The CyberSmart Manager

Unless Business Rewrites Its Managers' Roles, The Production Is Destined to Flop.

BY CHARLES KREITZBERG, Ph.D.

The curtain is rising on the second act of the technology revolution but the actors aren't on stage. Unfortunately, much existing software does not meet the needs of the new economy. What's more, business lacks "CyberSmart" managers who can help craft the new software systems critical to e-business success. In the past, managers were able to leave technology to the technologists, but no longer. Now business managers must play a leading role in defining technology needs. Unless business rewrites its managers' roles, the production may be a flop.

How We Got Here

The first act of the technology revolution began when the development of the PC brought computers to every desktop. Ten years later the Internet connected them to a worldwide network. Web browsers, available for free, sporting a simple point and click interface, made the World Wide Web accessible to most everyone. And a relatively simple (if ugly) language called HTML made it possible for average users to create Web sites for their businesses, their organizations and themselves.

For business, the emergence of the Web was transformational. Before the Web, getting two computers to talk to each other was a challenging and chancy task. The Internet standardized computer communications, so adding a computer to the Internet was almost as easy as plugging a telephone into the phone network. Not only could users within a company exchange information but also companies could routinely interact with vendors and consumers. It was inevitable that the Web would become the key tool of 21st century commerce, and the economy would shift to accommodate it.
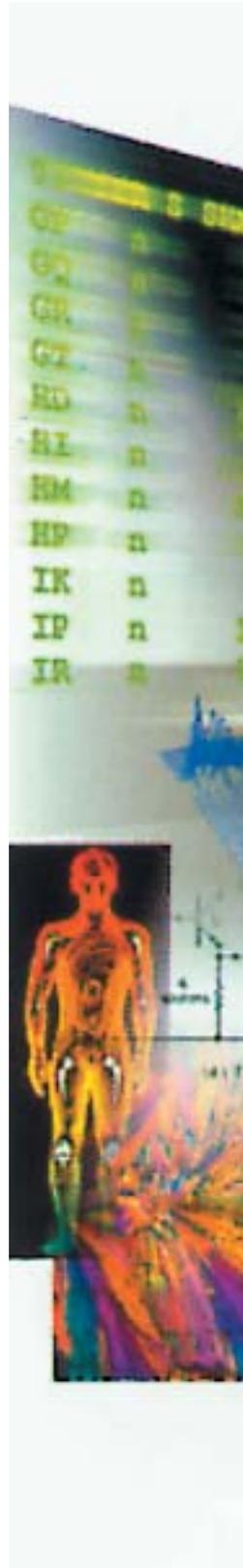
Even before the Internet, business was moving to a new model. Decentralized customer-centric models were replacing centralized bureaucratic structures. But the Internet accelerated the pace of change. The Internet made it possible to easily link departments, customers and suppliers into a single, integrated computer network that could share data and execute transactions. Technology, which had been an enabling resource, has become the core infrastructure of the new corporation. Now business needs new software and new business processes to move forward in the information economy

The first act of the e-revolution boosted the economy at a breakneck pace as businesses and consumers, energized and excited by the new vision, hungrily snapped up hardware and services. And in the first act of the technology revolution, showing up was enough to make you a player. Build a Web site with a shopping cart and you might become an e-commerce king. Create a dot-com company and you could do an IPO before you earned a dime of profit.

Success seemed so easy that even a child could become a millionaire entrepreneur. But gold rushes never last and now it's time to get real. Business is tough. There's lots of competition out there, and the competition is getting smarter, fast.

E-Business Has Become Serious Business

According to the Boston Consulting Group, e-commerce will account for 24 percent of all business-to-business commerce in the United States in 2003, with a transaction value of $2.8

But business is ill prepared to make the needed changes. Technology is still foreign to most business executives and managers, while technologists lack essential business understanding. To succeed, business needs to articulate its vision and incorporate that vision into business process and the software that supports it. Corporations must factor technology into strategic thinking, experiment with new ideas, continuously evaluate their successes and refine their vision accordingly. This cannot happen unless managers become "CyberSmart"—fluent and comfortable with information technology.

What Is a CyberSmart Manager?
Four Criterion

The CyberSmart managers who will direct the information economy must have a level of understanding that allows them to think in the language of technology.

- They must envision technology solutions to business problems and communicate their vision to others.

- They must have the knowledge and skills to partner with technology professionals, ensuring that projects to acquire or develop new software are sound from both business and technical perspectives.

- They must be able to judge when a project is veering off track and intervene.

- As technology clients, they need to make fiscal decisions that support technical excellence without waste.

Unlike programmers or systems analysts, CyberSmart managers are not technology professionals. Nor are they technology managers who direct software development efforts. CyberSmart managers are business professionals who understand the technology relevant to their projects on a conceptual level. They're not concerned with bits and bytes but with *tactics*.

The April 17, 2000, issue of *ComputerWorld*[3] reported the results of a survey of 300 major companies, conducted by the New York-based consulting firm, Towers Perrin. The survey found that key managers in most large companies are still not

trillion.[1] The Forrester Group estimates worldwide Net commerce—both B2B and B2C—will hit $6.8 trillion in 2004.[2] As more businesses move into e-commerce, competition is becoming savage. Dot-com firms are tumbling off their over-inflated clouds and facing a grim reality back on earth. To survive in the e-jungle, corporations must be focused and effective. There is little room at this stage for chaos, indecision or mediocrity.

CyberSmart. Some 90 percent of the survey's respondents reported that their key managers lack e-commerce skills and insights. One e-commerce manager complained, "There's a big reliance on the latest technology buzzwords, without understanding what they are or the ramifications to the company." And experience with e-business, by itself, is not enough to close the gap. Companies active in e-commerce for more than two years still reported that their chief concern is finding managers with Internet skills and insights.

> "Just as **a single stalled automobile** can create a rush-hour nightmare, a single problem in the **technology chain** can stall the **entire business.**"

The Technology Chain

To understand why CyberSmart managers are essential to business success, consider how much new technology needs to be put in place. Today, virtually every business has legacy systems that were built to operate in a very different— now obsolete—technology environment. Legacy systems generally do not exchange data easily with each other. Nor do they interact easily with the Web. Not only do these systems need to be updated or replaced, but so do the business processes that they support.

Because the information economy is so new, there is no roadmap to tell businesses how to change. Businesses must make their best guesses about how to recast products, operations, markets and competition so that they are profitable in the new economy.

For some businesses, the changes may be minimal, while others may find their fundamental value propositions challenged. What is the future of a record company when consumers can download music over the Internet and create CDs on their personal computers? How will car buying change now that consumers can negotiate prices over the Web? What's the role of an insurance agent or a real estate agent in a Web-based economy? How about a drug store when physicians can electronically transmit a prescription and Federal Express can deliver it the next morning? Any element of the existing value chain might change.

Consider these examples:

- The product itself may be updated (a videotape becomes a DVD).

- The sales process may change from a storefront to a direct sale over the Internet.

- Customer service may shift from telephone service to customer self-service.

- Distribution might shift from company-owned warehouses to outsourcing to a carrier such as FedEx or UPS.

So businesses need to determine what changes to make and how to support the new business process through information technology. With e-business, software is no longer a back-office function, isolated from other business operations. Instead, information technology drives the business, turning outward to touch suppliers, partners and customers.

Each step in the supply chain is linked to other steps through software. All of these steps, taken together, form a single, interdependent enterprisewide system in which small inefficiencies cascade to become large ones. And just as a single stalled automobile can create a rush-hour nightmare, a single problem in the technology chain can stall the entire business.

What this means is that it is no longer possible to consider technology projects in isolation. Each new project must fit seamlessly into the overall technology infrastructure. Software programs must exchange data with each other much more rapidly and efficiently than in the past.

This integrated software picture is quite different from the traditional legacy systems that ran business just a few years ago. These legacy systems were built as isolated applications with little thought about how to exchange information with other systems. Such systems were often called *stovepipes* or *silos.* As each silo completed its piece of the process, it would toss the transaction "over the wall" to the next silo. It was a decentralized and loosely coordinated process in which few ever saw the entire structure or could attempt to optimize across silos.

The extent of the integration needed can be seen in Figure 1, a typical enterprisewide technology chain. In this new infrastructure, silos are replaced by integrated systems that exchange data in real time and function as a single integrated system.

THE ENTERPRISEWIDE TECHNOLOGY CHAIN

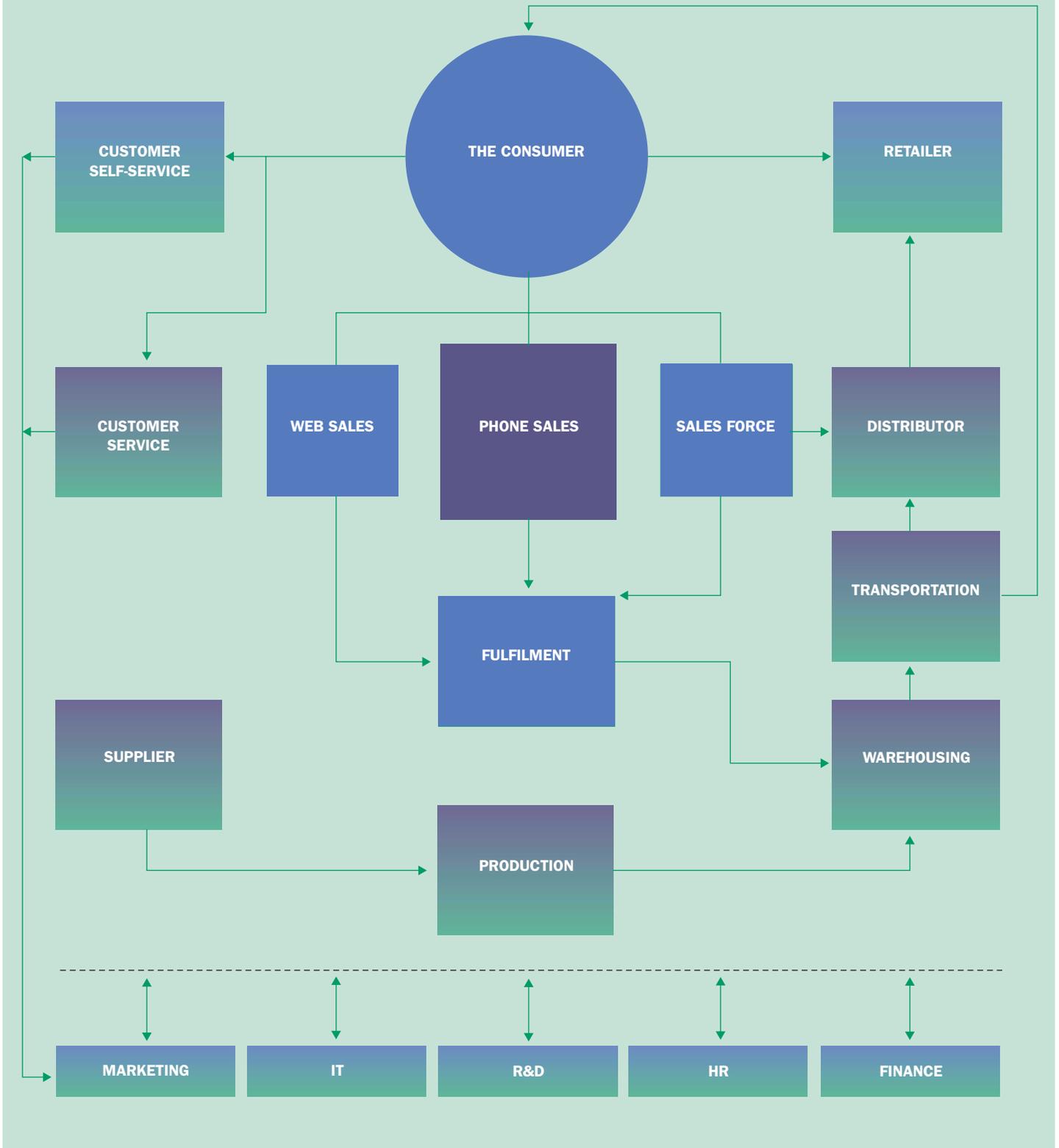**IN THIS NEW INFRASTRUCTURE, SILOS ARE REPLACED BY A SINGLE INTEGRATED SYSTEM**

FIGURE 1

SUCCESS CRITERA BY THE STANDISH GROUP

CRITERION	WEIGHT
1 User Involvement	19
2 Executive Management Support	16
3 Clear Statement of Requirements	15
4 Proper Planning	11
5 Realistic Expectations	10
6 Smaller Project Milestones	9
7 Competent Staff	8
8 Ownership	6
9 Clear Vision and Objectives	3
10 Hard-Working, Focused Staff	3
TOTAL	**100**

FIGURE 2

"**The idea** that business managers need to take **responsibility for the technology** they use is **not a comfortable one.**"

In the example shown in Figure 1, consumers have several ways to purchase a product: from a retailer, a direct salesperson, by telephone or on the Web. No matter how the consumers choose to interact with the company, they should receive consistent, personalized service. A consumer who makes a purchase should not have to repeat information already in the system such as address and credit information previously provided. If a consumer telephones the call center, the call center software should display the customer's previous relationship with the firm, and provide the agent with the tools to reinforce the relationship and identify cross-sell and up-sell opportunities. Based on the customer's questions, the agent may need to answer questions about the product and its availability, then take the customer's order, delivery

and payment information and schedule the order for delivery.

If the order requires customization, the information needed to produce it must be sent to production. Information also needs to be passed to the fulfillment organization so that delivery can be scheduled. In an e-business setting, fulfillment may be handled by a strategic partnership with a carrier that provides warehousing and delivery support. Information on the sale will also be forwarded to the customer service department, which will register the product, arrange for installation if needed and provide service throughout the warranty period. Information about the sale is also sent back to production, which is responsible for maintaining sufficient inventory to meet demand.

Many other information flows might

be triggered by this sale. Suppliers, marketing, MIS, even R&D might need information to help them work efficiently. In this integrated software world, a single order touches many departments and triggers many actions, all of which ensure high-quality customer service and efficient business operation. In addition, such support functions as human resources and finance are also integrated into the technology chain so they can obtain data for payroll and MIS.

Much of this seems like common sense but it is very different from the isolated systems that now support businesses. Making the transition to enterprisewide systems is a daunting and expensive task. Without a constructive partnership between business and technology specialists, the chance of success is low.

Paying the Price for a Bad Fit: A Legacy of Failure

The idea that business managers need to take responsibility for the technology they use is not a comfortable one. In a legacy environment, where technology was more support than core to the business, it was not critical that managers take responsibility for technology outcomes. In fact, for most managers, the mantra was "let IT do it." That attitude resulted in a lot of bad decisions about software, and the rate of failed projects was high.

Still, although business paid a price for its inattention to technology activities, software that was a poor fit to real needs was more an inconvenience than a threat.

In the information economy, the price is much higher. Software that does not fit the needs of the business is expensive— both financially and in lost opportunity. It weakens the company strategically and operationally. Yet most software that is produced or acquired does not fit the real needs of the business.

This lack of fit manifests itself in many ways: software that doesn't perform all the functions needed; software that's difficult to learn and awkward to use; soft-

> **"Every computer user suffers a constant series of small frustrations that … add up to trillions of dollars in lost productivity."**

ware that fails to create a pleasant and empowering user experience; and software that is delivered late and costs far more than originally planned. Despite staggering investments in software, the end product is not meeting expectations

How prevalent is this problem? Although corporations are reluctant to discuss their failures, the studies available consistently show a widespread problem. Here are some examples:

- The Standish Group reported in 1995 that only 16 percent of software development projects could be considered successful. Thirty-two percent were cancelled before completion while 53 percent were late, over budget and implemented only half the envisioned functionality. Imagine if 84 percent of our bridges fell down or 84 percent of our airplanes crashed.

- Christmas 1999 was hailed as a banner year for e-commerce with almost $8 billion in online sales. Yet a Boston Consulting Group study[4], released in March 2000, found that 28 percent of the purchases that consumers attempted *could not be completed.* Imagine if every third time you went to the supermarket, you couldn't buy anything. Some customers were so incensed they said they would no longer purchase anything from the offending companies' *retail* stores.

- A major telephone company attempted to reduce the risk of reprogramming its outdated systems by purchasing and customizing off-the-shelf software. Despite an investment of $100 million, it had to scrap the effort just before
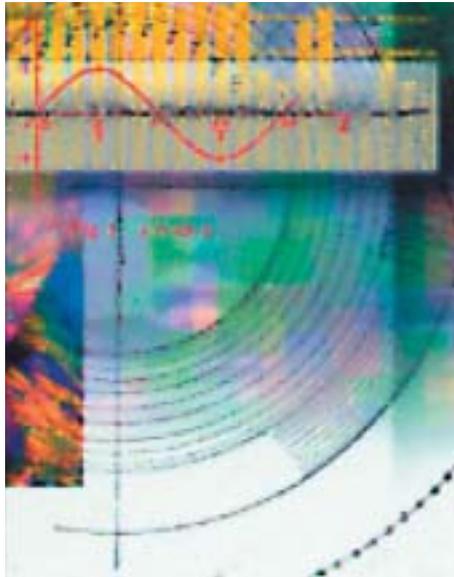
release because the system did not meet the needs of the business. And this is no isolated case. About $80 billion worth of software projects are abandoned annually in the United States alone. In corporation after corporation, you can hear war stories about the chaos surrounding technology projects and their consistently unsatisfactory results.

And not all the problems are large scale. When the IRS blew $3.3 billion in a failed effort to upgrade its computer systems, the problem received considerable media attention. Less visible but equally pernicious are the smaller problems that occur every day on a departmental level and in small businesses. How many times have you puzzled over a cryptic error message? How often has your computer frozen, crashed or displayed the blue screen of death? How often have you been frustrated trying to figure out how to get what you need from a word processor or

other desktop application? How many e-mail messages arrive missing the expected attachment? The truth is that every computer user suffers a constant series of small frustrations that, in the aggregate, add up to trillions of dollars in lost productivity.

The politics in organizations often conceal unpleasant realities. Participants in corporate projects often declare victory when the battle has not truly been won. This may occur because the projects have involved a great deal of struggle and participants are grateful to have succeeded at all, even if the outcome is less than ideal. And there is a natural desire to avoid taking the blame or looking foolish. For their part, business executives who are not fluent in technology may not realize that the technology project they funded has problems. They may not see the implications of that failure.

Why Software Is So Hard to Get Right

Why is it so hard for business to get the software it needs? Some problems are purely technical. Software is inherently complex and demanding. At its best, the development process is difficult and risky. The tools used by programmers are often immature and flawed—rushed to market by vendors eager to recoup a staggering investment. But, surprisingly, most of the problems are human.

In his book *After the Gold Rush*, Steve McConnell makes a persuasive case that poor management practice, rampant within the software industry, is creating a chaotic situation in which it is difficult or impossible for quality to emerge.[5] The Standish Group identified 10 success criteria for software projects, which are shown in Figure 2.[6] Projects that score high on these 10 factors tend to succeed, while those that score low tend to fail. Surprisingly, the factors are overwhelmingly non-technical—all relate to project and people management.

THE THREE LAYERS

	BUSINESS SIDE	TECHNOLOGY SIDE
Level 1: Executive	CEO, CFO and other members of the executive committee	CIO
Level 2: Manager	Product Manager Department Head	Development Manager
Level 3: Professional	Business Associate	Programmer, Systems Analyst

FIGURE 3

> **"Technology fluency** creates the potential for good communication but **relationships and process** are needed to make sure it happens.**"**

There is a convincing amount of data to make it clear that the software management process is deeply flawed and chaotic. Communication between the business and technology players is inadequate. And the result is a consistently unsatisfactory product.

A Dysfunctional Relationship and the Need for Cultural Change

At the core of the problem is a dysfunctional relationship between IT and business. Like a warring family, there are resentments and miscommunications. And, as any family therapist will tell you, to solve the problem both sides need to change. Noted consultants Paul Strassmann and Danek Bienkowski[7] write:

IT needs to fuse with the business…. This means that:

—IT projects, both those which serve the businesses directly and those aimed at internal effectiveness, are aligned with business goals and kept abreast of business changes.

—IT is evaluated on its success in adding value to the business.

—The whole culture of information technology is focused on making the business successful.

However, successful alignment is a two-way street…. In the same way as IT must make a concerted effort to be a business organization, top management must bring IT into the fold.

Creating fusion (rather than confusion) between business and IT requires a huge cultural change. IT and business have very different cultures and styles. Business is focused on profit and often is driven by relationships. Software is abstract and an engineering disciple that focuses on structure. From the perspective of the business professional, you might say that programmers are from Mars. Programmers, for their part, often wonder where in the universe business people come from.

The roots of IT culture go back to the 1960s, when technology was a back-office function with little impact on the bottom line. User involvement was limited to receiving output, usually in the form of large stacks of paper, and requesting software changes from time to time.

While users often complained that IT was not responsive enough, they were delighted to be protected from the details of technology. And the economics of computing made the back-office model economically efficient. Mainframe computers were a horrendously expensive, time-sensitive "wasting" resource. Computer capacity could not be stored for later use, so if a computer sat idle for an hour, that hour of computing capacity was lost forever. This is not a problem for an $800 personal computer, but it was a big problem for a $10 million mainframe.

The need to squeeze every second of productivity out of the computer led to the creation of a user-unfriendly culture. Computers were fast, people were slow, and the two were kept apart. With users out of the picture, information technologists were free to develop their own culture in their hermetically sealed silo. In the process, technologists were also often isolated from business realities.

The language that technologists speak is largely incomprehensible to business people. Unfortunately, there is arrogance in the technology culture that diminishes those who do not understand the language. This is not an easy problem to overcome because it's more than simply using different words. The language reflects a different worldview and translation is difficult.

Technologists are concerned with the *structure* of technology while business is

"Creating fusion (rather than confusion) between business and IT requires a huge cultural change."

concerned with *how* it is used. The question of how well a technology product works has a very different answer for a technology and a business manager. This is apparent from the metrics each uses to measure success. Typically IT metrics are concerned with computer performance and capacity. Business metrics, on the other hand, are concerned with financial performance.

There is no question that IT needs to become more business-oriented and user-friendly. There is increasing awareness within the IT community that this change is needed. But changing IT culture, although inevitable and desirable, will be a long and difficult process. Technologists are often rigid and confrontational. Communication and empathy are not their strengths. The stress of their job often leaves them little time or mind space for supporting and mentoring clients.

Changing technology culture is the long road to success. A more productive approach is helping business people to become CyberSmart. If business people can develop the technology fluency to meet technologists on common ground, productive conversations can follow.

An analogy that may help make this clearer is found in the medical profession. In some respects, doctors are a lot like information technologists. They work in a complex and high-stress environment where results depend largely on their knowledge and skill. For consumers of medicine, it's a high-stakes process, yet communication is often flawed. Because patients lack the information to make sound judgments, they often let the doctor make critical decisions for them.
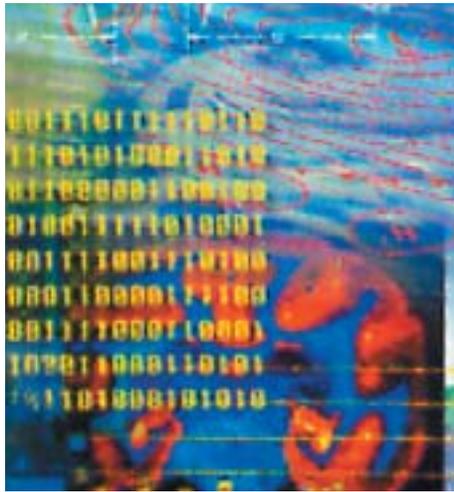
There is a need for the medical culture to change and, as with technology, some progress has been made. But it is far easier and more productive to create medically fluent patients who can meet their physicians on common ground and take significant responsibility for their health care.

The same is true in business. Much like a patient who tells the doctor, "You're the professional, tell me what to do," the business manager has too often declined responsibility for making technical decisions. And like the patient who has given up control, the manager feels helpless, uneasy and resentful. Yet, because managers feel uneasy in their mastery of technology, the risk of making the wrong decision seems great.

Technology Fluency

It may seem odd that there is not more technology fluency in the workplace. After all, for years managers have been exposed to computer technology through intranets, e-mail, word processing and spreadsheets. But the knowledge and skill needed to be a full partner in technology decisions is different from the knowledge needed to operate a desktop computer. Being a user of technology is different from being a creator of it. At the same time, the knowledge and skill needed are not the same as those needed by a programmer. The business manager should not be concerned with bits and bytes or other technical details; what is needed is a high-level conceptual understanding of the options.

While older business managers confess to a discomfort with technology, they often expect younger hires to have the needed skills. Unfortunately, this is not the case. While younger staff have a high comfort level with computers as users, they often have as little understanding of the underlying technology as older managers do. As an analogy, younger people, as second- or third-generation consumers of television, have great comfort with video technology but they are not necessarily skilled directors. Being a good consumer of technology does not qualify you to create it.

Just as businesses train managers in the basics of human resources and finance, they need to teach managers the basics of information technology or technology fluency, at a level appropriate to their role in the organization.

Communication in the CyberSmart Company

Teaching business managers technical concepts is not enough to produce a full partnership between the larger business and IT. Technology fluency creates the potential for good communication, but relationships and process are needed to make sure it happens. So it is important to understand what communications need to take place and how to encourage good communications.

I've found it useful, in analyzing lines of communication, to view the organization as having three distinct layers: senior management, middle management and professionals. Each level has different

THE MAJOR LINES OF COMMUNICATION

COMMUNICATION REQUIREMENTS FOR MANAGING THE BUSINESS-TECHNOLOGY PARTNERSHIP

BUSINESS DRIVERS
Globalization
Customer Expectations
Competitve Pressures
Industry Direction
Alliances

TECHNOLOGY DRIVERS
New Technology Offerings
Standards
Availability of Talent

OUTSIDE FACTORS

INTERNAL FACTORS

E-VISION
Who are we?
What do we want to be?

T-VISION
What is possible?
What do we want to be?

Essential Communication

What does the vision mean to my project?

What does the vision mean to my project?

E-STRATEGY
What will we do?
How will we do it?

T-STRATEGY
What will we do?
How will we do it?

Essential Communication

What does the vision mean to my job?

What does the vision mean to my job?

E-OPERATIONS
Pro

T-OPERATIONS
Create/Maintain Infrastructure
Create/Maintain Systems
Support Users

Essential Communication
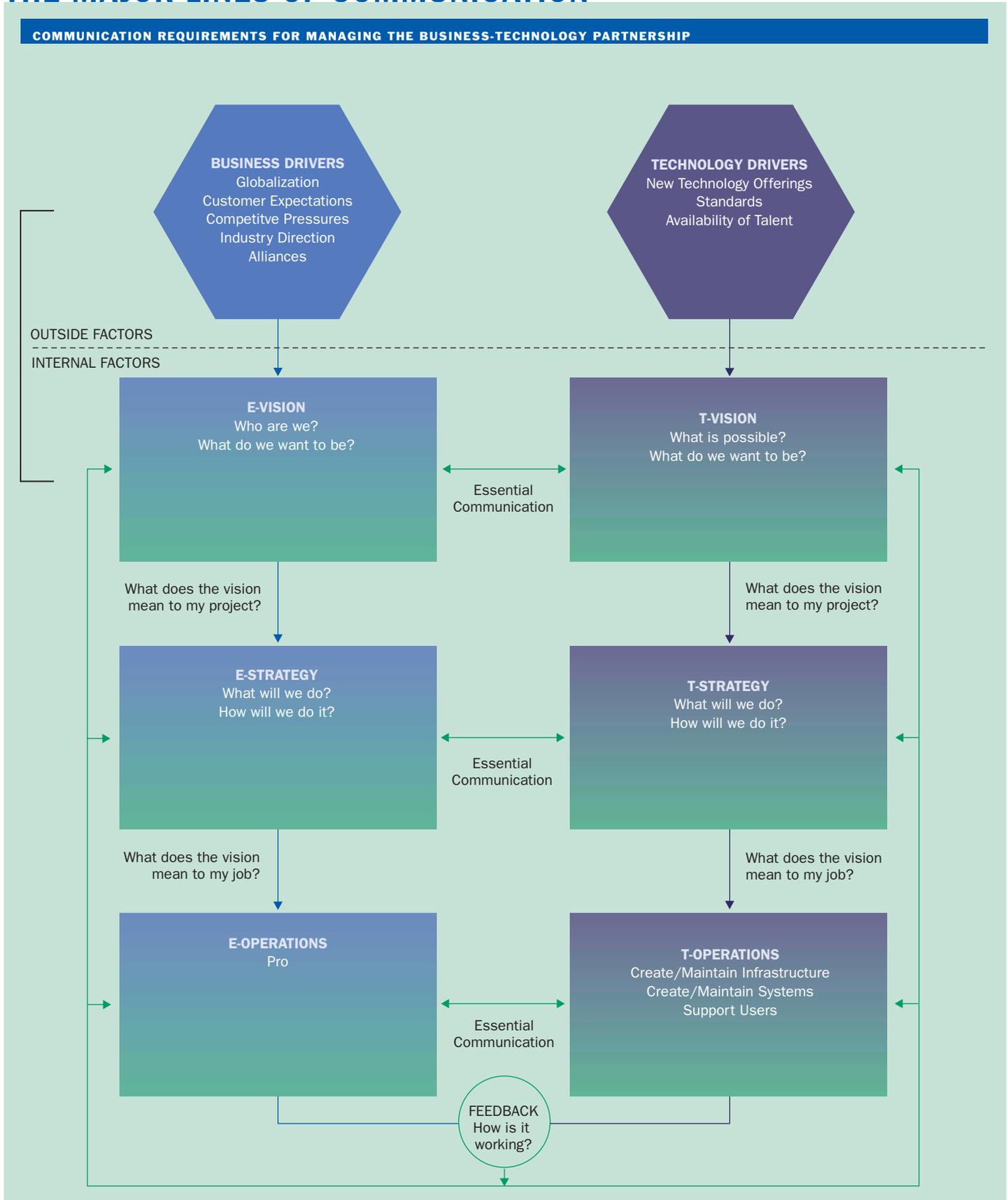
FEEDBACK
How is it working?

FIGURE 4

responsibilities and, as a result, has a somewhat different need for technology fluency. There is a clear division into the business and technical sides of the house. With few exceptions, executives, middle managers and staff tend to view themselves as either business or technology professionals. Those few who have attempted to cross the technology divide, such as business analysts and usability professionals, often feel isolated.

Figure 3 shows typical titles for each of the three layers.
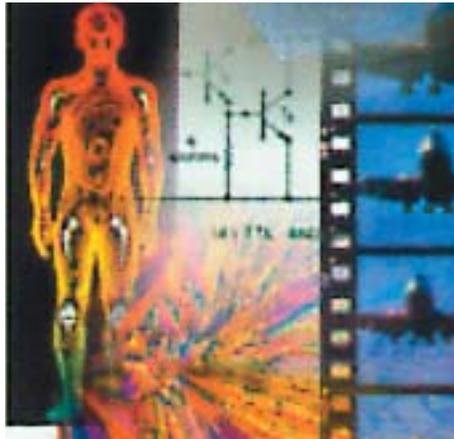
"CyberSmart managers need to be able to "think in the language of technology" … to be able to envision how technology can contribute to solving business problems."

Level 1: Executives
Executives have leadership responsibility for setting organizational strategy. To incorporate technology into their strategic thinking, executives need to understand what technology can do, what resources are needed to implement it and what risks are associated with fielding (or neglecting to field) it. Typically the executive team will develop an overall strategy for the business and the CIO will derive a technology strategy to support it. In terms of technology fluency, business executives need a broad, conceptual view of technology and rarely need to focus on its details. So an executive might think of a unified database of customer information in terms of how it would benefit the business, the value it would bring, and possible legal and security concerns at a high level. The executive would be unlikely to know or care about the details of vendors' offerings.

Level 2: Managers
Because mid-level managers are responsible for initiating and managing projects that implement the organization's strategies, they need to be able to think about how technology can help them achieve their goals. Often a business manager will fund a technology project and middle managers need to be able to participate in build-buy decisions, evaluation of vendors and estimating project costs.

Elements of these decisions can become quite technical. It is easy for a business manager to get lost in the details. Mid-level managers need a solid and wide-ranging understanding of technology concepts so they can ask the right questions and comprehend the answers. They also need to understand the implementation life cycle so they can evaluate progress of the projects they are funding. A mid-level manager developing a project plan for the unified customer database would need to understand what differentiates one product from another, how to participate in the negotiation of a licensing agreement, and how to estimate resource needs for implementation and quality assurance.

Level 3: Business Professionals
Business professionals work with their technology counterparts at the grass roots level. Their major role is usually participating in requirements analyses, creating prototypes and preparing content. Sales and marketing professionals often are asked to represent the client view.

A great deal of decision making about specifics takes place at the professional level; the people who staff the project determine how the software will actually operate. Business professionals need to understand the capabilities of the software they are using. They may get down to the level of specifying data fields and specific interactions.

The Importance of Managing Lines of Communication
Figure 4 shows the major lines of communication that are needed to manage the business-technology partnership. At each level there is a clear need for direct communication between the business and the technology side. Business executives need to educate their technology counterparts about the state of the business, changes in the marketplace, legal and regulatory issues and competition. For their part, technology executives must update their business counterparts about technology trends, issues and opportunities. Together, operating as full partners, the senior management team needs to forge the integrated business-technology strategy essential to the information economy business.

Mid-level management must translate the strategy set by executives into specific initiatives. For example, if an organization were introducing its products into another country (a strategic objective), mid-level managers would need computer systems for managing sales, inventory and fulfillment. Business managers would be concerned with marketing, taking orders, warehousing, delivery, customer support, financial reporting and compliance with local regulations. Technology managers would be focused on how to

KEY TECHNOLOGY TERMS

A TECHNOLOGY PRIMER FOR BUSINESSPEOPLE

1. **Fundamentals**

    1.1. Computer Hardware

        1.1.1. CPU

        1.1.2. RAM and ROM

        1.1.3. Disks

        1.1.4. Input/Output Devices

    1.2. Computer Software

        1.2.1.   What's a Program

        1.2.2.   Programming Languages

        1.2.3.   Operating Systems

        1.2.4.   Object-Oriented Design

    1.3. Computer Networks

        1.3.1. Legacy "Star" Networks and "Dumb" Terminals

        1.3.2. Client-Server Networks

        1.3.3. The Web

        1.3.4. Intranets and Extranets

        1.3.5. Virtual Private Networks

        1.3.6. How Computers Communicate

        1.3.7. Modems

        1.3.8. High-Speed Lines (T1, T3, DS3)

        1.3.9. DSL and Cable Modems

    1.4. Databases

        1.4.1. Files vs. Databases

        1.4.2. Record Layouts

        1.4.3. Indexes

        1.4.4. Sorting

        1.4.5. Searching

        1.4.6. Reports

        1.4.7. The Data Warehouse

2. **How the Web Works**

    2.1. The Web as an Information Utility with Non-proprietary Protocols

    2.2. Web Clients and Servers

    2.3. Thin Clients

    2.4. Packets and IP Addresses

    2.5. Programming Web Applications

        2.5.1. Web Sites vs. Web Applications

        2.5.2. Applets

        2.5.3. Client-Side Web

            2.5.3.1. Programming

            2.5.3.2. HTML

            2.5.3.3. Java

            2.5.3.4. JavaScript

            2.5.3.5. DHTML and XML

        2.5.4 Server-Side Web Programming

            2.5.4.1. ASP

            2.5.4.2. PERL

            2.5.4.3. CGI

    2.6. Multimedia on the Web

        2.6.1. Animated GIFs

        2.6.2. Flash

        2.6.3. Streaming Audio and Video

        2.6.4. Whiteboards and Collaboration

3. **Creating the User Experience**

    3.1. User-Centered Design

    3.2. Requirements Fathering

    3.3. Prototyping

    3.4. Usability Testing

    3.5. User Support and Performance Support Systems

4. **The Technology Behind E-commerce**

    4.1. Creating a Catalog of Products

        4.1.1. The Product Database

        4.1.2. Presenting Products and Searching

        4.1.3. The Shopping Cart

    4.2. Checkout

        4.2.1. Creating a Database of Customers

        4.2.2. Tax and Shipping Tables

        4.2.3. Managing Credit Cards

    4.3. Customer Relationship Management (CRM)

        4.3.1. Computer Telephony Integration

        4.3.2. Customer Self-Service

    4.4. Integrating E-commerce with Enterprise Systems

5. **Bringing Legacy Systems Up to Date**

    5.1. Re-engineering Techniques

    5.2. Moving from "Silos" to Cross-Functional Integration

    5.3. Making Build-Buy Decisions

6. **Security, Privacy and Trust**

7. **Developing Software**

    7.1. Waterfall and Iterative Methodologies

    7.2. Managing the Development Process

    7.3. Quality Assurance

FIGURE 5

"CyberSmart managers are only one component of a **CyberSmart organization**. There is also a need for business-savvy **technology professionals.**"

create and support an international broadband network, get hardware and software delivered to end-users, installation and support.

It is clear that there is a great deal of communication that needs to take place between the business and technology sides to create the systems that will support the new market.

Business and technology professionals are responsible for actually executing the projects. They will take direction from mid-level management but will typically make a large number of decisions that in the aggregate determine how the software actually operates. At the professional level the communications requirements become intense, specific and often quite technical. It is here, perhaps more than any other place, where projects encounter communications difficulties that cause them to fail.

What CyberSmart Managers Need to Know

CyberSmart managers need to be able to "think in the language of technology." This means that managers need to be able to envision how technology can contribute to solving business problems. And they need to participate in the creation of the solutions as full partners and decision makers.

Technology fluency falls somewhere between computer literacy, which is usually defined as the ability to operate a computer for standard office applications, and the technical skills required in information technology professionals. What is required is a working knowledge of technology concepts in support of responsible
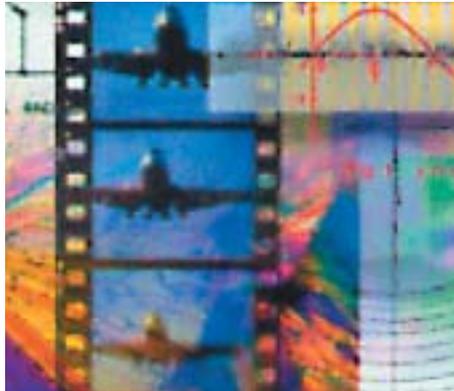
decision making and problem solving.

Technology is a broad field and there are many concepts that are relevant. I have found the outline shown in Figure 5 to be useful as a framework that can be adapted to individual needs.

Conclusions: Gaining a Strategic Advantage

Helping managers become CyberSmart is not easy. There is a lot to learn and many business people will resist because of fear, time pressure and workload. It is essential, however, that organizations take this step or they will find themselves with expensive, failed projects and software that doesn't meet their needs.

Because it requires more than buzzword knowledge of concepts, it is not possible to create CyberSmart managers in a three-day workshop. It takes a sustained effort over time. Material presented in an abstract way is far less meaningful to business people than material related to business issues they understand. For example, industry-specific case study presentations are far superior to academic lectures. Even better is training

linked to actual projects in which the business people are participating.

CyberSmart managers are only one component of a CyberSmart organization. There is also a need for business-savvy technology professionals. And business process must reflect the central role of technology.

In time, evolutionary pressures will produce CyberSmart organizations because those who fail to adapt will diminish. But organizations that want to compete in the information economy can gain strategic advantage by developing themselves into CyberSmart companies.

RESOURCES

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Charles Kreitzberg, Ph.D., is CEO of Cognetics Corporation in Princeton Junction, New Jersey. You can reach him at (609) 799-5005 or charlie@cognetics.com.