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LESSONS FROM THE STEEL AXE: CULTURE, TECHNOLOGY, AND ORGANIZATIONAL CHANGE

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Lessons from the Steel Axe: Culture, Technology, and Organizational Change

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IT IS WITH great pleasure that I introduce this Forum piece from Peter De Lisi, with whom I have worked over the past several years. As this article points out, when one is close to the customer working with information technology, the importance and centrality of organizational culture become obvious. The article also shows the multi-faceted set of issues that one must confront when dealing with culture. What gives this paper especial credibility is the fact that the author has spent many years working with organizational clients, helping them to create information technology solutions that really work. He does not speak from an academic base but from a wealth of practical experience. This makes his insights especially relevant.

—Edgar H. Schein
MIT Sloan School of Management

AN AUSTRALIAN aboriginal tribe, the Yir Yoront, offers a startling example of the often dramatic interplay between culture and technology. At the turn of this century, the Yir Yoront society was literally destroyed by the introduction of technology.[1]

The Yir Yoront supported themselves by hunting and fishing. Their primary tool was the stone axe, which they used to hunt, to chop firewood, and to construct domed huts. The stone axe had great cultural significance, as well. Only men could make axes, and only men could own them. If a woman wished to use an axe – as she might frequently need to during the day – she could borrow it from a relative according to prescribed rules of kinship. For example, she could borrow it from her father or an older brother, but never from a cousin or an uncle. These kinship rules reinforced the privileges associated with masculinity and age. The stone axe, then, signified an entire system of social relationships.

It was also pivotal in the development of relationships with other tribes. Each year during the dry season, the Yir Yoront traded with partners 400 miles to the south. This area was the source of the stone used to make the axes. The trading took place in conjunction with important festivals, centering on initiation rites and other totemic ceremonials.

Toward the end of the nineteenth century, steel artifacts from Europe began to infiltrate the Yir Yoront society, including the steel axe. Missionaries gave women and children steel axes in return for labor and allegiance. Men now found themselves borrowing steel axes from women and children – a significant role reversal. The construction of stone axes lost its associations of masculinity and self-reliance. And since the Yir Yoront no longer needed to trade for stone, important social celebrations disappeared. Eventually, the Yir Yoront society collapsed, a victim of changing technology.

Now our culture approaches the turn of a century – the twenty-first. The same interplay of forces – technology and culture – is at work in our organizations today. To the extent that we understand these forces and use them to our advantage, we can spare ourselves the fate of the Yir Yoront.

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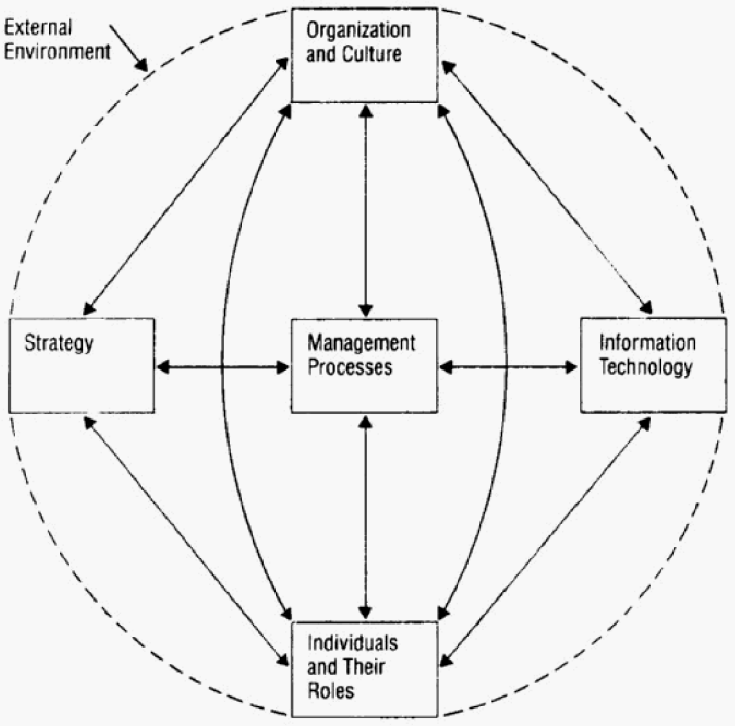
This paper explores those forces and their systemic interaction.

The Primacy of Organizational Culture

I believe that societal values are a fundamental, driving force, influencing everything from the way we structure our organizations to the way we use computers. My work at Digital, which involves consulting on strategic issues of information technology (IT), has led me to two conclusions, which are based on that assumption:

- Given the changing nature of organizations today, *organizational culture is more important than ever before* and much more important than previously supposed. Developing a shared vision and articulating a shared culture are essential. Just as important is managing change – introducing information technology, changing strategic direction, and so on – in such a way that it *enhances* the culture rather than diminishes or changes it.
- We have heard a great deal about IT's potential as a competitive weapon, but effective strategic use of IT is still unusual. However, some currently available technologies (especially networking capabilities) do have the potential to enhance both teamwork and executive decision making. *But networking capabilities will not be realized, either, unless the networks fit the existing organizational culture.*

Figure 1 **"Management in the 90s" Organizational Model**



This model reflects the original framework for the Management in the 90s program. It has since been modified.

Source: MIT Sloan School of Management

Organizational Change and Information Technology

The original framework for the Management in the 90s program at MIT uses a model of the systemic interactions among organizational elements (information technology, organization and culture, strategy, individuals and their roles, and management processes) with "management processes" in the center (see Figure 1).[2] In the final report, organizational culture is accorded a slightly more important role and is shown as the area bounded by structure, management processes, and individuals and their roles.

I would argue that "organizational culture and leadership" should be separated from organizational structure and granted the central role in the system (see Figure 2). This model does not help us understand how an organization *functions*, as much as it helps us understand the *strategic changes that are occurring* in today's organizations.

In the sections that follow, I will discuss each of the elements in turn – how each fits into the systemic picture, and how each is changing.

Organizational Culture

Ed Schein defines organizational culture as follows:

> Organizational culture, then, is the pattern of basic assumptions which a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, which have worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.[3]

I believe that the "pattern of basic assumptions" held by a group affects strategy, structure, information technology, and the individual more fundamentally than these elements affect culture. In

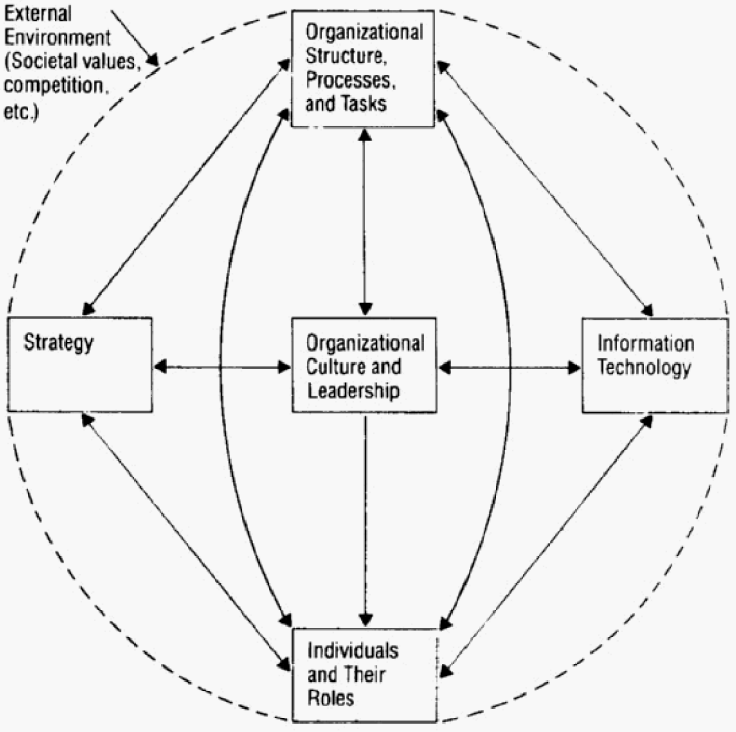
fact, culture predisposes these elements; it is the primary driver of strategic organizational change. An example: Over the past eighteen months, I have worked with a diversified, Fortune 500 enterprise. It is a company with an entrepreneurial culture; people within the organization have significant autonomy and empowerment. The company retains many of the values of its original founder and provides a highly motivating, family-like environment.

As part of our strategic planning intervention, we at Digital developed a list of critical issues or obstacles to the organization's achievement of strategic goals. After approximately four months of developing these critical issues, by division, we were asked to present them to the executive committee. After analysis and reflection, it occurred to us that many of the issues could be distilled into one *root* issue. This was, "What kind of company do you want to be?" We developed Table 1 to show to the executive committee that many of the critical issues concerning the organization came down to a choice between two different cultural approaches. On the one hand was the entrepreneurial culture, with an emphasis on internal control, creativity, individual autonomy, and so on. On the other hand was a professional management culture, stressing, among other things, external controls, conformity, and hierarchies.

Before this time, key questions masqueraded as structural issues (should we be centralized or decentralized?), strategy issues (should we strive for cost leadership or differentiation?), and control issues (should we control more tightly or continue to give the divisions autonomy?). Now it was clear that the fundamental question facing this company was a cultural one. The company already had a highly entrepreneurial culture, but some managers thought it needed to move toward professional management, now that it had grown very large. The professionally managed culture, however, represented values that contradicted those of most individuals within the organization; they had grown up with entrepreneurial values. Once the executive committee understood that the core issue facing them was about culture, they decided to reaffirm the values that had made their organization successful in the past. Apparent issues of strategy, structure, process, and information technology suddenly fell into place. That experience made us true believers in the primacy of organizational culture.

Leadership belongs in the center of the strategic

Figure 2 **A Culture-Based Organizational Model**



model, too, but as my discussion of it is primarily concerned with the use of IT by senior managers, I have included it in the section on individuals and their roles.

Organizational Structure, Processes, and Tasks

Shifts in the larger culture influence individuals, who influence organizational *culture*, which in turn affects organizational *structure*. These cultural changes in the larger society are also evident in psychotherapy, education, and child rearing. Each of these disciplines has moved away from "authority-centered" philosophies and toward more "person-centered" philosophies. In psychotherapy, it's called "client-centered therapy," and in education, it's called "student-centered learning." Many of today's well-educated, baby boom workers are demanding bigger challenges, more autonomy, and more involvement in the decision-making process. The information technology section below elaborates on this idea and includes a discussion of the impact of societal values on the way we use computers.

Table 1 Two Approaches to Organizational Culture

Entrepreneurialism	Professional Management
Internal Controls	External Controls
Creativity	Conformity
Individual Autonomy	Central Control
Intuitive	Rational/Logical
Right Brain	Left Brain
"That Ol' Gut Feel"	Scientific Management
Decentralization	Centralization
Distributed	Centralized
Networks	Hierarchies
Adult-Adult	Adult-Child
Person-Centered	Organization-Centered
Product Differentiation	Low Cost Producer

Recent writings on the organization of the future take these new values into account. It's not yet clear which metaphor best describes the new organizations: Peter Drucker's symphony, Alvin Toffler's adhocracy, Tom Peters's permeable membrane organization, or John Naisbitt's collapsed pyramid. What appears to be common to these and other authors, however, are three very basic ideas:

- The organization of the future will have fewer layers of management and fewer staff functions.
- Organizations will revolve around small teams.
- Organizations will be more "customer-centered."

Information technology is facilitating (but not driving) the emergence of these new organizational forms. With information available to all individuals in an organization, regardless of status, and across time and space, the company no longer needs multiple levels of management to pass the information up and down the hierarchy. Also, since executive decision makers are able to access information directly, they no longer need staff personnel to prepare and filter the information beforehand.

Information technology facilitates small teams by connecting individuals through wide networks that span geography and time. Small teams are typically composed of people with very different backgrounds and expertise—even people who live in different countries and speak different languages. For example, an engineering team, composed of design engineers, manufacturing engineers, and supplier representatives, can hold a dialogue electronically. The individuals can participate from locations all over the world, and they can contribute to the discussion at different times.

Electronic communication makes the small team a viable structure, but only a strong and appropriate organizational culture will make it *work*. For example, I worked with a large manufacturing client that was experimenting with the small team concept. This corporation had previous success with semipermanent, formal teams, those created and empowered by management, but not with either permanent, formal teams, those created by management as a permanent work arrangement, or informal teams, which are spontaneously created by individuals and empowered by the assumptions of the culture. Over a period of time, it became clear to me that the culture of this particular organization was not conducive to either permanent or informal teams. The exhortations to individual excellence and individual risk taking, rooted in this organization's cultural heritage, undermined group solidarity; they made it very difficult to support the small team concept beyond the level that already existed.

Customer-centeredness appears to be a response to global competition and is a major aspect of the total quality management (TQM) philosophy. TQM ultimately springs from customer satisfaction as its central source. Because so much has already been written on the subject of customer-centeredness, I will not elaborate further on it here.

I'd like to describe my own vision of the organization of the future—one that incorporates teams of teams, hierarchical elements, and "customer centeredness." This organization builds on recent trends toward integration.

Rockart and Short, in their description of the networked organization, argue that time to market, quality, and cost reduction are the forces driving integration, or, as they call it, "more effective management of interdependence."[4] A wider view of this phenomenon, however, suggests that societal values are the fundamental force driving us toward this end. The movement toward interdependency in our organizations can be seen as a microcosm of the movement toward interdependency in our society, as evidenced by our growing awareness of ecological systems, global economies, and nuclear threat. Logically, then, current efforts toward integration will continue until we reach an even more refined and more integrated view of the organization, one in which members operate as parts of a *system*, not just as parts of a team.

My vision of the organization of the future is

based on that exemplar of a system—the human body.

The organization of the human body and the business enterprise are surprisingly similar. In fact, we use human metaphors frequently to describe functions of the business enterprise, such as "organizational memory" and the "life blood" of the organization.

However, the comparison appears to break down in three areas:

- The human body system deals comfortably with *knowledge*, whereas the business enterprise still has difficulty dealing with informational constructs and vocabulary.
- The human system demonstrates a clear hierarchy from cells to organs. At this point, however, the human system organizes itself into *systems*, whereas traditional organizations have tended to maintain the hierarchy all the way to the top.
- The human system demonstrates awesome integration—75 trillion members all working for the good of the whole organism, whereas our business enterprises have tended to segment themselves into isolated and independent functions.

If we could rectify the above deficiencies and more closely approximate the system of the human body, we would have an organization of complete systemic interdependency. This interdependency would be inspired by a common, overriding vision (e.g., culture) or a common set of objectives. I will sketch out just a few of the possibilities.

Analogous to the respiratory system in the human body, the knowledge system in this organization of the future "breathes new ideas into the organization," purifies them, and then, analogous to the circulatory system, circulates them to the members of the organization. Knowledge is the "lifeblood," and capital is the nutrition.

In a manufacturing company, the manufacturing component consists of a closed loop process that revolves around customer satisfaction. Composed of concurrent teams, the members determine customer needs (Quality Function Deployment), and then drive the product design, manufacturing, and servicing to satisfy them. Manufacturing does not correspond to a bodily process; it is the enterprise's reason for being.

At the center, the command and control system of the organization corresponds to the central nervous system in the body. Hierarchy thus remains an element of the design, but without all the layers of management that exist in our current organizations.

Underlying the command and control system are values and organizational culture, which influence the organization much as personal values and societal culture influence human behavior. These play an especially important role in the organization of the future—they provide an *internal* control mechanism.

Much more research and elaboration needs to be done on this suggested organization model. For now, however, I feel sure that the values of society are pushing us in this direction. The various forms of integration (concurrent engineering; value chain integration; functional, cross-functional, and cross-enterprise integration) all seem to be "mileposts" on a journey to somewhere. The *systemic organization* may be the destination.

In Figure 2, I combined organizational structure, processes, and tasks as one element. Frankly, I have been more concerned with structure than processes and tasks, thus far, and much more work needs to be done in this area. Each of these areas has undergone an interesting historical shift. In the traditional organization, management first established tasks and processes to be performed, and the organization with which to perform them, and then looked for appropriate strategies. It is my belief that in the organization of the future, culture (who we are, what we want to achieve) and strategy (how we go about achieving it) will generally lead and drive both the tasks to be performed and the structure of the organization; information technology will facilitate the implementation of strategy.

Strategy

What is the relationship between culture and strategy? Michael Porter, in his major work on competition, describes three generic strategies: cost leadership, differentiation, and focus.[5] I believe that these competitive strategies must fit the culture of the organization in order to succeed. For example, at the diversified, Fortune 500 company described previously, managers disagreed on whether their primary product should compete on the basis of cost leadership or differentiation. Only when we considered their cultural context did we discover the source of the disagreement: the representatives of the old entrepreneurial culture favored differentiation, while the advocates of the new, professionally managed culture supported the control aspect of the cost leadership strategy. Once these issues

were discussed, we successfully moved the organization through this phase of its strategy development. What had seemed to be an argument about cost leadership and differentiation turned out to be, more fundamentally, an argument about organizational culture.

As we are concerned primarily here with information technology, it is useful to consider the ways strategy can employ IT to competitive advantage. There are few examples of IT being used to truly enhance competitive advantage—and these are often quite simplistic. The standard examples were probably more serendipitous than they were the result of a well-planned strategic design. In my consulting work, I have categorized the various examples of information technology being used for competitive advantage, then added a few other categories of potential uses; I call these "The Twelve Strategic Uses of Information Technology" (see Table 2).

Several examples from this list can serve to illustrate successful uses of IT. A high-technology supplier established an electronic conference with one of its primary customers in order to deliver value-added consulting over a network. Supplier experts from all over the world could join the conference. In the process, the supplier differentiated itself from competitors and thereby altered the competitive balance. Another example occurred at Digital itself. Digital's chairman, Ken Olsen, has credited electronic communication between worldwide engineering staff and suppliers as a major factor in reducing the time to market of a recent product by nine months.

Information technology can also affect the organizational structure, making it leaner and more efficient, which contributes to competitiveness. It can affect individuals—empowering them, raising morale, and spurring creativity. These effects, similarly, can contribute to the competitiveness of the organization.

Table 2 Strategic Uses of Information Technology

1. IOS (Inter-Organizational Systems)
2. ET (Emerging Technologies)
3. Cost Leadership
4. Market IT Services
5. Value-Added Information
6. Create a New Information Services Business
7. Enhance Decision Making
8. New Organizational Forms
9. Enhance Sales and Marketing Capabilities
10. Enhance the Overall "Quality" of the Organization
11. Foster Greater Creativity, Adaptability to Change
12. Time-Based Competition

Individuals and Their Roles

All these changes ultimately affect the individual and his or her role; jobs are eliminated or fundamentally altered. Since our self-esteem is so tightly bound to how well we think we're performing our job, and therefore to how valuable we think we are, job changes can have a tremendous impact on our physical and emotional well-being.

In her recent book, *In the Age of the Smart Machine*, Shoshana Zuboff describes the effects of information technology on the individual worker.[6] She coins the term "informate"—to empower people through information technology—and maintains that the opposite has actually occurred. Information technology has taken away from the factory worker the contributory skill of "acting on," that is, the intuitive sense of understanding the physical processes by smelling, hearing, and sensing them. Information technology has stripped the clerical worker of the skill of "acting with"—that skill involved in communicating and coordinating with people. These workers now typically sit behind CRTs in air conditioned rooms, physically removed from the processes and people with which they were formerly involved.

Clearly, we have not yet fully embraced the challenge of using information technology to enhance the individual's work experience. We are apt to think about this problem, too, in terms of "more, better technology" instead of by thinking more about people themselves.

Management information system (MIS) staff members have a key role to play in addressing the "informating" challenge, but before they can do that, their own roles must be reevaluated. These roles are strongly influenced and moderated by the company's culture. My introductory experience with MIS was with a large aerospace company. It was characterized by the pyramidal hierarchy—a structure not well known for empowering the individual, or for pushing decision making down to the lowest levels of the organization. On this particular occasion, I challenged the audience to consider the expanded role of MIS organizations in the next decade.

Computing resources of the organization are unfolding into a "computing universe" with the user at the center, instead of the organization.

The result was disappointing. The audience seemed only concerned with the more mundane uses of IT. It was almost as if they were saying, "What does this have to do with the report I have to get out at 3:00 this afternoon?" Subsequent reflection and experiences have led me to believe that part of the problem is the previous lack of empowerment of MIS staff—especially in hierarchical organizations. In many cases, the cultural frameworks do not support an empowered role. MIS organizations must see their roles quite differently in the 1990s if they are to succeed.

Henry Mintzberg's work on the roles of senior managers is useful as a framework for discussions of the applicability of IT to management leaders. Mintzberg describes the three roles of senior managers as informational, decision making, and interpersonal.[7] I have used these three roles to form axes of a cube (see Figure 3). Each axis can be broken down into subheadings. For example, the informational axis includes data, information, and knowledge. The decision-making axis is composed of individual, expert assisted, and group. The interpersonal axis can be broken down into no visual cues, some visual cues, and face-to-face.

The subheadings progress in value from "lower" to "higher." The model suggests that knowledge (or idea) access has more value than data access. (For an excellent discussion of the value of idea and knowledge access, see Theodore Roszak's *The Cult of Information*.[8]) The model presents group decision making as more effective than individual decision making. (Although one might think this would be task dependent, psychological research indicates that, at least in uncharted waters, group decision making is more effective than individual decision making.[9]) Finally, face-to-face interaction is considered more valuable than interpersonal communication that lacks visual cues—which is, practically speaking, a contradiction in terms.

This progression theory suggests that the highest form of executive operation is at the intersection of knowledge access, face-to-face encounter, and group decision making—a concept called "decision conferencing." Much work remains to be done on this theory, but it seems more appropriate for current senior executives than the desktop executive information system. Most senior executives were not raised on computers and spend most of their time in face-to-face meetings. Indeed, a study by McLeod shows that senior executives prefer face-to-face encounters above all other kinds of media.[10] It doesn't make sense, then, to try to change the way executives work. Wouldn't it be more effective to use information technology to complement the way they work?

What are the implications for decision conferencing? I can imagine a number of scenarios, such as use of an "executive information consultant" at meetings of senior executives. With a large projec-

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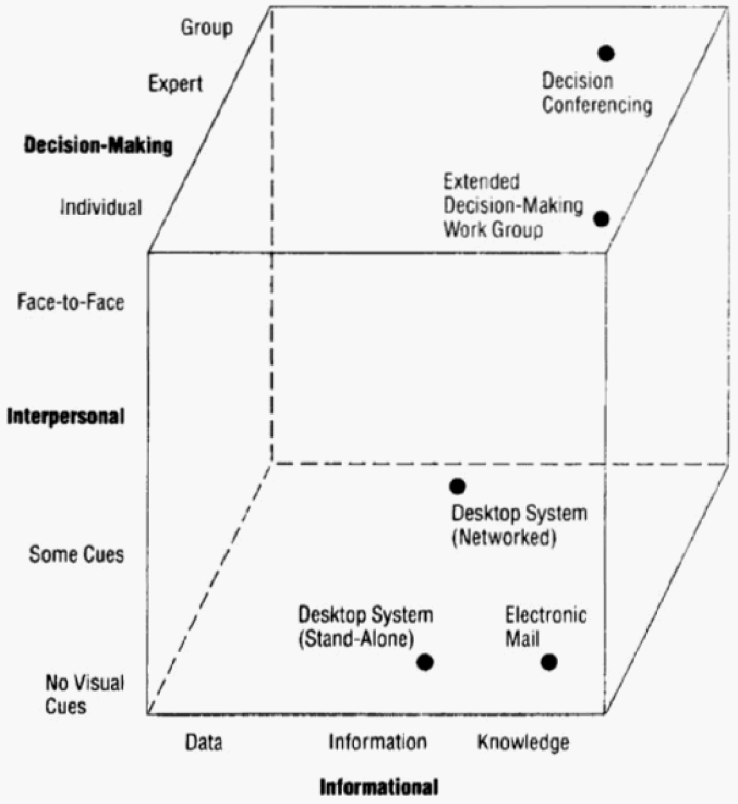
Figure 3 **Executive Information System Model**



tion screen, this person would access and display any information the executives require in order to make decisions. Such a use of IT is a powerful form of executive information system.

Another possibility I call "extended decision-making workgroups." In this approach, a senior executive meets electronically with an extended staff, independent of time or geography. The format is many-to-many communication, as in computer conferencing, and involves knowledge access, group decision-making, and some visual cues. To a greater extent than electronic mail or pure information dissemination, computer conferencing allows emotions to surface and provides participants with status indications and interpersonal communication cues. More important, computer conferencing provides the executive with an opportunity for knowledge development.

Computer conferencing builds a structured transcript from the input of the participants. This allows each person dialing into the conference to see what others have already said, exchange ideas, and develop knowledge. Electronic brainstorming can occur with an extended worldwide staff. For example, suppose that the president of a global corporation, with operating divisions located in major cities throughout the world, wishes to make a timely decision and depends critically on input from the worldwide executive staff. The president initiates a query on an electronic conference and then receives reports from executives around the world as they sign into the conference at different times. Each in turn has the benefit of seeing what others have said and can build on those ideas. Within twenty-four hours, the president has the required input to make a decision.

Information Technology

I have woven a discussion of information technology throughout the sections above, focusing in particular on its capacity to change individual jobs, to streamline organizational structure, and to provide competitive advantage. Now I would like to focus on a capability that interests me very much and that has great potential for affecting tomorrow's organization in positive ways: networking.

Here my interest is hardly detached; I have worked at Digital Equipment Corporation in the consulting function for the past four years. That experience, naturally, has molded my thinking about this subject.

Several years ago I conducted a research project on the social implications of computer networks.[11] These were my conclusions:

• **Information technology and computer networks derive more from forces driving society than from technology evolution itself.** Information technology has progressed from large, monolithic mainframe computers in the 1950s and 1960s, to the computer power that now sits on our desktops. It would appear that this evolution has been driven by the increasing price performance of computers and the miniaturization of circuits. However, the evolution of distributed forms of computing, and peer-to-peer networks, have actually been driven by the same forces that have changed psychotherapy, education, and child rearing. In computing, we call it "distributed computing," but could just as well call it person-centered or user-centered computing. While technology pushes down to the desktop, users exert an even greater force, pulling technology toward the satisfaction of their needs. Our research suggests that the value shift in society has a more significant impact on technology than previously supposed.

Because this is such a provocative way to view technological evolution, I will elaborate further on the factors that contributed to my conclusions.

I began with a philosophical and scientific inclination to look for common underlying causes of change. I wondered if the "person-centered" shift, which had already been used by philosophers and writers to describe other social changes, might have also influenced this area.

My own observations and experiences confirmed that computer users were becoming much more powerful. The development of information centers, the formation of user committees, the appearance of user executives as chief information officers, and the overall increase in user computing autonomy, all suggested that the computing resources of the organization were unfolding into a "computing universe" with the *user* at the center, instead of the organization.

This is an area for further study and also one with tremendous implications. If my conclusions are valid, we may find technology vendors paying much more attention to the values of their potential customers than they have in the past.

• **Computer networks can be a powerful agent for social change.** Sara Kiesler explains, for ex-

ample, that electronic mail makes it possible to bypass lines of authority, thereby affecting status and role. Also, the lack of visual clues in electronic communication reduces inhibitions. This leads to spontaneous, even abusive, outbursts, a concept she calls "flaming."[12]

- **Networks need to fit your corporate culture.** If societal values do indeed influence our organizational culture, structure, and the way we compute, then it should be arguable, for example, that a person-centered network, in an authority-centered organization, could cause great conflict. In this case, the network *empowers* the person, while the organization *controls* the person. The reverse is also true, that an authority-centered network would conflict with a person-centered organization. Therefore, a network decision should not just be based on cost, technology, and vendor reputation.

Computer conferencing is an excellent example of a person-centered communication network. In this many-to-many dialogue, usually among equals, participants exchange knowledge and develop collegiality. Leadership derives from knowledge, not from position or status. Shoshana Zuboff describes the case of "Drug Corp" and its implementation of a computer conferencing network. She devotes an entire chapter to the dynamics and conflicts that occurred between the users of the person-centered network and the control-oriented management hierarchy. Sadly, in this case, the threat to the established power structure became too great and the network emphasis was shifted "from one of inquiry and dialogue to one of perfunctory messages and routine electronic mail."[13]

Not surprisingly, computer companies reflect this cultural-fit issue. They are just as likely to introduce network products that reflect their own internal culture as they are to introduce products that are technology driven. It can be safely said that Digital Equipment Corporation's distributed network architecture reflects as much the way the organization works internally as it does any technological necessity. Similarly, IBM's network architecture reflects its own highly disciplined and controlled culture.

- **Networks need to be tailored to the needs of the function or organization they serve.** In his classic research into human networks, Harold Leavitt concluded that hierarchical, human networks ("stars") were faster and more controlled, whereas peer-to-peer ("circle") networks were more creative and adaptable to change, producing higher morale among the participants.[14] I won't attempt to prove that Leavitt's results with human networks can be directly applied to electronic networks, although my subjective experience indicates that this is so. Rather, I leave it as a question for further research. If the results do apply, we may one day see the "star" network in portions of the organization where fast decision making is required and the "circle" network where creativity, adaptability to change, and morale are more important.

Implications

I'd like to distill the previous discussion by discussing what I consider to be the three major challenges of the 1990s.

The first is to "informate" our individual workers, at all levels of the organization. In the final analysis, most of our competitive potential resides in individuals. We must use information technology to empower people and to produce greater morale, enthusiasm, and creativity.

Our second major challenge is to build teamwork. I believe that team building and electronic communication can conflict with each other, however, and if this is so, that conflict must be managed. An example may illustrate this point. In June 1988, Digital hosted a seminar for twenty-two senior level executives to simulate the organization of the 1990s. Small teams of executives competed with each other on such measures as stock price, earnings per share, and sales volume. The executives never met face-to-face with the rest of their organization except in the first meeting; they relied on electronic communication and other information technology tools. They did meet face-to-face with the people in their small group.

Usually this intensive three-day event resulted in strong feelings of camaraderie among the participants. But in the past, we had made much less use of electronic communications. This time I sensed a lack of strong feeling. At the conclusion of the seminar, I asked one of the participants if he had gotten to know most of the others. His answer shocked me. He said, "I got to know the two other people in my particular group, but I never really got to know any of the other people in my corporation or in the other corporations." I asked him why, and he said, "That's easy. We never really met face-to-face except for that first meeting."

If teamwork is vital to the success of the 1990s organization, how do we build it when electronic communication seems to conflict with it? Additional work needs to be done in this area, but we do know two things: (1) We need to continue face-to-face dialogue even though participants are far away from each other and even though we communicate increasingly through electronic means; (2) many-to-many forms of communication seem to foster team building despite the lack of face-to-face communication.[15] For reasons we don't totally understand yet, many-to-many communication seems to provide cues that are absent in other forms of electronic communication. Within Digital, a computer conferencing system called VAXNotes is used to promote the values of the culture and to support some of these electronic teams.

The third major challenge of the 1990s is to develop a shared set of values. As workers and teams become increasingly distributed over wide areas and different time zones, how does one build a shared sense of purpose? As Karl Weick put it, what is the "genetic code" that tells individuals what is right in the absence of the former controls and structure of the hierarchical system?[16]

The answer lies in developing a strong organizational culture – a system of shared values that helps an individual develop a sense of what's right to do. Weick, in a paper about culture as the "genetic code" in high reliability systems, describes the techniques used to train operators in such systems as the FAA and nuclear reactors. He concludes that culture may serve a better purpose than training or other techniques. One cannot train an operator to react to every situation that may arise, whereas cultural stories provide a foundation that the operator can draw upon in case of a crisis.

If we can meet the three major challenges of the 1990s, we will have dealt with the organization at the individual level, the group level, and the organization-wide level.

A century ago, the Yir Yoront learned the bitter lessons of the impact of technology on their organizational system. As we approach the twenty-first century, we have a chance to learn from those experiences. Unfortunately, we have only now begun to discern the impact of technology on individuals and their social and cultural systems. Much more work needs to be done in this area, but the rewards are clearly worth the investment. In the balance hangs not only organizational effectiveness, but also the fulfillment of the individuals and teams within those organizations. ■

References

For the past four years, I have provided strategic consulting to several Fortune 500 companies in the western part of the country. This experience forms the basis for many of the observations and ideas discussed herein. I owe a special debt to the "Management in the 90s" program at the MIT Sloan School of Management. The research proceedings from this program have been invaluable to me in working with organizations and helping them formulate their strategic direction.

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