collection of several different organizations, it must operate as one. The employees of each organization in the NVE must be able to easily and transparently communicate with one another. For example, under ordinary circumstances, a customer calling a company to check on the status of an order might be told to hang up and call the shipping agent to find out where the product is in transit. In an NVE, the call would be passed transparently from the company to the shipping agent. In addition, all of the information about the order would be transferred with the call.

The process should be unnoticeable to the customer, whether the medium is data, voice, or video. Shared communications are not just for customers, however. The same is true for all of the partners within an NVE, who must be able to collaborate as if they were within one single organization.

SHARED DATA

Information is the lifeblood of any organization. To be useful, the data must be secure, reliable, and timely. This is often difficult for a single organization, and it is particularly difficult for an NVO. Sharing data across organizations in an NVE adds stress on security, reliability, and timeliness. A secure NVE must be able to prevent unauthorized interception or access to data, by authenticating the person requesting the data, authorizing that the person has the appropriate approval to gain access to the requested data, and proving that a given transaction took place at a particular time and date. Ensuring security in an environment as complex as this—where partners, people, and transactions are constantly changing—is a major challenge.

SHARING DATA ACROSS ORGANIZATIONS IN AN NVE ADDS STRESS ON SECURITY, RELIABILITY, AND TIMELINESS.

LINKED APPLICATIONS

If NVOs are going to join together to offer customers a virtually seamless array of services, they must link computer applications just as seamlessly. When a customer places an order, a series of actions must be triggered throughout the supply chain—for example, notifying the component supplier to ship the appropriate parts to the assembler, notifying the assembler to make the product, and notifying the shipper to deliver the product.

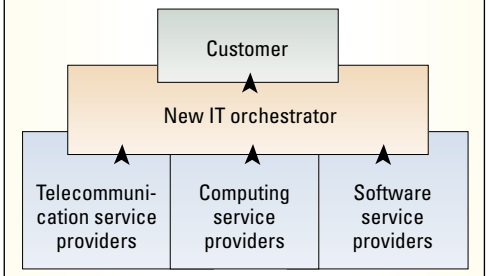
Linking partners requires a communications network that never goes down, that has greater than 99.999 percent availability, 24 hours a day, 365 days a year. It requires a communications network that is not only on, but can also reliably deliver data without any errors. It also requires a communications network that operates in real time.

MANAGEMENT AND CONTROL

To ensure that the communications network is able to meet all the demands that an NVE places on it, the network must be constantly monitored and managed. New partners, individuals, and applications will need to be added to the network and old ones removed.

Network capacity will need to increase on demand to meet increased traffic loads. Priority will need to be given to certain applications, and certain sets of data, at designated times. Maintaining adequate security is a constant concern. All of these demands make network management a high priority for any NVE.

Fig 2 THE NVE SERVICE OPTIONS



SERVICE PROVIDER OPTIONS

Today, no single company can provide all of the IT services that are required by an NVE. Three types of companies can provide parts of the complete solution—telecommunications service providers, computing service providers, and software service providers. Each of these types of companies is trying to increase the array of products and services they offer, either by partnering or by doing it themselves (Figure 2).

TELECOMMUNICATIONS SERVICE PROVIDERS

Traditional telecommunications firms ("telcos") have a long history of providing communications services. They not only build the physical networks—they own and manage them as well. Companies such as AT&T and France Telecom provide a mixture of data, voice, and video services to consumers and business alike. Frame Relay and ATM networks provide secure and reliable backbones for many corporate networks. The mix of wired and wireless networks offered by telcos reach into most geographical areas of the developed world.

As effective as these service offerings have been in the past, they do not meet all of the needs of NVOs. Telcos cannot yet offer converged, packetized, ubiquitous networks with the availability, reliability, and quality of service that is comparable to traditional circuit-based networks. Bandwidth on demand—a necessary capability if NVE networks are to reliably operate in real time—is another service that is not yet available from most telcos. While wireless voice services are now widely available, wireless data services are still lacking consistency and they are slow. Telcos do not have the application development and computer hosting capabilities that

firms such as IBM and EDS offer, or the software capabilities of companies such as Microsoft and PeopleSoft.

COMPUTING SERVICE PROVIDERS

Companies such as IBM and EDS have traditionally offered computer hosting and systems integration services for corporations and government agencies. They are proficient at designing custom applications, integrating systems, and hosting applications. Computing service providers are particularly adept at developing industry-specific solutions, such as what EDS has done for General Motors. Many of these companies have recently entered the Web hosting business as well.

As strong as computing service providers are at providing point solutions for single organizations, they have little expertise providing network services to many geographically dispersed organizations and sites—the very kind of communications networks that NVEs require. Because IT service providers do not own the physical networks, it is difficult to ensure reliability, security, availability, and quality of service—areas that are telco strongholds. And while computing service providers are proficient in developing custom software applications, most have little experience developing off-the-shelf solutions that can be used by different kinds of organizations.

IF NVOs ARE GOING TO JOIN TOGETHER TO OFFER CUSTOMERS A VIRTUALLY SEAMLESS ARRAY OF SERVICES, THEY MUST LINK COMPUTER APPLICATIONS JUST AS SEAMLESSLY.

SOFTWARE SERVICE PROVIDERS

Companies such as Microsoft, Oracle, and PeopleSoft are beginning to develop software that is designed to meet the needs of NVOs. Instead of generic enterprise applications, these firms are developing solutions targeted at specific industry niches or specific tasks. These can be traditional applications or new Web services. Web services include software modules that organizations purchase and use to perform discrete tasks. In other cases, Web services may be delivered as actual services to the customer, with the software being run and managed by the software company.

But software companies have some limitations when it comes to offering the full breadth of IT services that an NVE demands. They are capable of managing their own applications, but are not likely to be interested in hosting a competitor's software. They also have little to no expertise in operating communications networks. And with rare exceptions, software companies have little or no background in consulting and systems integration. In short, while software companies may be proficient in offering their own solutions, they may not be as effective when it comes to working with products and services from other vendors.

TODAY, NO SINGLE COMPANY CAN PROVIDE ALL OF THE IT SERVICES THAT ARE REQUIRED BY A NETWORKED VIRTUAL ECOSYSTEM.

CHOOSING A PROVIDER

There are several factors to consider when selecting a partner to take on the out-tasking of IT services. Do not necessarily out-task all IT services. Retain those skills and functions that are key differentiators. Be sure that providing IT services is the partner's core activity, and not simply an ancillary business. While service level agreements and performance metrics are important tools to insure performance, a successful partnership is based in part on trust, so there should be a strong cultural fit between the partners. Above all, remember that one of the key reasons for out-tasking is to allow each of the companies in the NVE to focus on what it does best, thus enhancing the overall value of the ecosystem.

No single company can currently offer the breadth of IT services that an NVE requires, and that is not likely to change soon. Most NVOs and their respective NVEs will rely on a variety of companies to provide the services they require. They will look to telcos to provide the network infrastructure, computing service providers to provide the computing resources, and software service providers to provide software and Web services. It is increasingly likely that one of these types of firms will step up to become the new "IT orchestrator," a general contractor that takes responsibility for the operation of the entire infrastructure and coordinates the work of all the other firms.

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