Chapter 2

Life in Networked Organizations

Learning Objectives

Upon completing this chapter, you should be able to:

- Describe the impact of digital networks on business and other organizations worldwide.
- Explain how information technology, especially the growth in digital networks, is changing the way people work in organizational environments.
- Identify key trends that are driving change and their implications for people, technology, business process, and organizational structure.
- Differentiate among Internets, Intranets, and Extranets and the types of applications supported by each of them.
- Identify key trends in networking hardware and software.
- Describe the expanded capabilities and benefits of the Next Generation Internet.
- Identify major opportunities and challenges for EUIS in networked organizations.
- Analyze a business setting and recommend changes needed to reinvent it for the digital economy.

2.1 INTRODUCTION

With the explosion of the Internet and phenomena such as e-commerce, e-business, and globalization, the pace of change has become relentless. Enterprises that survive and thrive into the twenty-first century will be:

> "flat, fast organizations, with even the newest employees engaged in helping the company succeed. Employees given the chance to share in the invention of their companies—given a voice in a pluralistic process— will embrace the institutional change necessary for leading in the new millennium. Using technology to support energetic and engaged staffs— to free up employees to team, to dream, to invent—may be the key to future success."

It's not just the availability of digital networks that is driving change, however.
This century is witnessing an explosion of information and other diverse economic and societal trends that is creating a far more complex society This convergence of factors coupled with the availability of digital networks is driving change at an unprecedented pace.

In chapter 2, you will examine the technology and its impact on workplace environments. The ability to use technology to enhance individual, work-group, and

organizational performance will become increasingly important in the twenty-first-century workplace. This ability requires a thorough understanding of organizational development and change leadership as well as information technology skills. The technology will advance much faster than the ability to use it. The ability to understand the implications of new technologies for how we work, to break old behavior patterns, and to change our paradigms unfortunately comes much more slowly.

2.2 THE CHANGING WORKPLACE (PROCESS)

Probably the most profound impact on the workplace over the next few decades will be the impact of the Internet and other networking technologies. Digital networks will transform the workplace in ways that most people hardly can imagine today. As we look back 100 years and compare life in 1900 to our life today at the dawn of this new millennium, the changes are profound. Among the myriad of new technologies, the twentieth century has brought electricity cars, televisions, airplanes, telephones, microwaves, rocket ships to the moon, guided missiles, computers, and the Internet. Each of these technologies has brought wide-ranging cultural changes, as well. Take the automobile, for example. Whereas paved roads, gas stations, repair shops, and tire manufacturers may not have been too difficult to predict, how many do you suppose foresaw today's superhighways, motels, the RV industry, drive-in restaurants, drive-up banking, car washes, commuter traffic jams, and automobile insurance among the hundreds of spin-off industries and cultural changes? Although few if any may foresee or predict, we can be certain that the changes that will occur over the next 100 years will be as great if not greater in magnitude.

Digital networks will transform not only the workplace but many other aspects of modern life, as well. This transformation is underway already. Networked organizations foster virtual environments where people work from home and remote locations. Work teams are spread out around the world, not just in business but in almost every field of endeavor including science, politics, medicine, art, and music. The Internet has spawned new virtual learning environments and virtual communities brought together around common interests. The impact of technologies— such as webcasting, Internet telephones, streaming audio and video, net meetings, wireless computing, and much more—is just beginning to be felt.

Enterprises must leave behind aging models and career paths that evolved out of the Industrial Revolution. "In the old-fashioned career path, employees came to the same building for the same hours, paid their dues and climbed the ladder," says Bruce Tulgan, founder and CEO of Rainmaker's Thinking, Inc., a workplace consulting firm based in New Haven, Connecticut. "But a smaller and smaller number of employees fit that model. You have to do business now with a fluid talent pool. It means a fundamental rearrangement in the way you organize your business and the way you handle staffing, a new way of looking at your human resources, a new way of motivating employees that goes beyond simple retention strategies."[2]

Digital networks are having their greatest impact in creating new and. powerful bonds among customers, suppliers, and business partners. In the digital economy, speed and agility are paramount. The impact goes far beyond business, however, touching every

aspect of life in America and, perhaps even more significantly, the world. A *Newsweek* issue devoted to e-life (see Spotlight, The Dawn of E-Life, page 43) concluded, "What is certain is that America has digitized, and there's no going back. .. . The corner has been turned, but only just. We're at the beginning of a new way of working, shopping, playing, and communicating."[3]

Although this text focuses primarily on business, digital networks are having a profound impact on many aspects of life. In this section, we examine briefly some of the workplace changes that various sources are observing or forecasting as digital networks reach critical mass.

2.2.1 Anytime, Anyplace Environments

In networked enterprises, workers will have access to almost everything they need via the desktop and portable PCs. We're moving to a world where fairly simple personal companion devices will proliferate side-by-side with powerful PCs that support knowledge work at home or the office—or anywhere in the world. Workers can carry with them incredible amounts of information or be connected to anyone or anything in the enterprise as they need it from anywhere.

An Internet presence makes enterprises instantly global, opening up new opportunities for products and services, but also making new demands upon the organization. The boundaries of what we think of as an organization are going to blur. How work is transacted will change in ways yet unforeseen.

As Internet capacity expands, we are seeing a convergence of data-, text-, voice-, and video-enabled applications. People have greater access to bandwidth from home and office. In fact, it is becoming so easy to stay connected and plugged in that the distinction between private and public enterprises and between our private and pubic lives is blurring. If you have full access to your desktop from home, hotel, plane, and even a vacation cottage, when are you on the job and when are you off the job? It works the other way, as well. With cellular phones, pagers, instant messaging, and computer monitoring, parents can more easily keep in touch with children from the office or anywhere. Day care centers are even beginning to install computer monitors so parents can check in and see their children at work or play, reassuring themselves that all is well.

2.2.2 A 24/7 Global Digital Economy

The twenty-first-century workplace never sleeps. Global enterprises operate on a 24-hour clock, 7 days a week. Although the New York office may be closed, employees in China or Australia are in the middle of their day. They may need access to information from company operations in New York or San Francisco.

Some call it the digital economy. Some call it the knowledge economy. Whichever you prefer, today's global information infrastructure provides instant access to information that enables executives to react quickly to opportunities that emerge anywhere in the world. Billions of dollars can be moved around the world in seconds to take advantage of changing opportunities.

In 1998, the Commerce Department issued its first report on the emerging digital economy, revealing that about one third of the nation's real economic growth

SPOTLIGHT ON SOLUTIONS Technology, People, Structure, Processes

THE DAWN OF E-LIFE

WAS THERE A SINGLE MOMENT WHEN WE TURNED THE CORNER? When we moved from a culture centered on network television, phones with wires, information on paper and stock prices based on profit into a digital society of buddy lists, streaming video, Matt Drudge and 34-year-old billionaires in tennis shoes? Did the transition come with the Deep Blue chess match, when millions of Web surfers watched a stack of computer chips dominate the world's greatest player in a test of "intelligence"? Could the global outburst of online mourning after the death of Princess Diana have marked our passage? Did it come last Christmas, when hundreds of thousands of shoppers avoided malls and clicked through their gift lists? Or was it the online lingerie fashion show? The online birth? And just when did putting an e-mail address on a business card stop marking you as ahead of your time?

Let the chat rooms debate what marked the turning point. What's certain is that America has digitized, and there's, no going back. Worldwide there are almost 200 million people on the Internet. In the United States alone, 80 million. The numbers tell just part of the story:

The Net is no longer a novelty an interesting way to pass the time. A third of wired Americans now do at least some of their shopping on the Net, and some are already consulting doctors on the Net, listening to radio on the Net, making investments on the Net, getting mortgages on the Net, tracking packages on the Net, getting news on the Net, having phone conversations on the Net, checking out political candidates on the Net. Each of these activities is impressive, but the aggregate effect is a different kind of life. Our goal in this special issue of *Newsweek* is to examine what's happened, why, and how the Internet is changing the way we live now.

It s been 30 years since the Internet s predecessor the Arpanet, was switched on to help academics and government wonks get connected Ahnost25 years since the first software for personal computers (co-written by some kid named Bill Gates) About 5 years since the Net became ***in*** effect the world s grandest public utility driven by a combination of cheap powerful PCs, a remarkably scalable infrastructure that sped up our connections (though not enough), and easy-to-use

browsing software that took advantage of the Net's open rules. And maybe 3 or 4 years since concocting Internet business schemes became the world's most desirable creative outlet, the contemporary successor to writing the Great American Novel.

The triumph of tech, for better or for worse, is far from complete—in schools, businesses, operating rooms, labs, banks or the halls of government. Just about everything we've ever done that has to do with communication and information has been digitized, and now we're going to start tackling stuff that hasn't been done because you can do it only with the Internet. And if you think up something that fits that bill, there's a venture capitalist in Palo Alto who will whip out a huge check for you. Even the most knuckleheaded CEO—the kind of guy who used to think it was beneath him to put a terminal anywhere near his mahogany desktop—now knows that job No.1 in the firm, no matter what the company does, is to figure out how to become an *Internet* company, because he can be sure that his competitors are.

It's crucial to assess the impact of this shift, because the digital revolution is much more profound than a mere change of tools. The Internet is built on both a philosophy and an infrastructure of openness and free communication; its users hold the potential to change not just how we get things done, but our thinking patterns and behavior. Bound together by digital mesh, there's hope we may thrive together—if some nagging, unanswered questions find felicitous answers. Can a spirit of sharing be maintained in the face of the need to recoup huge investments? Will persistent secur**ity** holes—both personal and national with the threat of cyberwar—erode our confidence in this new medium? Is it really possible for governments to forgo their impulses to regulate the Net with their usual heavy handedness? How will the bounty of the digital age be distributed fairly?

The corner has been turned, but only just We re at the beginning of a new way of working, shopping play mg and communicating At *Newsweek* we re calling this phenomenon e-life, and it's just m time Because the day is approaching when no one will describe the digital Net-based computer-connected gestalt with such a transitory term. We'll just call it life.

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came from information technologies. This revelation has led economists to begin looking for a new definition of output transcending the industrial era concept of widgets coming off the assembly line. New terminology, such as *knowledge assets* and *intellectual capital,* are creeping into the language of economics.

Renowned economist and best-selling author Lester Thurow believes that "knowledge-based capital, along with the advent of electronic commerce and a true global economy, are changing the very rules of economics and society" In his book *Building Wealth: The New Rules for Individuals, Companies and Nations in a Knowledge-Based Economy* (HarperCollins, 1999), Thurow says that the basis for the new economy is the proliferation of knowledge.[4]

This new digital or knowledge economy is increasingly innovative and entrepreneurial in contrast to the slow-changing, more static economy of the industrial era. Enterprise leaders wishing to succeed in the new digital economy must embrace and adapt quickly to change. Technology increasingly will be a driver of business change, as faster, broader networks become more ubiquitous. Business leaders and CIO's, or technology leaders, must work in closer partnership. End users across the enterprise must become more savvy about how to harness the technology at their desktop to improve their own productivity, as well as to enable and support business innovation and change at all levels.

2.2.3 Teamwork and Collaboration

Society has become too complex for individuals to work meaningfully alone. Companies that hope to win in the twenty-first century must find new ways to foster and reward information sharing and collaboration. This need for collaborative work processes flies in the face of long-engrained hierarchical structures and management practices. Breaking established patterns of thought and action can be near impossible, especially when reward structures are still geared to recognizing individual performance. Implementing collaborative tools, such as *Lotus Notes,* has minimum impact on how people work unless the business processes change, as well. In fact, some sources estimate that no more than 10 percent of *Lotus Notes* projects actually employ its collaborative functions, such as discussion databases.[5] The collaborative aspects are underutilized not because of faulty technology, but because the technology often is deployed without considering how the organizational structure must change to support it.

Collaboration is fundamental because it gets to the notion of participation, which is necessary to understanding. What you learn from a lecture or reading is transformed into personal knowledge when you debate in groups and start to solve problems. We learn from and with each other. The question is how to build a culture in which that kind of learning is deeply honored. In today's knowledge economy, we need to look at how communities can work together to create shared understandings.[6]

In the digital economy, collaboration is no longer an option. Collaboration will be an essential ingredient for success in the years ahead. It is the key to unleashing the energy in people, bringing the benefits of diverse thinking to solving problems, and fostering a culture of innovation.

To succeed in twenty-first-century enterprises, workers must collaborate effectively so that all of the key people on a project are well informed and energized. Collaboration on a widespread basis makes for a stimulating, energized workplace. When a critical mass of capable people work in concert, it creates synergy. New ideas are generated through

cross-stimulation, and less-experienced employees are pulled along to a higher level. The company as a whole works smarter.[7] The ultimate goal is for work teams to identify and develop the best ideas from throughout an organization and then act with the same unity of purpose and focus that a single, well-motivated person would bring to bear on a situation. Digital networks, which facilitate information sharing and communication, can help bring about this group cohesiveness. The technology in itself doesn't make a collaborative culture; that starts from the top. Digital information flows, however, reinforce collaboration, making it possible for bright people all over a company to be in touch with each other.

2.2.4 Fast Moving and Flexible

Increased global competition and rapidly changing customer behavior are driving shorter business cycles. Decision makers must be able to act quickly in this brutally competitive environment. Accurate and timely information is vital to defending, maintaining, and advancing an enterprise's position in the market.

In the digital economy, market environments change fast. New business models, like that employed by Amazon.com, can change the rules of the game and transform an industry. *Time* named Amazon.com's CEO, Jeff Bezos, as "person of the year" because "e-commerce is changing the way the world shops." The same *Time* edition also features the story of e-Bay, "the other e-commerce revolutionary" These .com companies deploy two very different approaches, both of which are shaking up old industrial world models. "E-Bay's many-to-many approach to selling—the world is just one big auction—completely opposes Amazon.com's one-to-many, fixed-price model, and it has been profitable from day one." Both companies made the rest of the retail industry scramble. Moreover, rather than being a cold, impersonal world, cyberspace is giving new meaning to the word *community.* "For many people e-Bay does what communities have traditionally done. It not only provides them financial systems, but also draws them together with like-minded folk, offering encouragement, rewarding unique talents and interests, giving them an outlet for their eccentricities and individuality. Arid in some cases, rescuing them from the margins where they would otherwise languish alone." Fans suggest that e-Bay represents a return to earlier one-to-one sociability or perhaps even improves on it, because the Internet diminishes the traditional divisions of geography and class.[8]

To compete in the twenty-first century, enterprises must be fast moving and flexible. The chairman of Microsoft Corporation, Bill Gates, sees it this way:

The twenty-first century will be about velocity: the speed of business and the speed of change. To stay up with and anticipate change, businessesneed radically better information flow. To get a better flow of information to develop the right processes and strategies, they need a digital nervous system. Most organizations don't have enough data to understand key aspects of their business well enough. A digital nervous system will help you understand your business better and then act more effectively on that understanding. An infrastructure designed around information flow will be the "killer application" for the twenty-first century.

If the 1980s were about quality and the 1990s were about reengineering, then the 2000s will be about velocity. About how quickly the nature of business will change. About how

quickly business itself will be transacted. About how information access will alter the lifestyle of consumers and their expectations of business. Quality improvements and business process improvements will occur far faster.

We have infused our organization with a new level of electronic-based intelligence. I'm not talking about anything metaphysical or about some weird cyborg episode out of *Star Trek.* But it is something new and important. To function in the digital age, we have developed a new digital infrastructure. It's like the human nervous system. The biological nervous system triggers your reflexes so that you can react quickly to danger or need. It gives you the information you need as you ponder issues and make choices. You're alert to the most important things, and your nervous system blocks out the information that isn't important to you. Companies need to have that same kind of nervous system—the ability to run smoothly and efficiently, to respond quickly to emergencies and opportunities, to quickly get valuable information to the people in the company who need it, the ability to quickly make decisions and interact with customers.

The successful companies of the next decade will be the ones that use digital tools to reinvent the way they work. These companies will make decisions quickly, act efficiently and directly touch their customers in positive ways. I hope you'll come away excited by the possibilities of positive change in the next ten years. Going digital wifi put you on the leading edge of a shock wave of change that will shatter the old way of doing business. A digital nervous system will let you do business at the speed of thought—the key to success in the twenty-first century.[9]

In the digital economy, market environments change faster than the most competitive company can respond on its own.[1°] This is one of the factors driving corporate mergers. Enterprises can acquire expertise and knowledge faster than they can develop it in-house. From the knowledge management perspective, the best merger partners are those with complementary strengths. "Increasingly," wrote Tom Davenport and Larry Prusak in *Working Knowledge,* "firms acquire other companies specifically for their knowledge."[11] Twenty-first-century enterprises need to be fast and flexible.

2.2.5 Just-in-Time

The byword in networked organizations is *just-in-time.* It started with just-in-time supply methods and stockless inventory systems. Strategic systems for linking customers and suppliers have changed the way many enterprises—including factories, hospitals, and retailers—handle the supply and inventory requirements of their businesses. Just-in-time supply methods reduce inventory requirements by tightly integrating the ordering and delivery of materials, thus greatly reducing inventory levels and associated costs. Stockless inventory goes a step further, delivering goods to the floor as they are needed, effectively eliminating inventories entirely and out-sourcing responsibility for inventory management to the supplier. Wal-Mart's legendary inventory replenishment system, which is triggered directly by point-of-sale purchases, has propelled it to the position of number I retailer in the nation.

The concept of just-in-time has many other dimensions, as well. Online help and electronic performance support systems provide just-in-time job aids, which are context specific. Corporate universities deliver training at the desktop to knowledge workers just-in-time as new assignments require.

2.2.6 Process Oriented (Versus Functional)

Digital networks offer enterprises fundamentally new ways to expand their markets, streamline their corporate business processes, and attract and retain customers in new and innovative ways. By becoming more process oriented, enterprises are reducing the influences of bureaucracy and linking their internal operations more directly to meeting customer and market demands.

A *business process* refers to the unique way in which an enterprise organizes and coordinates work activities and resources to produce a product or service. Business processes are generally cross-functional, transcending the boundaries between sales, marketing, manufacturing, research and development, accounting, and human resources. A business process generally represents a concrete work flow that is linked directly to serving customers. Examples include new product development, which turns an idea into a manufacturable prototype, and order fulfillment, which begins with receipt of an order and ends with payment for a delivered product or service. The order fulfillment process generally transcends the functions of sales, accounting (credit checking, billing, and accounts receivable), manufacturing, shipping, and possibly installation of complex equipment, for example.

E-business has escalated the focus on business processes, often fundamentally changing the business model underlying how business has been conducted traditionally. The business process view provides the basis for reengineering and other corporate change efforts. By focusing on a complete business process that is linked directly to achieving corporate objectives and meeting customer and market demand, enterprises have been able to streamline work flows, significantly reducing cycle times and costs. The most successful efforts have been associated with radical changes in the underlying business models—often having a major impact on an entire industry. The success of new business models on the Internet, such as those underlying Amazon.com and e-Bay, have underscored the critical importance of enterprises focusing on their key business processes and executing them well. Business reengineering and organizational change are discussed in more detail in chapter 11.

2.2.7 Innovation

Innovation isn't just the new strategy; it's the only strategy for businesses that want to thrive in the new millennium.'[2] Innovation always has been something at which U.S. industries have excelled. In the new, global knowledge economy, the need to continue to invest in innovation has become even more urgent.

Although innovation can start anyplace in the enterprise—manufacturing, marketing, even IT—it cannot succeed without a lot of support from senior management. According to *CIO Magazine,* innovation is core to the culture of most enterprises that made the CIO 1999 List of Top 100 Leaders for the Next Millennium. "Senior executives have opened their doors to new ideas and new ways of doing business. They have found creative ways to motivate and reward employees at all levels of responsibility to rethink their jobs—to concentrate less on the task at hand and more on tomorrow's needs and solutions."[13]

With a shorter and shorter grace period for companies to grab market attention~ for their products, technological breakthroughs can no longer assure a company dominance for

years to come. Innovation must be an integral part of a company's culture, and enterprises need to provide the support and resources for workers to excel at it. For instance, 3M asks employees to spend 15 percent of their work-week daydreaming about new inventions. Nokia routinely polls employees for product suggestions. Such policies must be seen as potential revenue builders— not as overhead. It's a leap of faith that companies must be willing to make.[14]

2.2.8 Knowledge Age Learning Organizations

Competition and decision making are increasingly knowledge based. As firms become more far flung, employees become even more mobile, and business grows ever more complex, keeping tabs on corporate knowledge has become increasingly challenging. The problem today is not information; it's information overload. In essence, the problem of putting your finger on the right information at the right time has been compounded. It's not just information; it's information in context. It's knowing who's working on what and who knows what. It's about how to better leverage the experience and expertise of people and to provide an environment for knowledge sharing. In the networked organization, the need for coordinating information flow and managing knowledge across the enterprise has grown exponentially—and so have the options for addressing this need.

One of the most dominant trends to emerge in the past couple of years is the concept of *knowledge management* (KM), which is managing knowledge for strategic advantage. When the earlier edition of this text was published, the term *knowledge worker* was just emerging, and terms such as *knowledge management*, *Knowledge Age*, *knowledge economics*, and *enterprise portals* didn't even exist. The American Productivity and Quality Center (APQC) in Houston describes KM as a conscious strategy of getting the right information to the right people at the right time so that they can take action and create value. A new trade magazine titled *Knowledge Management* began publishing in October 1998. According to the magazine editors, KM as a discipline has been on a slow but sustained growth curve that is likely to continue ascending for years to come. KM is multidimensional in nature and hard to define. It cannot be purchased in a box. It is not simply a market opportunity, nor just a management approach. It is not the exclusive province of the employer or the employees. It is not wholly owned by IT, human resources, executive management, or the lines of business. Most of all, based on tracking KM trends, issues, products, and applications it is not just another management fad.'[5]

Managing knowledge and transferring best practices is simple in concept but difficult in execution. Knowledge management is discussed in detail in chapter 5.

An even more recent concept is the *enterprise portal*, a single, browser-based point of entry to all of an enterprise's knowledge assets. In a nutshell, an enterprise portal is a Web-based front end to internal and external information that is classified according to a company-specific information taxonomy. One important characteristic of enterprise portals is that they bring together structured information from corporate database systems and unstructured information from document management systems, e-mail, and Web pages. Another important characteristic is that they use some form of automated classification technology to sort information into useful content categories.[16]

Ultimately, KM will have profound implications for the roles of individual workers. While it may be difficult to define KM precisely, real benefits are to be gained from engaging people throughout an enterprise to focus their intellectual abilities on innovation and hard-to-solve problems, rather than simply dealing with and maintaining routine tasks. Digital networks open up new options for enabling the flow of information and data within an enterprise. Our

Information Age society has become too complex for individuals to work meaningfully alone. Even the medical profession has been affected:

> At the moment, only one physician in four even uses a computer at work. But that is sure to change. I see patients in the office and the hospital. I do house calls. I'm on call at the hospital tonight. And the care I give depends on the information I command. Medicine has gotten too complex to practice from a dog-eared textbook. Fortunately, there is now an alternative. InfoRetriever and other portable databases won't make doctors obsolete. But doctors who lack them may soon be just that.'[7]

Another major trend in response to the increased demand for continuous learning is *corporate universities.* According to Corporate University Xchange Inc., a New York City-based consulting and educational research group, more than 1,600 companies, including nearly half the Fortune 500 companies, maintain corporate universities. Corporate universities are "less a place to go to for training than a metaphor for continuous learning."[8] To illustrate the magnitude of these efforts, average annual budgets in 1999 were $17 million, up from $13 million in 1998.

Corporate universities have evolved primarily in response to the increased need for continuous learning in the fast-paced, digital economy. Ninety percent of those 1,600 companies offer at least some virtual training. Proponents expect the growth of the virtual university component to continue because it fits well with a knowledge-based digital economy. Enterprises need to train more people on more topics and to do it faster, on a worldwide basis, and at lower cost. Web-based technology allows enterprises to provide that training anywhere, anytime. Workers study at their own pace, skip sections that aren't relevant, repeat sections as needed, and do it right from their desktop or home computers. Corporations are also finding that Web-based curriculums provide an effective tool for creating a unified culture, which is particularly important as companies grow, merge, and globalize. Corporations can use it, for example, to make training available to geographically dispersed teams and to share lessons learned by a team in japan with others in dozens of locations around the globe.

Bain Virtual University, launched in June 1998 by Barn & Company, a Boston-based consultancy, wanted to create a central, consistent, constantly updated learning source available all the time to all employees at 25 offices worldwide. Cox University, launched in July 1998 by Cox Communications, serves 50,000 employees in 200 locations. Its mission is to help Cox meet its business goal of becoming the leading telecommunications and media company in its market. Conoco University elected to go virtual because "We are a global corporation that happens to have a Houston headquarters. The university had to live in the conference rooms and corridors of Conoco around the world, not just be an initiative from Houston."[19] Conoco offers Web-based learning programs around three major themes: executive development (open to only th~ top 200 to 300 leaders), shared purpose and direction, and fundamentals for the future.

2.3 THE TWENTY-FIRST CENTURY WORKFORCE (PEOPLE)

How will the third millennium workforce differ from that of the twentieth century? For starters, "perhaps they'll banish the term *human resources,* an Industrial Age invention that seems to imply individuals, like coal, conveyor belts or chairs, are commodities to be

maintained."[20] In the meantime, some of the new position titles that are emerging are revealing. Figure 2-1 shows a number of titles gathered randomly from recent computer trade magazine articles.

Forecasters say that the average worker of the future will have six or seven different careers, each requiring new skills, new attitudes, and new values.[21] Continuous learning is now a hallmark of careers in the new economy. Post-secondary institutions no longer produce fully and permanently qualified professionals. Students and graduates planning careers can no longer predict what skills and competencies will be required in the years to come. Success increasingly depends on continuous learning and knowledge management, both of which can be aided by information technology.

No one can foresee all the changes that will happen to workers, organizations, governments, and society as we move into the digital age. What is sure is that life in cyberspace enterprises will be significantly different than in the industrial firm. In the sections that follow, you will explore some of the ways in which digital networks are transforming the workforce.

2.3.1 Shifting People into Thinking Work

Information work is thinking work. Most routine, repetitive work has been automated or, if not, ought to be. That's what computers do best—routine, repetitive tasks. At the same time, people are freed up to do the thinking work—answer questions, handle the exceptions, solve problems, and create better products and services. Yet, many companies still hire and manage staff as they did 30 years ago when routine, repetitive tasks made up the majority of work. Consequently, problems do not surface until irate customers call. Customers are told that's the way the system works, and they spend hours on the telephone being passed from one department to another to resolve problems.

Enterprises need to reexamine the ways in which they use IT to handle routine tasks. Digital networks give enterprises new opportunities to provide the human touch where it matters. Service levels that were acceptable in the past no longer meet the expectations of today's more demanding consumers. The difference is dramatic between getting a note that was clearly written by a person versus a computer-generated form letter, or receiving a phone call about a billing problem or order from a person versus a computer. It's of tremendous value to have a person working with a customer who is unhappy about something important or who has special needs. With the aid of smart systems, a service worker's span of control can be expanded easily to shift responsibility from executing transactions to satisfying clients. In a hotel, for example, digjJa1 networks can streamline the check-in and check-out processes dramatically and solicit routine feedback, freeing up staff time. Guests who prefer might simply walk up to a lobby kiosk and check themselves out or do it from the room before leaving. How much value would hotel guests gain if half a dozen additional people were acting as concierges instead of as clerks? Improvements could include answering the phone before the second or third ring, not being left on hold, getting prompt assistance with service needs, or perhaps offering new services.

Having workers focus on whole processes allows them to tackle more interesting, challenging work at the same time that it improves customer service. It also engages them, fosters a greater sense of responsibility, and helps keep the focus on the end in mind. One-dimensional jobs (tasks) can be eliminated, automated, or rolled into a bigger

process. One-dimensional, repetitive work is what computers, robots, and other machines are best at and what people are poorly suited to and generally find boring and distasteful. Managing a process instead of simply executing isolated tasks makes someone a knowledge worker. Digital networks make it all possible.

2.3.2 Diversity

Demographic diversity will continue to have a striking impact on business, education, and many other aspects of life. Diversity is not only tolerated, it is a distinct advantage for competing in the global marketplace. Dissent is to be encouraged because it encourages workers to think for themselves. The ability to appreciate diverse thinking and constructively manage conflict are critical skills for twenty-first century workers. *Failure* should never be a dirty word because fear of failure begets fear of risk. Creating such a culture is not an easy task. It is a critical one, however, because timidity and conservatism can cause a company to lag behind.

2.3.3 Taking Ownership, Empowerment; Broader Jobs

A culture of empowerment is key to succeeding in a knowledge economy. It is knowledge workers and business managers who benefit from more and better information, not just senior managers. When workers get access to digital networks and IT tools that deliver better results, they demand more. Moreover, with the support of digital networks, scope of responsibility can be expanded, effectively shifting the horizon of workers from completing isolated tasks to contributing toward corporate goals. Twenty-first century corporations must empower knowledge workers and organize for learning:

> Aim for distributed power. Concentrating power in a few people at the top is contrary to competitive output. Concentrated power creates expectations that decisions are made “somewhere up there.” It sub-optimizes available brain power, creating an enormous under-utilization of the intellectual abilities available lower down in the organization. While distributed power

Figure 2-1 Emerging new job titles

Senior adviser on learning and organization development, BP Amoco
Vice president of business development process change, Gateway
Vice president of electronic commerce, Gateway
Vice president of global architecture, Gateway
Vice president of knowledge management, Gateway
Vice president of global applications, Gateway
Knowledge architect, Hallmark
Senior director, knowledge management, Pillsbury
Ernst & Young chief knowledge officer (CKO)
Mentoring director
Staff strategist
Communications facilitator
Manager of strategic innovation
Career coach
Internet strategist

may be time-consuming and frustrating, history has shown it very effective in business. When top managers end the frustration by stepping in, they destroy the conditions for maximizing available talent.[23]

Knowledge empowers. The old corporate cliché about distributing information on a need-to-know basis is antithetical to empowerment. It suggests that somehow someone "up there" knows what everyone else in the organization needs to know. It suggests that knowledge workers are still Industrial Age cogs who should be doing repetitive, single-task jobs. It suggests that workers should not step outside the box. Progressive CEOs agree:

A company's middle managers and line employees, not just its high-level executives, need to see business data. It's important for me as a
CEO to understand how the company is doing across regions or product lines or customer segments, and I take pride in staying on top of those
things. However, it's the middle managers in every company who need to understand where their profits and losses lie, what marketing programs are working or not, and what expenses are in line or out of whack. They're the people who need precise, actionable data because they're the ones who need to act. They need an immediate, constant flow and rich views of the right information. These employees shouldn't have to wait for upper management to bring information to them. Companies should spend less time protecting financial data from employees and more time teaching them to analyze and act on it.[24]

Fast, open communication will play a critical role in shaping organizations in the digital economy. Changing the way individuals can communicate, will also change how most organizations work. For instance, e-mail has helped flatten many corporate hierarchies by providing entry-level employees unprecedented direct access to top decision makers. Traditionally, it was viewed as an act of warfare if an employee carbon-copied the boss's boss on paper. In e-mail, however, individuals do it all the time—without repercussions. Empowerment requires creating a culture where people at all levels of responsibility are listened to and encouraged to report the bad news as well as the good. For example, the impetus for Microsoft's response to the Internet, according to Bifi Gates, did not come from him or the other senior executives. It came from a group of dedicated employees who recognized the power of the Internet early on and took advantage of Microsoft's policy that smart people anywhere in the company should have the power to drive an initiative. In many ways, according to Gates, technology has shaped the policy. "Do people all over my company feel free to send me e-mail because we believe in a flat organization? Or do we have a flat organization because people have always been able to send e-mail directly to me? For years, everybody at Microsoft has had a PC and e-mail access. It's a famous part of our corporate culture, and it's shaped the way we think and act."

2.3.4 Pay for Performance

The pursuit of a job for life no longer drives employees in today's knowledge economy. Instead, flexible career paths are becoming the norm. Employees look for opportunities to continue to expand their knowledge and experience and to enhance their resumes or

portfolios in the process of completing assignments and contributing to projects. Many employees today want a challenge as well as a paycheck.

The changing marketplace is forcing enterprises to come up with inventive, new ways to inspire and reward good performance. In response to changing competitive pressures, enterprises need greater flexibility to assign and reassign workers. As workers rotate on different projects, they may no longer report to one manager long enough for the old standard, annual performance review processes to be valid. Enterprises are focusing more on the requirements of specific projects and needs as they arise. They are developing inventories of employee competencies and skills and assigning and reassigning workers when and where needed. Compensation is based on the level of knowledge, skills, and experience and demonstrated performance as opposed to time in the job.

Face time and seniority count for less than they did formerly when it comes to recognition or promotion. Speed and efficiency are what matter most. The worker who boasts that he or she spent 80 hours in the office this week on a project wifi not win. Instead of "that's great," the response is likely to be "you needed 80 hours for this?"

Work assignments are increasingly defined in terms of specific results to be delivered within a certain time frame. Parameters and requirements are agreed upon, and the work does not necessarily have to be done in the office from 9 to 5. Work can be completed anytime, any place.

2.3.5 Telecommuting, Flexible Work Hours

New work styles include more relaxed work environments and dress. Flexible work hours, job sharing, and telecommuting are becoming increasingly commonplace. On-site or company subsidized day care, mother's lounges, and childbirth and adoption leaves for men and women are among the benefits designed to make the workplace more flexible to attract and retain high quality workers. Savvy enterprises recognize that to attract and retain quality employees, their workplaces must be transformed into truly diverse, flexible environments that enable workers to balance their personal lives with their professional lives.

2.3.6 Work Groups without Borders

Teams and work groups increasingly have no borders but are geographically dispersed. As more and more business happens almost entirely online—and as the lines among companies and their partners, suppliers, and service providers blur— the new collaborative applications are becoming essential for completing projects or executing business transactions without being hampered by the limitations of time and geography. As indicated by a recent survey of 400 professionals from various industries, shown in Figure 2-2, a new generation of workers is embracing "boundary-less" work arrangements. Whereas the over 50 set is apprehensive about breaking down the corporate office, feeling that boundary-less workers are less respected and may have reporting problems, younger workers feel just the opposite.

Digital networks change what is possible and practical. The costs of information and coordination are dropping. New avenues are available for coordinating the efforts of globally dispersed workforces. Instant messaging and real-time collaboration can be highly effective in coalescing geographically dispersed work groups. Applications like

customer—relationship management and online customer service can take advantage of real-time collaborative software to provide customers and partners with an immediate, high-touch level of communications. Team members can use instant messaging to exchange just-in-time messages, the equivalent of shouting over the top of the cubicle wall for help.

2.4 LIFE IN THE WORLD OF E-BUSINESS AND E-COMMERCE (ORGANIZATIONAL STRUCTURES)

Digital networks have opened new ways for conducting business inside (e-business) and outside (e-commerce) the enterprise. Life in the world of e-business and e-commerce is essentially business without boundaries. The Internet provides new channels of communication and interaction that can be used to create closer relationships with customers in marketing, sales, and service. The Internet brings an immediacy and reach to relationships that have no parallel in the Industrial Age economy.

E-commerce offers enterprises fundamentally new ways to expand the markets in which they compete; to streamline their corporate business processes to deliver products and services more efficiently; to attract and retain customers in new and innovative ways; and to deliver better, more personalized customer service. E-commerce is not without risks, however. Market conditions constantly change as new competitors enter markets with new business models. Customer loyalty is fleeting as customers are just a few clicks away from switching to competitors. Moreover, competitive advantage can be short-lived as traditional barriers are rendered irrelevant by technological advances.

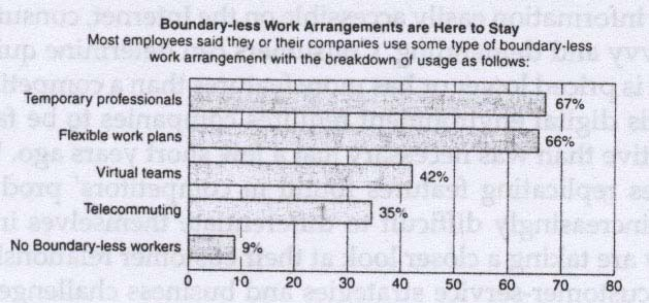
Relationships, both business to business and business to consumer, are key as firms learn to create online business communities. This concept of community— enabled by electronic networks—runs contrary to the individualistic competitive models of the past century~ According to Don Tapscott, chairman of the Alliance for Converging Technologies, "Driven by the need to reduce supply chain costs and respond more quickly to end-user demands, communities of companies are using networks to trade with one another and create products or services that draw on the talents of many players. Digitally savvy firms in every industry are beginning to use this model to establish the conditions for value creation and dominance."[26]

In the long run, e-business—the use of Internet and other digital technology for internal organizational communication, collaboration, and coordination of business processes—may have an even greater impact than e-commerce. The use of internal networks based on Internet technology—called Intranets—is soaring. Their ease of use and low cost provide a huge advantage over other internal networks. The seamless interface with the Internet provides another major advantage. Internal applications are expanding rapidly and include publishing personnel policies, electronic forms, catalogs, employee handbooks, and many other types of proprietary documentation; reviewing account balances; scheduling revising design documents; and hundreds of other applications. Even more far reaching, perhaps, are the new opportunities to create collaborative environments, in which knowledge workers can share information, exchange ideas, and work together on projects and assignments regardless of geographic location. Collaborative tools include e-mail, fax, voice mail, bulletin boards, newsgroups,

groupware, discussion boards, chat moms, teleconferencing, and more. These tools are described and discussed in chapter 4.

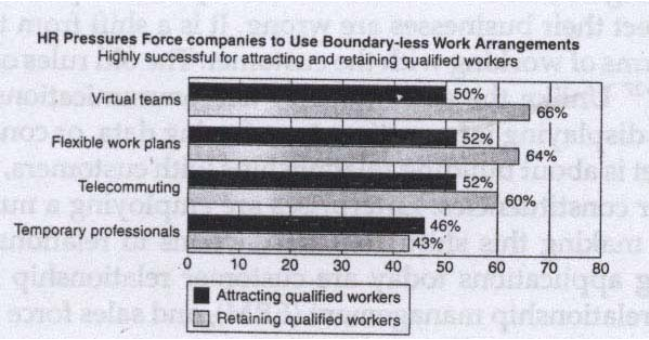
Both e-business and e-commerce can fundamentally change the way business is conducted. They open up new horizons for what is economically and practically feasible by reducing the cost of information and coordination. More than ever companies are in a position to create wealth by adding knowledge to each product at each step.

Welcome to the post-industrial live-work space. Corporate dress codes have eased, and now the corporate work environment is becoming amorphous. We're seeing the age of the regimented company left behind as we step toward the new millennium, where technologies are not only providing new business opportunities but are also enabling workers to balance their personal lives with their professional ones. Ceridian Employer Services, a human resources solutions company, surveyed about 400pm-fessionals from a number of industries and found that the younger element of the workforce is embracing what they call a "boundary-less" work arrangement. The breaking down of the corporate office structure includes working in virtual teams, telecommuting, flexible work plans and temporary, project-based contracting.



Tools offer flexibility

Surprisingly, senior executives and HR managers were the least interested in investing in technology tools, while workers and their managers saw extreme benefit in online training, the Internet and home fax machines. The Internet ranked number one as the tool that best supports working away from the office or in some other "boundary-less" format.

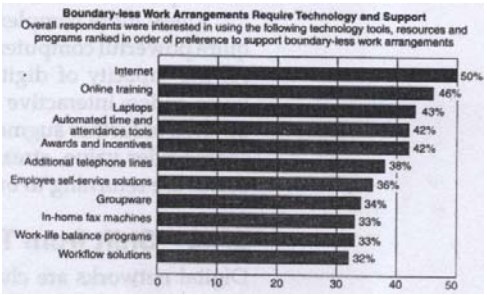


Generation gap

Those free-loving participants of the '60s Generation take the conservative road here, while their offspring and their younger cousins, Generation X, embrace a boundary-less arrangement with open arms. Those over 50 are particularly apprehensive about breaking down the corporate office, feeling that boundary-less workers are less respected and will have more reporting problems. The younger— and likely more technologically savvy—workforce feels just the opposite.

Boundaries are out

Most companies offer some sort of "boundary-less" work plan'—whether it's virtual teams, flexible work schedules or employing temporary professionals. But the younger companies, like their younger employee counterparts, are trailblazing the flexible corporate landscape. Companies younger than 10 years old are almost twice as likely to increase their use of virtual teams as older companies



Keeping your talent

Employees are quick to jump ship nowadays for sweeter deals with the competition. Among the incentives are money, training, advancement opportunities and more lately, flexible work environments. Giving a worker more control over his career will likely keep that person around longer.

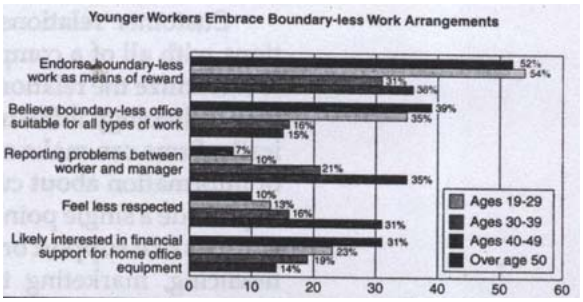


Figure 2-2 A new generation of workers embraces the "boundary-less" company

Source: Survey conducted by Ceridian Employer Services and published in *Knowledge Management Magazine,* 2 (May 1999) p.32

2.4.1 The Customer Is King

With so much competitive information easily accessible on the Internet, consumers are becoming far more savvy and demanding. Consumers can determine quickly which company's product is priced lower or has more features than a competitor's product. Competing in this digital environment requires companies to be faster, more agile, and more creative than was necessary just a few short years ago. With more and more companies replicating features found in competitors' products, companies are finding it increasingly difficult to differentiate themselves in the marketplace. Instead, they are taking a closer look at their customer relationships.

These more complex customer-service strategies and business challenges require powerful computers on both sides of the relationship—vendor and customer. As the capacity of digital networks expands, various electronic means such as voice, video, interactive use of the same computer screen and so on will be incorporated to further augment the new relationships. Thus, after focusing for years on shareholder value, streamlining business processes, and eliminating jobs, enterprises are returning to building their companies on a customer-centric model.

2.4.2 Shift from Transactions to Relationships

Digital networks are changing business in fundamental ways. "Companies that think e-commerce won't affect their businesses are wrong. It is a shift from transactions to relationships in terms of working with the customer. The old rules of customer service don't apply."[27] Unlike the early days of telecommunications, the Internet is not merely about displaying information, transferring data, or conducting transactions. The Internet is about building relationships with customers, business partnerships, and other constituendes. Enterprises are employing a number of new strategies aimed at making this shift from transactions to relationships. Some of the fastest-growing applications today are customer relationship management (CRM), enterprise relationship management (ERM), and sales force automation (SFA).

Customer relationship management links back-office and front-office functions with all of a company's touch points with the customer. It thereby attempts to maximize the relationship with each customer through better service, supported by a technology

infrastructure. By linking back and front office functions electronically, firms can make available to everyone within the firm who needs it a wealth of information about customers at a fraction of the previous cost. The objective is to provide a single point of entry that connects customers and their orders to all operations that support order fulfillment—e-mail, e-commerce, call centers, Web conferencing, marketing tools, customer service, sales automation, lead tracking, billing, manufacturing, shipping, and partner and channel tools, all leading to a central database. When well implemented, CRM dramatically increases competitive advantage by streamlining communications and transactions to enhance marketing, sales, finance, delivery, and service efforts.
Enterprise Relationship Management (ERM) extends CRM to include other relationships, such as those with business partners and suppliers. The ability to share information with business partners and suppliers over digital networks opens new avenues for closer collaboration that can lead to reduced cost and improved service.

Sales Force Automation (SFA) employs software that automates routine tasks such as tracking customer contacts and forecasting, thereby freeing up the sales force to concentrate more on selling. Getting sales representatives to buy in and use technology, however, can be a major challenge.

2.4.3 Mass Customization

Whereas the industrial era was characterized by mass production, the digital era is characterized by mass customization. Contrary to popular notions about dehumanized technological environments, digital networks are leading to increased personalization. A new strategy for a growing number of enterprises is one-to-one marketing, which is an approach that targets individual customers with customized products and services. (see Figure 2-3)Companies like Amazon.com strive to get to know their customers on a personal basis. Then they use customer information and history to tailor future transactions. When *Time* named Amazon's Jeff Bezos as "Person of the Year," they noted the company vision of being "the world's most customer-centric company." However, it is not just the new upstarts that are concentrating on customers. Mass customization has become the strategy of long-standing veterans like Ford Motor Company, Dell Computers, and Levi Strauss, as well.

This trend "represents a 180 degree turn from previous years when it was the company, not the customer, that dictated what appeared in the market. You wouldn't have dreamed of asking Levi Strauss & Company years ago to custom-fit a pair of jeans for you—now the company will do it and it won't break your trouser budget. Nor would you have considered asking a car manufacturer to build a car that suited your individual tastes. Today, the car of your dreams is only a few clicks away."

2.4.4 Transforming the Enterprise

Business leaders are finding that they have squeezed all the efficiencies they can from flattened organizations and reduced budgets. In the digital economy, it's the rapid flow and analysis of information that differentiates the winners from the losers. The big advantage lies not just in reengineering or total quality management. It lies primarily in sharing information and making decisions faster than your competitors can. The ability to capture and share knowledge is critical. Digital networks are hastening the transition

from hierarchical, bureaucratic organizations to networked organizations where information and decision making move horizontally within flat organizations.

By taking advantage of advances in IT and digital networks, enterprises are streamlining the mundane, day-to-day tasks like invoicing, purchasing, and inventory control. In the process, they are making this information more accessible at every point of contact with clients and vendors. This automation of internal operations—sometimes referred to as e-business—-often doesn't have the glamour of e-commerce, but many industry forecasters believe that it is in this back office of business where the biggest productivity dividends will be achieved—in the wholesale automation of corporate transactions and procedures.

Reengineering is taking on new significance as enterprises attempt to redefine themselves to extract greater advantage from networking technologies. Work in the twenty-first century has become an exercise in managing change. In a society where change is a constant, a talent for exploiting change with IT is invaluable. The challenge for enterprises is seldom a lack of ideas; it's the ability to put ideas into action—to make them happen. Technology is merely an enabler. People, not technology, accomplish organizational change. Putting new ways into action requires more than technology savvy. It requires business knowledge, foresight, and an understanding of the end-user environment. The biggest challenge is how to harness the technology to create an optimal workplace environment that enables workers to be more productive, affords them greater fulfillment, improves decision making, and makes organizations more competitive. The challenge is to create workplace environments that attract, retain, and challenge workers on every level to excel.

2.4.5 Eliminating Intermediaries

Digital networks provide enterprises with direct links to clients and business partners, effectively eliminating the traditional intermediaries. Whether it's e-trading of equities, travel, banking, shopping, shipping, or whatever the industry, traditional distribution channels are being challenged by the Internet.

Bill Gates used the term *friction-free capitalism* to describe "how the Internet was helping create Adam Smith's ideal marketplace in which buyers and sellers can easily find one another without taking much time or spending much money. Achieving Smith's 'perfect price' comes not just from eliminating the middleman but also
from the additional information available online. The Internet makes it easy for a buyer to get background information about a product—how it's rated by consumer organizations or other independent reviews—and to compare prices easily. Buyers also can tell sellers more about their requirements, and sellers will be able to target their wares to the people most interested and to cross-sell related products."[29]

Empowered by the Internet to deal directly with manufacturers and service providers, customers gain little added value from intermediaries who simply transfer goods or information. The value of a pass-through intermediary's work is falling quickly to zero. For example, travel agents who simply book plane fares are at risk. This kind of high-volume, low-value transaction is perfect for a self-service Internet travel reservation site. The key question for the future is what value travel agents will add to the process. Can they, for instance, create a total travel adventure or highly personalized tour packages

with benefits that would be difficult for any but the most savvy of travelers to duplicate for themselves?

Figure 2-3 E-commerce innovations that foster one-to-one relationships with consumers

10. E-Trade's Smart Alerts (www.etrade.com) Notifies investors via e-mail, Web, or pager when a stock hits a particular trigger point.
9. *The Wall Street Journal Online's* Personal Journal (www.wsj.com) Allows subscribers to select up to eight key words, categories, or company names of particular interest. All stories that match the key words are then saved into folders for later viewing.
8. Ticketmaster Online/City Search Online Viewer (www.myticketmaster.com) Simulates the view you can expect from your seats for many venues around the country(See "That's the Ticket," *CIO* Section 2, June 15, 1999.)
7. Amazon.com's "1-Click" Ordering System (www.amazon.com) Accesses shipping and billing preferences for each customer automatically and places the order.
6. S&P Personal Wealth's Asset Allocator (www.personalwealth.com) Provides customized portfolio advice.
5. Peapod.com's Recipe Generator (www.peapod.com) In partnership with Kraft Foods, this program allows consumers to enter the contents of their refrigerator into the site and receive recipes that incorporate all~r most of the items.
4. Lands' End's Personal Model (www.landsend.com) Customers enter information about their height, build, and hair coloring to create a virtual model. They can try different clothing on the model to get a sense of how it will look on them.
3. Dell's Online Product Configurator (www.dell.com) Customers who purchase a PC can configure 21 different features, such as hard drives, printers, and speakers. Each feature provides an additional 3 to 10 options that allow for millions of configurations.
2. Cisco Systems' Customizable Online Knowledge Base (www.cisco.com) Gives customers access to the same customer service knowledge base that Cisco's technical support personnel use.
1. Amazon.com's Recommendations System (www.amazon.com) Suggests books, CDs, and videos to its customers based on past purchases. *—D. Duffy*

Source: Reprinted through the courtesy of *CIO.*

2.4.6 Building Partnerships and Alliances/Open Systems

In the digital economy, the nature of competition as it evolved in the industrial era is being challenged. In good relationships, wise buyers sometimes go out of their way to help their vendors. Although conventional wisdom holds that buyers squeeze the most they can out of their sellers, the opposite is often true in good relationships—a phenomenon called "discretionary collaboration." This concept may be critical in the information management process and distributed environments of today's global enterprises. "Companies must learn to coevolve with others in their environments—in a process that involves not only conflict, but collaboration, shared visions, alliances, and other complex relationships for which there is very little precedent."[30]

"The key to competitiveness right now is business model innovation, and the new models that work are partnerships," according to Don Tapscott, author of *Blueprint to the Digital Economy: Creating Wealth in the Era of E-Business.* Based on his study

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ABOVE THE CROWD

The concept, known broadly as mass customization, is best exemplified by Dell Computer, which builds mil lions of computers each year, each to the specifications desired by the buyer. For one big customer, Ford, Dell has established different PC configurations designed to suit different employees in many different departments.

When Dell receives an order for a PC via the Ford intranet, it knows immediately what type of machine the worker is ordering and what kind of machine he or she should get.

Ford pays a premium for such personalized service, Is the price worth it? Consider the alternative. Ford could purchase its PCs from a local distributor. The distributor would send boxes over to Ford. Those boxes would need to be opened and configured by a systems worker. This process, which is common at most companies, typically requires 4 to 6 hours of a professional's time for each computer and often results in configuration errors. Clearly, Dell's customization is worth the higher price.

The same is true for other custom products. Levi Strauss is able to charge more, not less, when it customizes a pair of jeans, and Mattel can be sure that little girls will pay a higher price for a personalized Barbie doll. So there's no doubt: Companies are beginning to use technology to push margins higher.

Source: J.William Gurley, "Productivity Paradox."

Based on his study of 120 new, partnership-based businesses, Tapscott says that, "We've been talking about partnerships forever, but what we're seeing now is completely different." He believes that in the future, manufacturing companies won't make things, partnerships will. Partnerships will be the foundation for the design, production, marketing, sales, and support of products and services. These new partnerships and affiances call for sharing information not only among members of the firm, but with clients and business partners, as well.[31]

Enterprises of all types—corporations, universities, medical facilities, and so on—are becoming more open systems. In today's emerging systems, the key concepts no longer are authority and control but rather partnership, collaboration, and cooperation—and perhaps even creative chaos. The Internet is surely a precursor of the ultimate open system.[32]

2.4.7 Virtual Communities

Virtual corporations result when decision makers decide to partner with other corporations to achieve competitive success. Instead of hiring additional staff to manufacture a needed product, a corporation examines its strengths and then joins with other businesses for those products. Corporations achieve this by linking their computers with those of other companies. Suppliers can use. The computer links to make forecasts on demand for their products, and retailers can use the links to reduce inventory and improve availability.

Perhaps even more significant is the concept of *virtual communities*, which are groups that coalesce around common interests or needs. This concept runs contrary to fears people often have about technology leading to impersonal, detached, isolated environments.

Community building is going to be one of the biggest growth areas in the next few years on the Web. The Web dramatically increases the number of communities you can bond to. In the past, you might have had time to be a part of your neighborhood community

and one or two social organizations you took the trouble to join. In the Web lifestyle, you are limited only by your interests. One of the most powerful socializing aspects of the Web is its ability to connect groups of like-minded people independent of geography or time zones. If you want to get together a group of avid bridge players, or talk issues with people who share your political views or stay in touch with your ethnic group scattered all over the world, the Web makes it easy to do. If you want to keep up with the goings-on in your hometown, the Web can help. . . . A Web site such as Third Age, which offers an electronic community space for seniors, illustrates the power of electronic community building. The site provides advice on family, health, and technology; warnings about scams targeting seniors; and discussion groups on topical issues.[33]

Savvy enterprises, universities, and organizations of all types are shifting the approach to their Web sites from one-way communication to fostering two-way communication. Thus, Web sites are becoming increasingly interactive. The concept of virtual communities moves beyond interactive communications, however, to fostering one-to-one relationships. This introduces the concept of recognizing the individuality of users, which is a fundamental ingredient for building a true relationship. It starts with the notion of a personalized home base. Customers, partners, and employees can tailor the home base, making it a far more interesting and advantageous place to exchange information. As an alternative, the enterprise, making use of intelligent agents, can tailor the site to users based on their previous interactions and patterns of use. By tailoring services and making use of interactive communications features such as e-mail, chat rooms, and collaborative tools, enterprises can enhance the value and effectiveness of their relationships with constituencies. One example of this type of relationship is Web-based Help Desk support (see chapter 7). Enterprises are able to provide access to technical information tailored for a client's make and model of equipment; share experience among users through frequently asked questions; promote interaction among users through, for example, posting questions that other users can respond to; maintain a record of prior questions or problems and their resolution; submit questions to technical assistants; and talk directly with users through real-time chat sessions. In essence, the paradigm—or business model—becomes more of a *communications center* than today's notion of a Web site.

As illustrated in this chapter's Spotlight Creating Virtual Communities, colleges and universities are capitalizing on this approach to create richer learning communities and foster lifelong relationships with alumni and other important constituencies.

2.5 THE KEYS TO SUCCESS IN A TECHNOLOGY-DRIVEN ECONOMY

What are the keys to the new millennium? According to a survey conducted by *ClO Magazine,* the number one key is people. To win in a technology-driven economy, companies must focus on people within and outside the enterprise.[34]

An 18-member panel, which included academicians, analysts, and consultants with expertise in a broad range of industry and technology areas, selected 100 companies that they thought were best positioned to prosper in the new millennium. Predicting future

success is always rather shaky ground, but several dominant themes emerged among these 100 companies. These themes confirm many of the trends discussed elsewhere in this chapter and throughout the text and are summarized briefly in the sections that follow:

- Cater to customers
- Invest in people
- Embrace creativity
- Rethink your business
- Seize the Web
- Care about others

2.5.1 Cater to Customers

Know your customer is the mantra for companies moving away from simple cost cutting to actual growth in revenues in the coming millennium. Across all industries, the increasing transformation of products into commodities has created a dilemma for companies attempting to stand out in the marketplace.

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CREATING VIRTUAL COMMUNITIES

Universities are leveraging the power of the Internet and digital networks by implementing systems for technical, administrative and instructional support that tailor meaningful communications to students faculty staff, and alumni The most forward thinking are going even further in an effort to create lifelong virtual communities.

Like the far flung families that are becoming typical of Baby Boomers and Generation X, higher education is struggling to maintain a sense of community and loyalty among its constituents Geographical restrictions have fallen Distance learning technologies offer a plethora choices—students can pick from an array of education providers changing their future alma mater almost as easily as changing their long-distance provider.

Fore- -casters say that the average worker of the future will have six or seven different careers each requiring new skills, new attitudes, and new values Already, traditional undergraduates, those 18 to 22 years old, attending full time and living in college housing, account for less than 25 percent of all students in higher education. Lifelong learners—-mature adults who require continuing education—already comprise 44 percent of the student population. Even traditional students are expecting round-the-clock access. In response, more than 80 percent of traditional U.S. colleges and universities will use distance-learning technologies and techniques in one or more "traditional" academic programs by the year 2002, according to the GartnexGroup.

"The feeling of remoteness is the biggest barrier to distance learning," according to Mike Rebbechi, executive director of Information Technology at Charles Sturt University (CSU), New South Wales, which serves a student population of nearly 18,000 distance learners. In response, CSU and other universities are attempting to use technology which ironically is often viewed as cold and impersonal, to create a sense of community. "We are trying to make any services and faculty we have available to on-campus students, also available to off-campus students. In addition, we want to provide the best modes of delivery and services available to our on-campus students," Rebbechi explains.

Higher education is providing access and community to distance learners through the World Wide Web, e-mail, computer conferencing with selected audio! video streaming, two-way audio/video computer conferencing, multi media virtual reality and even offerings on business networks The capacity and capabilities for virtual communications will continue to proliferate. Ultra intelligent networks, digital wireless and Web channels will become more affordable and available.

It s important that we do depict it as a learning environment and not as a cold technological world' says Gary Kerr, academic vice president at the Southern Alberta Institute of Technology (SAIT) We'd better be

able to differentiate ourselves m the marketplace by providing highly interactive communications strategies and learning strategies that will engage the learners and keep of them moving along.

Toward this end some universities are striving to create a "home base" for learners as a platform for building a true relationship based on individual needs and interests. Home base, in Internet terms, is where users ultimately spend the majority of their time on the Web Like the home page that greets users of America Online, it is a secure communications center where users get the most from their time spent on the Net. In higher education, home base is the page where students, faculty~ and administrators will return over and over again The university's home base can be an exclusive provider of electronic communication by delivering services such as e mail collaborative tools, voice mail customized personal and campus content, and e-commerce, all through a secured access path.

"The value of the home base is that learners can tailor it, making it far more advantageous and far more interesting to them to go to receive information. It will increase their utilization of the page, and that increases my ability to communicate with them," says Eric D. Weber, dean of student services, Salt Lake Community College. "The personalized home base gives us an opportunity to develop much better relationship with our learners and reinforces the personal, interacive kind of learning environment that we want to create," adds Gary Kerr of SAIT. "A key feature is the ability of learners to interact with us, in the chat rooms, for example. It gives them the ability to question our people so we can respond. The more interactive the tools appear to the learner, the better the quality of the relationship we can establish with the customer."

The benefits of the communications center—and the opportunities to better serve students—are increased exponentially by integrating the center to a university's existing administrative software and hardware. The result is dynamic and personal event-driven applications that maximize the content in a university's existing database by delivering data automatically to the user based on some set criteria. By linking the communications center to a university's database and enabling it with event-driven technology, higher education can deliver tailored, meaningful communications to students, faculty, staff, and alumni. By enabling 24-hour access to curricula, as well as administrative services, institutions can meet the service expectations of today's consumers. "The capability to communicate to a wide audience, yet with different messages, is the greatest benefit of the technology," says Curt Guenther, interim director of media relations at the University of Memphis. "We can deliver individualized messages to alumni, parents, students, and prospective students, messages they will be most receptive to, messages they want to hear. It makes our job easier."

Gary Olsen, assistant vice president, alumni affairs at Villanova University, sees the technology supporting long-term relationships with alumni and donors. "It will allow us to disseminate information in a very personalized and individualized way to our students, our faculty, our staff, and our alumni. It has the potential to bring our campus community and our university community closer. . . . It will allow us to bring our 80,000 alumni to our campus without their having to leave their homes. It's a very, very exciting prospect for the future." In the Information Age, consumers are at the center, requiring greater choices, heterogeneity, and personalization from businesses. Whether you're selling books, or degrees, your network must support increased application functionality user friendliness, and flexibility. While many vendors are hoping to catch the prospect's interest for a second, the more savvy companies are trying to hold on for a lifetime, building a lifelong relationship with the prospect

Higher education is possibly the most likely market to build such a relationship with its constituents. People understand that, unlike the choice of computers, car insurance, or stereos, the choice of a college or university will impact their lives..

Source: Adapted from Rodney L. Everhart, Creating Virtual Communities, *Syllabus, http://www.syllabus.com,* April 1999, (12:8) 14—16

Consequently, they are turning to strategies to differentiate themselves through services. Many companies are embracing the concept of *customer relationship management (CRM),* but few so far have taken the steps necessary to truly implement it—to link the back and front offices directly to the customer.[35]

Beyond the ability to tailor marketing initiatives, forward-looking companies are using customer relationship management to increase market share by customizing products and services and building consumer loyalty. Customization is at the heart of the marketing

strategies of companies like Capital One Financial Corporation, based in Falls Church, Virginia. Instead of standardizing credit programs to maximize efficiency, Capital One provides multiple variations of programs built upon the interests of individual consumers. Capital One began life in 1988 as the Signet Bank with 1 million customers and $1 billion in managed loans. Signet spun off the division in 1994, and it currently has 18 million customers and $17.4 billion in managed loans. They offer more than 3,000 different credit card products, whereas most of their competitors have only a few standard offerings. By using massive databases, Capital One sales representatives are able to access in-formation instantly on individual customers in order to suggest further services.
Recent initiatives by Kraft Foods Inc. provide another example of this customization trend. Kraft mounted a multifaceted effort to raise sales for its retail partners, and thereby itself, through the use of the Web with data warehousing and data mining technologies. An internally developed retailer software program
helps grocery stores analyze customer preferences and stock shelves accordingly, resulting in 5 percent sales growth and reducing the time it takes retailers to manage the process from days to hours. Meanwhile, the Krafts Interactive Kitchens Web site (www.kraftfoods.com) offers consumers extensive information about nutrition and helps them build meal plans. Kraft is working now on linking up information obtained from the Web site, its toll-free number, and e-mail messages to further aid grocery stores in managing stock and raising sales through more customized service.

2.5.2 Invest in People

Getting the best people and inspiring them to pull ahead of the competition will be the primary challenge in the coming years. Increasingly, companies are turning to unconventional approaches to attract, retain, and empower the best in their industries. Companies are employing fewer full-time and more contract employees.

The trend is clearly for companies to equip all employees with access to everything they need at their desktop or with mobile units. Job sharing, flexible work hours, and telecommuting are becoming more common. Companies offer extensive training programs through corporate universities. In addition to the more traditional classroom type of workshops and seminars, however, corporate universities offer extensive Web-based training options available on demand from anywhere. Digital networks, collaborative software, mobile communications, and videoconferencing technologies harness the power of teams.

Long-standing management practices are beginning to change, as well. Indicators point to a reversalin the 1980s and 1990s trend of reducing middle-management ranks as the role of management becomes more important. Companies are looking for a new breed of managers, however, who will be leaders and coaches rather than the supervisors of the past. Managers must lead by engaging their staff in working as a team. Longevity with the company will no longer be enough for middle managers to qualify for positions. The most-sought-after competencies wifi be the ability to work with employees to set concrete goals and deadlines, create clear performance specifications, give fast feedback, and avoid micromanaging.

2.5.3 Embrace Creativity

Many of the reengineering efforts of the 1990s simply meant cutting staff and squeezing the life out of budgets. The survey showed that companies now are beginning to understand that the only real path to maintaining growth and creating new value for customers is innovation. Companies are acting tp make innovation an integral part of the culture and to provide the room and encouragement for staffers to excel at it. For instance, Tom Peters, in his book *In Search of Excellence*, points out that excellent companies are better listeners. They get a benefit from market closeness because most of the real innovation comes from the market. When Procter & Gamble (P&G) began putting the toll-free 800 telephone number on all its packaging—it got 200,000 calls the first year with customer ideas or complaints. P&G responded to every one of those calls, and the calls were summarized monthly for the board meetings. Insiders report that the 800 number is a major source of product improvement ideas. According to Peters, there is surprising and powerful theoretical support for what P&G and others are doing. Eric von Hippel and James Utterback of the Massachusetts Institute of Technology are long-time students of the innovation process. Studying the source of innovation in the scientific instruments business, they found that out of the eleven "first of type" major inventions they looked at, all came from users; of 66 "major improvements," 85 percent came from users; and of 83 "minor improvements," 66 percent came from users.[36]

2.5.4 Rethink Your Business

Rethinking the company, whether in response to increased competition, globalization, or any of the other factors driving businesses today, was another post-2000 success trait among the CIO-100. Reengineering took many *forms,* often changing a company's underlying business or substantially altering its corporate structure or culture. For example, Enron Corporation, an energy company based in Houston, made reinvention a central theme of its strategy of rapid new business development.

Sometimes, business reengineering was a desperate response to failure. One CIO-100 company, Yellow Corporation, a freight transportation company based in Overland Park, Kansas, was caught off guard when deregulation hit in 1980. A strong internal focus left it ill-prepared to compete in an increasingly crowded industry. Near failure drove Yellow to look outside and determine what its customers were demanding. It learned that customers wanted just-in-time deliveries and specialized services such as electronic data interchange (EDI). In response, Yellow hired a consulting firm to develop a new client/server-based information system and two call centers to help the flow of freight information. The company also overhauled its old Web site, which was used primarily to post company information. Customers now can use the site to track their shipments and link to the call center. Usage of the Web site went from 10,000 hits per month in 1998 to 4 billion a month in 1999. The company also installed mobile data terminals in all trucks so that dispatchers can keep better track of where shipments are heading. According to one company executive, "Whereas Yellow was once a company whose philosophy was if we are efficient, then the customer will come, it is now a rapidly growing organization using technology to get closer to its customers."[37]

2.5.5 Seize the Web

"The barriers to entry for the Internet are very low;. . . but the barriers to really succeeding are very, very high." Survey findings underscore just how different business on the Web truly is. One of the lessons that companies learn early on is that online customers have different expectations about service than traditional customers do. Web customers want speed, reliability, and consistency. For example, E-Trade Group Inc. finds that "most customers are pretty technically savvy, so when they speak to a customer service rep, they want someone who can speak their language."[39] The electronic environment seems to subtly raise people's expectations and diminish patience and social politeness. Thus, Web business demands much better service than in the physical world.

Some industry leaders believe that because the cultures and expectations are so different, established companies that want to become a competitive force on the Web are at a disadvantage—that it is next to impossible for those companies to be focused on both the Internet space and the physical space. Cyber and brick-and-mortar companies operate so differently that even offering the same product requires a radically different way of thinking about issues like marketing and customer service.

2.5.6 Care about Others

Growth in environmentally conscious companies was another noticeable trend in the CIO-100 survey. For some new economy companies, caring for employees does not go far enough. They are going a giant step further to incorporate socially responsible behavior in the core corporate culture, as well. Some of the companies that made the CIO-100 list, like Patagonia Inc., based in Ventura, California, believe that treating employees well and weaving environmentalism into its business model are critical to corporate profits. Advocates argue that in the twenty-first century, companies with a social agenda as their underpinning will thrive better than companies that focus solely on the bottom line.

2.6 THE DIGITAL DIVIDE

According to government statistics and other sources, equitable access to computers and the Internet is a growing concern in the United States and worldwide. The so-called *digital divide* threatens to exacerbate an already widening income gap between the rich and the poor. Access to computers is expanding rapidly. In 1998, more than 40 percent of American households owned computers, and 25 percent of all households had Internet access. Community technology centers are springing up, and inner-city schools are being wired quickly thanks to federal dollars provided through the government's reduced E-Rate program. In the meantime, the divide is getting worse. According to a new Commerce Department report, "Falling Through the Net" (ntia.doc.gov), the gap in Internet access between those at the highest and lowest income levels grew by 29 percent in one year alone.

Although some expect the access gap to narrow as prices of computers continue to fall and incomes rise, an even bigger concern is the gap in being able to use the technology in meaningful ways. "Access won't by itself level the playing field:

If you wire them, they won't necessarily prosper. Computers might become as common as TVs, but they require initiative and creativity to use fully. Knowing how to play computer games is not the same as knowing how to design them."[4o]

2.7 NEXT GENERATION INTERNET (NGI) AND INTERNET2

As individuals and organizations race to take advantage of the opportunities and challenges of the Internet and World Wide Web, multiple efforts are underway to develop the Next Generation Internet. iWo major research efforts are promoted and heavily funded by the US. government. The first, the *Next Generation Internet (NGI),* is a US. government-led initiative focussed primarily on commercial and governmental applications. The second, the *Internet2 Project,* is a university-led collaborative effort with the objective of accelerating the next stage of Internet development in academia. We'll take a brief look at each and how they are working together on the Abilene network.

2.7.1 Next Generation Internet (NGI)

The Next Generation Internet (NGI) was initiated on October 10, 1996, in Knoxville, Tennessee, when then President Clinton and Vice President Gore announced a three-year commitment of $300 million to improve and expand the Internet. Built on the base of already federally funded research and development, the NGI initiative calls for substantial matching funds from private sector partners.

SPOTLIGHT ON SOLUTIONS → Technology, People, Structure, Processes

Dell Computer Corporation recently responded to a disgruntled customer by building a better box—a shipping box, that is. The customer was one of many who had been invited to the company's usability lab to test the length of time needed to get a new PC up and running. While unpacking a Dell Dimension tower, the customer struggled and struggled with the shipping box He finally became so frustrated that he picked it up and turned it upside down. The tower fell to the floor—and died. Although the purpose of the test was to learn how long it took a customer to install a computer, seeing someone destroy a tower was so startling that executives quickly decided to redesign the box and its packing materials.

Source: Adapted from Louise Fickel, "Know Your Customer," *CIO,* 12:21, August 15, 1999, p. 63. Reprinted through the courtesy of *CIO*

The initiative is built on partnerships between researchers developing advanced networking technologies and researchers using those technologies to develop advanced applications. Partnerships also involve federally funded network test beds and commercial network service and equipment providers that participate in these test beds to test concepts for the future commercial Internet. In addition, NGI will focus and stimulate other federal programs, from research and development to shaping future information technology procurement visions.

The NGI Vision is as follows:

In the twenty-first century, the Internet will provide a powerful and versatile environment for business, education, culture, and entertainment. Sight, sound, and even touch will be integrated through powerful computers, displays, and networks. People will use this environment to work, bank, study, shop, entertain, and visit each other. Whether at the office, at home, or on travel, the environment will be the same. Security, reliability, and

privacy will be built in. The customer will be able to choose among different levels of service with varying prices. Benefits of this environment will include a more agile economy, a greater choice of places to live or work, easy access to lifelong learning, and better opportunity to participate in the community, the nation, and the world.[41]

To reach this vision, three goals have been established, each with a strategic approach and each with metrics of success. The three goals are:

1. Experimental research for advanced network technologies
2. Next generation network fabric
3. Revolutionary applications

As one of its goals, the NGI initiative enables advanced network-based science, health, education, and environmental network applications. These applications are selected from the participating agencies and other government missions and are carried out in partnerships between the initiative and other programs. The role of applications in the initiative is to demonstrate the value of advanced networking and to test advanced networking services and technology.

2.7.2 Internet2

Internet2 (I2) is a project of the University Corporation for Advanced Internet Development (UCAID), involving more than 160 U.S. universities, working together with partners in industry and government. The Internet2 project is not a single separate network, but rather joins member network application and engineering development efforts together with many advanced campus and regional and national networks. The goal is to develop advanced Internet technology and applications vital to the research and mission of higher education (see Figure 2-4). Jnternet2 is working to enable applications, such as telemedicine, digital libraries, and virtual laboratories, that are not possible with the technology underlying today's Internet.

The Internet2 project is bringing focus, energy, and resources to the development of a new family of advanced applications to meet emerging academic requirements in research, teaching, and learning. Internet2 universities, working with government and others, are addressing the major challenges facing the next generation of university networks by:

- First, and most importantly, creating and sustaining a leading edge network capability for the national research community.
- Second, directing network development efforts to enable a new generation of applications to exploit fully the capabilities of broadband networks.
- Third, working to transfer rapidly new network services and applications to all levels of educational use and to the broader Internet community, both nationally and internationally.

Just as today's Internet arose from the academic and federal research networks of the 1980s, Internet2 is helping develop and test new technologies, such as Internet Protocol Version6 (IPv6), multicasting, and quality of service (QoS), which will enable a new generation of Internet applications. This research ultimately will benefit all sectors of society. Just as e-mail and the World Wide Web are legacies of earlier investments in academic and federal research networks, the legacy of Internet2 will be technologies adopted by and deployed in commercial networks.

Internet2 is not a physical network that will replace the Internet. Rather, Internet2's goal is to bring together institutions and resources to develop new technologies and capabilities that can then be deployed in the global Internet. Universities will maintain and continue to experience substantial growth in the use of existing Internet connections, which they still will obtain from commercial providers. In fact, the commercial sector is a full partner in the Internet2 project and will benefit from applications and. technology developed by Internet2 members. The Internet2 project has more than a dozen leading companies as partners.

Participation in Intemet2 is open to any university that commits to providing on-campus facilities that will allow advanced applications development. The investment this requires may be more than many institutions can manage right now. However, Internet2 intends to transfer rapidly the results of its work to the broader networking community. Fifteen years ago, connecting to the Internet could be as expensive as participating in Internet2 is today. As the technology dropped in price, the entire academic community benefited from the efforts of the initial research participants. It is anticipated that deployment of Internet2 technology will follow a similar pattern.

A key goal of the Internet2 project is to accelerate the diffusion of advanced Internet technology, in particular into the commercial sector. In this way, Internet2 will help to sustain U.S. leadership in networking technology. Internet2 will benefit non university members of the educational community as well, especially grades K through 12 and public libraries. Internet2 and its members aim to share their expertise with as wide a range of computer users as possible.

INTERNET2

Mission

Facilitate and coordinate the development, deployment, operation, and technology transfer of advanced, network-based applications and network services to further U.S. leadership in research and higher education and accelerate the availability of new services and applications on the Internet.

Goals

- Enable a new generation of applications
- Re-create a leading edge research and education network capability
- Transfer new capabilities to the global production Internet

Additional Objectives

- Demonstrate new applications that can dramatically enhance researchers' ability to collaborate and conduct experiments
- Demonstrate enhanced delivery of education and other services (e.g., health care, environmental monitoring) by taking advantage of virtual proximity created by an advanced communications infrastructure
- Support development and adoption of advanced applications by providing middle-ware and development tools.
- Facilitate development, deployment, and operation of an affordable communications infrastructure, capable of supporting differentiated Quality of Service (QoS) based on applications requirements of the research and education community.
- Promote experimentation with the next generation of communications technologies
- Coordinate adoption of agreed working standards and common practices among participating institutions to ensure end-to-end quality of service and interoperability
- Catalyze partnerships with governmental and private sector organizations
- Encourage transfer of technology from Internet2 to the rest of the Internet.
- Study impact of new infrastructure, services, and applications on higher education and the Internet community in general.

Figure 2-4 lnternet2 mission and goals
Source: www.internet2.edu. Reprinted with permission of Intemet2.

Over the past decade, federal government R&D agencies, the university community, and private companies have worked together to develop many of today's Internet technologies. That partnership created a multibillion-dollar industry. By renewing this partnership, Intemet2 will develop and diffuse new technology needed by all network users, helping to ensure continued U.S. leadership in computers and communications.

2.7.3 What Is the Relationship between Internet2 and NGI?

The university-led Internet2 effort and the federally led NGI initiative are complementary and are already working together in many areas. For example, the Internet2 program is in partnership with the National Science Foundation (NSF) merit-based High Performance Connections program. More than 90 Lnternet2 universities have received competitively awarded grants to support connections toadvanced backbone networks such as UCAID's Abilene and the high-performance Backbone Network Service (vBNS) developed by the NSF and MCI/World.com.

The Abilene backbone network is named for a frontier railroad established inAbilene, Kansas, during the 1860s. Just as the railroad changed the way people worked and lived, the Abilene Project is expected to transform the work of researchers and educators into the next millennium. The Abilene network spans more than 10,000 miles and operates at 2.4 gigabits per second, which is 45,000 times faster than a 56K modem. More than 70 Internet2 universities and research facilities were connected to Abilene by the end of 1999. As with Intemet2, Abilene supports the NGI and will link with existing federal research networks, such as the high-performance Backbone Network Service. The vBNS ultimately is expected to be replaced by a commercial network, but Abilene is expected to remain a test bed network to provide a place for continuing to try out new ideas—a place where ideas can fail as well as succeed.

Internet2 also is participating in the NGI Joint Engineering Task Force (JET) to ensure the cohesiveness and interoperability of the technologies Internet2 is developing. Additional cooperative relationships are being planned as part of NGI implementation. As Internet2 develops among university members, NGI programs go forward at federal agencies, and commercial vendors and other organizations continue to create new backbone networks, it will be crucial to ensure the interoperability of these networks and the widest possible availability of advanced services and applications.

2.7.4 What Do Internet2 and NGI Mean for Businesses?

The ramifications for commercial use are expected to be far reaching. Early commercial applications are expected to start entering the marketplace by the end of 2000. "The result for the world's businesses is that everything changes—from strategic business models to business processes and staffing skills. Companies will have to rethink how they work, how they build and sell products, and how they manage their network assets. In an age of Internet time, it becomes even more critical to understand high-speed network technologies and the capabilities they will enable."[42]

Some of the most far-reaching effects will be in the way people work and collaborate in organizations. The types of applications and functionality that can be delivered to the desktop and to wireless portable devices will expand dramatically. The combination of high bandwidth, full-screen video; 3-D multimedia display; and CD-quality audio opens

up extraordinary possibilities for business use. Imagine, for example, a videoconference in which the images of participants are captured by 180-degree surround camera and then projected thousands of miles away onto a wall—life size and with directional voice.[43] Or, picture a virtual team in Tokyo, Milan, New York, and London collaborating in real time, spontaneously discussing, viewing, exchanging, and editing documents and complex technical drawings. The implications are far reaching.

2.8 INFRASTRUCTURE AND PLATFORMS FOR EUIS

The desktop of the future will put everything knowledge workers need right at their fingertips. Moreover, it will be portable to anywhere in the world. In all like hood, it also will be wireless or at least capable of wireless operation in some locations if not everywhere in the world.

In addition to a suite of productivity tools on the local hard drive, the desktop will be Web-based and provide end users with a personalized, single view into the network. It will include collaborative services, links to corporate information, the Web, and updates from customers and suppliers. It will be a gateway to the corporate university. Most importantly, it will provide a customized gateway to all the knowledge and business intelligence essential to the job or projects relevant to the knowledge workers' current assignments. The knowledge and tools will be accessed easily and shared among colleagues; at the same time, they will be integrated tightly with other Web and desktop applications. In essence, knowledge workers will have just-in-time access to everything they need to do their jobs right at their fingertips. In addition, they will be connected easily with almost everyone with whom they need to collaborate or share information.

Knowledge workers will be able to collaborate with colleagues and customers near and far over an Internet with greatly expanded capacity as described. Doing so will probably be as natural as dialing the telephone is today.

Developing, implementing, and supporting this environment is the challenge for end-user computing. Successfully implementing the desktop of the future all hinges on being able to answer critical questions about how end users work and what knowledge is needed to support innovation and exceptional performance. What information is required? Where do they get it? How do they use it? How do they keep their knowledge current? This challenge is the hard part and is a primary concern of EUIS.

2.9 SUMMARY

Chapter 2 examines the rapidly expanding impact of information technologies and digital networks on workplace environments—people, processes, and organizational structures. It also looks at implications of the economic environment, the digital divide, and the Next Generation Internet.

The ability to use technology to enhance individual, work group, and organizational performance will become increasingly important in the twenty-first-century workplace. Technology is advancing much faster than the ability to use it effectively. The technology

provides powerful new capabilities, but understanding how to implement them is far more difficult than most people realize. Workplace changes examined include anytime, anyplace environments, a 24/7 global economy, increased need for collaboration, shorter business cycles, just-in-time operations, the shift from a functional to a process orientation, a focus on innovation, and new strategies for managing knowledge and learning.

Expectations of and requirements for the twenty-first-century workforce are changing Life m cyberspace enterprises will be significantly different than in industrial firms. Some of the more prevalent effects on the workforce include shifting people into thinking work, increased value placed on diversity, renewed focus on empowerment, pay for performance, flexible work environments, and a blurring of boundary lines. Many as yet unanticipated changes are likely as well.

Digital networks have opened new ways of conducting business both inside (e-business) and outside (e-commerce) the enterprise. E-commerce offers enterprises fundamentally new ways to expand the markets in which they compete, customize products and services, and streamline marketing, sales, and delivery. In the long run, e-business—the use of Internet and other digital technology for internal organizational communication, collaboration, and coordination of business processes—is expected to have an even greater impact than e-commerce. Both e-commerce and e-business open up new horizons for what is economically and practically feasible by reducing the cost of information and coordination. Some of the significant ways in which digital networks are shaking up industrial era assumptions include putting customers in the driver's seat, shifting the client focus from transactions to relationships, mass customization, eliminating middle-men, forging new partnerships and alliances, and creating virtual enterprises.

As individuals and organizations scramble to take advantage of today's digital networks, major research efforts are underway to develop the next generation Internet. The first, the Next Generation Internet (NGI), is a U.S. government-led initiative focussed primarily on commercial and government applications. The second, the Internet2 Project, is a university-led collaborative effort with the objective of accelerating the next stage of Internet development in academia. These initiative are complementary and are already working together in many areas, including development of the Abilene backbone network, capable of operating 45,000 times faster than a 56K modem.

KEY TERMS

- Abilene network
- Corporate University
- Digital divide
- Digital economy
- Digital workplace
- Enterprise portal
- Intemet2
- Knowledge economy
- Knowledge management
- Next Generation Internet (NGI)
- Virtual communities
- Virtual corporations

DISCUSSION QUESTIONS

1. What impact are digital networks having on businesses and other organizations worldwide?
2. Why is the twenty-first century being called the Digital Era? What are the implications?
3. List at least six ways in which the Digital Age workforce differs from the Industrial Age workforce.
4. Why do advances in technology outstrip our ability to use them?
5. How are e-commerce and e-business changing the dynamics of the marketplace? What are the implications for consumers? For business enterprises? For governmental and other nonprofit organizations?
6. What is the Next Generation Internet (NGI)? What is the relationship between NGI and Internet2?
7. Briefly describe several of the expanded capabilities and benefits of the Next Generation Internet.
8. What is the Abilene network? How did it get its name?
9. What do Intemet2 and NGI mean for business?
10. Describe the desktop environment that typical Digital Age workers can expect to find in the workplace

APLICATION EXERCISE

1. Working with a group of your classmates, pick a business with which you are familiar or have an interest. Imagine that you and your classmates have just been appointed by the CEO to head up a task force to reinvent the company as an e-commerce business or to create an e-commerce division of the company. How would you restructure the business? Describe how you would operate from the customer perspective. How would you build relationships with your customers? Describe the experience that a typical customer would go through in doing business with your firm. What will the customer do? What will you do? How will the customer feel about the experience? How will it be different than doing business with the brick-and-mortar business? What will be the benefits for the customer? For your firm?

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USEFUL WEBSITES

www.speedofthought.com/getfing/explore.html
The official Web site for Bill Gates's book, *Business @ the Speed of Thought.* It includes a video interview with Bill Gates and many excellent examples and cases that illustrate how digital technology can be applied to empower employees, streamline business operations, and thrive in a digital era.
www.internet2.edu/html/about.html
Intemet2 Web site for more information about the Internet2 project.
www.kraftfoods.com
Kraft Interactive Kitchens Web site offers consumers extensive information about nutrition and helps them build meal plans.
www.cio.com/printlinks
CIO Magazine covers leading issues for IS executives. You can view the latest surveys, articles, and much more at the Web site.
www.ntia.doc.gov
Source for U.S. Commerce Department report, "Falling Through the Net."
www.officeteam.com
Office Team Career Center provides a variety of interesting information about workplace and employment trends. Office Team is an international firm specializing in administrative staffing. A list of emerging top job titles and descriptions was available at *www.officeteam. com/OTlfopJobTitles* at the time this text went to press.

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Case Study Putting Organic *in the Org Chart*

Network Analysis Replaces Hierarchy with Real-World Webs

Organizational Charts Obsolete: Treelike hierarchies and linear value or material chains are obsolete in today's connected economy. Instead, many observers advocate mapping the organizational terrain to determine the hubs arid webs through which *flow* the interactions among people, products, and information.

Organizational X Rays: To help companies evolve into adaptive organizations, Valdis Krebs, an organizational behavior consultant based in Cleveland (www. orgnet.com), uses social network analysis to identify the emergent knowledge networks inside and among organizations. "The most fundamental flaw of the org chart is that it reveals only who works where and who reports to whom. Yet many people still take it as a picture of reality in the business world," says Krebs, who predicts that organizational hierarchy will fade into a background support role. The org chart does not show many things that are critical in today's connected knowledge economy: who knows what; who knows who knows what; key business relationships that connect the organization to the marketplace; the location of core competencies; emergent leaders, experts, and influencers; and the diffusion of innovations, new ideas, and best practices.

For example, in the market planning department of a Los Angeles financial services firm, both morale and productivity were failing. Krebs found that work in this department flowed according to the treelike structure of a traditional org-chart hierarchy—except that, in practice, this hierarchy placed the director at the center of a hub because he was the intermediary for every step of the process. As these diagrams show, the organization was able to evolve from an ineffective, inflexible organization into one that could adapt dynamically and organize itself according to the environment and the needs of customers and other key stakeholders.

Highlighting Bottlenecks: The hierarchy and its formal work groups are dearly shown in the department's first network diagram (Figure 1), which looks like a bird's-eye view of an org chart. An analysis of the workflow (Figure 2) confirms that this is a counterproductive structure that makes the role of the director, Thomas, too rigid for the flow of work and in-formation, although it also identifies Martha as an emergent leader in the group.

Dynamic Networks: New rules formalize Martha's status as owner of the daily work flow and allow knowledge workers to interact directly (Figure 3). Employees enjoy new freedom and responsibilities, while management can take comfort in improved performance. The next step would be to further enable this transformation through recognition and support of communities of practice, which better reflect the way a network's nodes—or, in this case, workers— naturally duster

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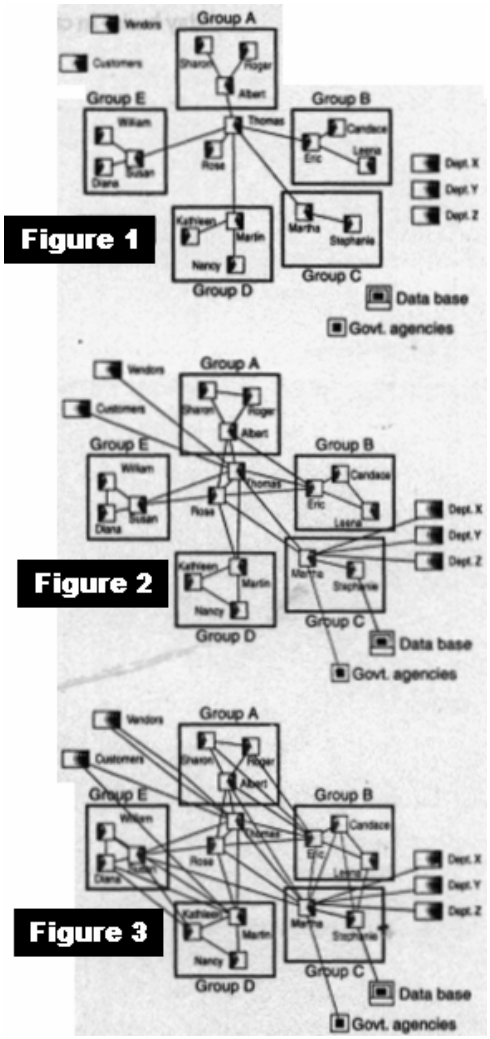

CASE STUDY QUESTIONS

1. What is the significance of the change from a hierarchical to a networked organization structure?
2. Do you agree with the case's conclusion that this is the way of the future for most organizations? Why or why not?
3. How have information systems, and especially digital networks, influenced this direction in organization?
4. In which type of organization would you personally prefer to work—the traditional hierarchical organization or an empowered, networked organization? Why? What difference do you feel it would make in the way you work on a day-today basis? In career opportunities and growth?