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**TEAMS AND TECHNOLOGY IN THE NEW
ORGANIZATION**

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ABSTRACT

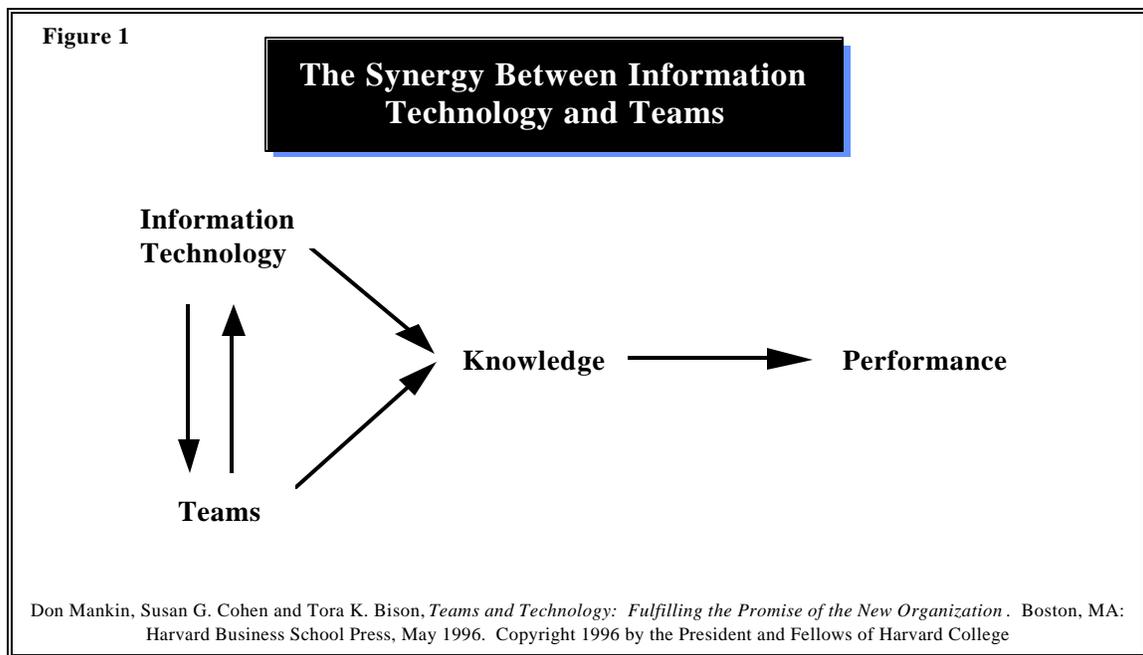
Teams and information technology (IT) are two of the most important developments in organizations today. Year after year, organizations increase their investment in new information systems and use teams to do more and more of their work. But many organizations are disappointed in the results. Few are getting the bang from the many bucks they spend each year to create teams and develop new information systems. The challenge facing organizations is how to develop the new competencies, roles, processes and organizational designs needed to fulfill the potential of these two promising and complex developments.

TEAMS AND TECHNOLOGY IN THE NEW ORGANIZATION

Teams and information technology (IT) are two of the most important developments in organizations today. Year after year, organizations increase their investment in new information systems and use teams to do more and more of their work. They devote vast amounts of time, money, and energy on teams and new technology with the expectation that their impact on the bottom line will eventually justify their costs. But many organizations are disappointed in the results. Few are getting the bang from the many bucks they spend each year to create teams and develop new information systems. The challenge facing organizations is how to fulfill the potential of these two promising and complex developments.

The assumption underlying current interest in teams and technology is the belief that they can contribute to the most important strategic resource of the postindustrial era -- knowledge. Whether solving production problems on the shop floor, creating new products in the laboratory, or mapping strategy in the executive suite, organizations need access to knowledge that is at the same time both interdisciplinary and highly specialized. That is why organizations are now so intensely interested in teams and IT. IT provides access to diverse sources for specialized information and enhances our ability to analyze, manage, and apply this information to our work. Teams bring together different individuals who know and can do different things. They are a means for pooling and using the diverse "knowledges" and skills of its members to accomplish mutual goals (Drucker, 1994, p. 68).

However, teams or technology by themselves will have only minimal impact. Each is necessary to take full advantage of the possibilities created by the other--that is, information technology can make teams more effective, and teams can help fulfill the promise of new information technology. When they are integrated, their joint contribution to knowledge and organizational performance is greater than the sum of their parts (see Figure 1).



It is easy to see how technology can catalyze team performance. In a practical sense, information is inherent to team work. Information is the raw material to be manipulated and transformed, and it is the basis for the process by which these actions occur. Information is what is exchanged by team members as they analyze and deliberate. Ultimately, it is the result of the process -- the solutions they devise, the decisions they make, and the new information and knowledge they generate. This is not just the case for work that has always been knowledge-based, such as market research, engineering design, and systems development. All work is becoming more knowledge-based, even the work of production teams. Therefore, team members need "tools" to help them gain access to this information, manage and analyze it, share it among themselves, and communicate it to others.

Less obvious, but just as significant, teams can make information technology more effective. In recent years, organizations have come to realize that the payoff from their huge technology investments have more to do with the reengineering of work processes and structures around their new technology than the specific features of the technology itself. "Socio-technical" change strategies are now helping more and more organizations fulfill the potential of their new technologies. Specifically, they are using their new technology to integrate some of the very functions deconstructed by the division of labor. With the technology, they are opening up functional boundaries so that pooled knowledge can be brought to bear on complex, time-critical issues. Everyone involved in the work process can have access to the same information and, as a result, work together more effectively to serve customer needs. Thus, the technology creates the potential, teams help the technology fulfill that potential.

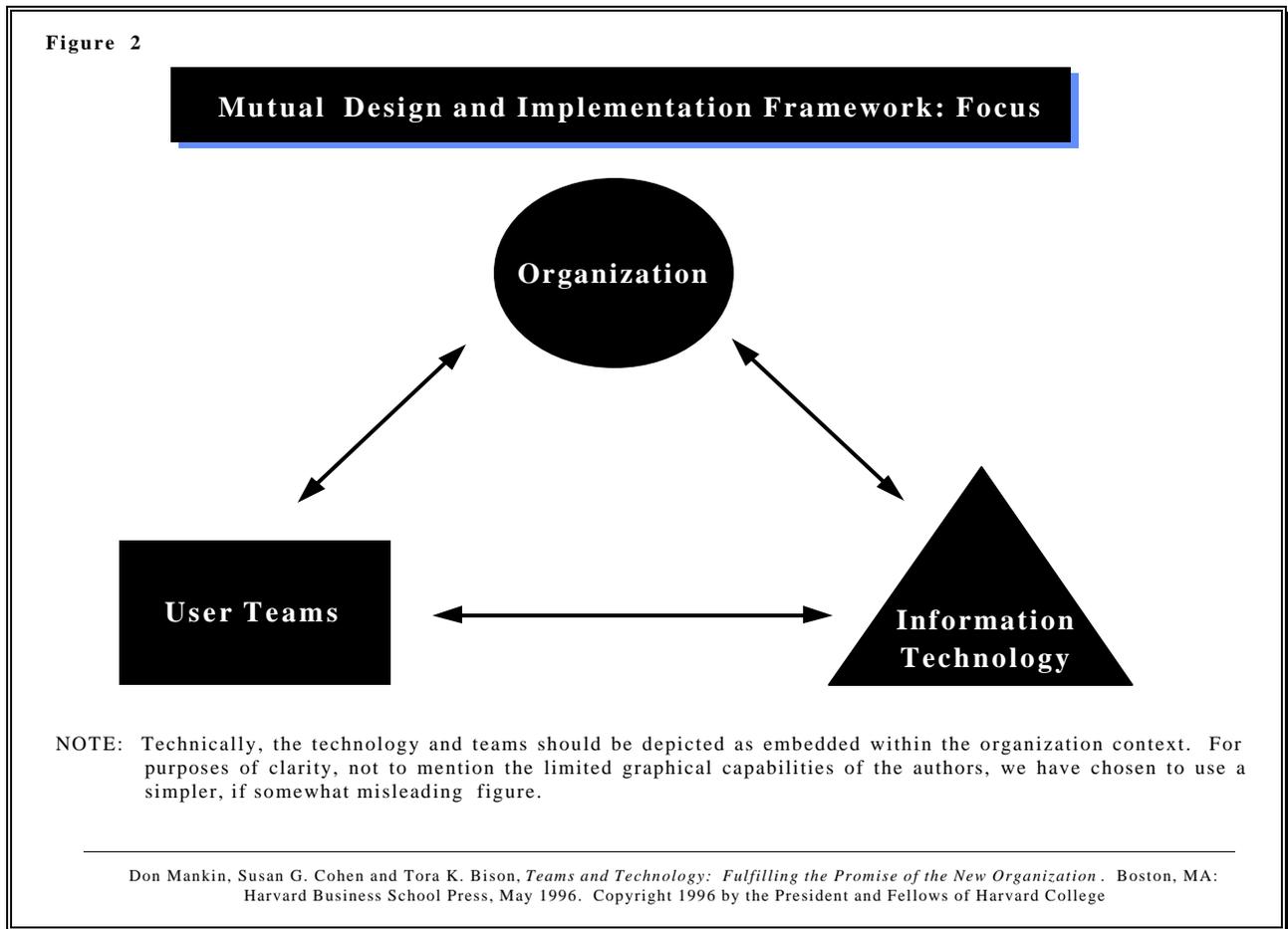
Although integrating teams and technology is an important step toward high performance, it is not enough. The growing use of teams and IT has significant implications for organizations. The nature of the organization itself -- its structures, policies, executive roles and technology platforms -- must change to support the teams and their technologies as they operate within, and increasingly across its boundaries. Developing new technologies and team designs should be embedded within a broader change effort to truly unleash their full potential. Team-based, technology-enabled organizations need to create high level structures, policies and systems to support individual teams and the information tools they use. This "macrostructure" must be able to integrate teams and their technology to help create the new organization.

MUTUAL DESIGN AND IMPLEMENTATION

Based on the arguments presented in the last several pages, we conclude that achieving high levels of organizational performance requires **the integrated development of teams, information technology, and the overall organizational context. This integration will occur only if development processes are interrelated. Therefore, designs in all three areas should be mutually reinforcing.** We call this integrated development process, "mutual design and implementation" or MDI.

Our use of the expression, "mutual," reflects both of its meanings in everyday use: 1) correlations, connectedness, and reciprocal influence among things, events and ideas; and 2) common interests and relationships among people. The first meaning refers to the focus of the process -- new information technology, the teams that will use this technology (we will hereafter refer to these teams as "user teams"), and the organizational context for this use. The mutuality describes the interdependency

of all three, as shown in Figure 2. This figure forms a triangle, which is also the Greek letter "delta," the symbol for change. Since a change in one corner of the triangle will necessarily influence the others, all three should be addressed to ensure that all changes will be complementary and mutually reinforcing.



The second meaning of "mutual" reflects our emphasis on the many diverse people and constituencies that need to collaborate in team, technology and organizational design. Integrated development of all three is a difficult task that involves complex decisions and multi-dimensional designs. Tradeoffs and compromises will have to be made, and ultimately, designs linked and integrated. This process requires varied high-level skills and knowledge, and many people will be profoundly affected by the decisions that are made. Therefore, a number of people with different kinds of expertise and interests will need to collaborate throughout this change process.

This collaboration should include those people whose work will be most affected by the changes, whose knowledge and skills are needed in the change effort, and whose commitment to the changes will play an important role in their success. These people are the "stakeholders" in the development process; they have a stake in the outcomes and are critical to its success. Therefore, representatives from all stakeholder groups need to be involved in the MDI process. The stakeholder

representatives make up the MDI project team (hereafter referred to as the "MDI team"). They are the primary agents of the change effort. They will be responsible for designing the technology and the user teams, putting them in place, and recommending the organizational changes needed to support them.

Successful change in any one of these areas -- teams, technology, or organizations -- is difficult. When it involves integrating all three, as in MDI, the task can be especially challenging. Effective MDI efforts require new competencies, roles, processes, and organizational designs. People need to develop new skills and knowledge, behave in different ways and take on new roles. The organization needs to develop new processes and designs to deal with changing competitive realities. As we describe these emerging requirements throughout this chapter, we will see that they are not only critical for MDI, but for any effort aimed at helping organizations face an increasingly competitive and unpredictable future.

NEW COMPETENCIES

Successful change requires the knowledge, skills, and commitment of many people. This is especially true for MDI. Numerous voices from different areas, expressing diverse interests and concerns need to be heard during the MDI process. They all can contribute to the rich tapestry of knowledge that is essential for broad, complex change.

Diverse Stakeholders

Some of the most important voices belong to those most affected by the changes -- the user teams. They will use the new technologies and work together in new ways within a redesigned organizational context. They know the most about the work to be modified, redesigned or transformed. They possess essential knowledge about the intimate, hands-on, day-to-day details of the work that can not be provided by any other means. They comprise the key collaborative relationships needed to fulfill their increasingly complex and multi-faceted missions.

They should also "own" the changes being made. In other words, they should help shape the changes and commit themselves to making them work. The best way to create this commitment is to build a system that meets the needs of the people who will use it; the best way to meet their needs is to incorporate their knowledge by involving them in the process by which design decisions and implementation plans are made.

Information technology experts also play a critical role in the MDI process. They will provide the technical expertise to translate user needs into new information systems, support the systems once they are implemented, and integrate them into the organization's IT infrastructure. Since they need to work closely with the user teams they serve, the quality of their collaboration is one of the best predictors of a system's ultimate success (Klein and Ralls, 1995).

Others also will be affected by team, technology and organizational change or possess critical knowledge or skills relevant to these changes. They include:

- the managers to whom individuals and teams report;
- human resources (HR) staff who can help facilitate the MDI team, develop training programs, and advise senior management on changes in HR practice and policy to support team-based work;

- customers and suppliers, both internal and external, who work closely with the team and use the same systems;
- senior management, who can use their authority to support the project; they also will be responsible for implementing new policies concerning overall organizational change that emerge from the MDI process.

They are all "stakeholders"; they literally have a stake in what happens and need to feel a sense of ownership over the outcomes. Their commitment, skills and authority are needed to create new work forms, technologies, and organizations. The "mutual" in the name for our framework means that all of these groups should collaborate in the design and implementation of any and all changes. Of course, not every individual within these groups can directly participate in this process. Therefore, representatives from these stakeholder groups need to be selected to serve on the MDI project team -- the group responsible for designing the new technology and the user teams, putting them in place, and recommending the organizational changes needed to support them.¹

Bridging Functional Differences.

Creating a team from such a functionally diverse group of individuals is one of the most important challenges of the MDI process. They have different backgrounds, work experiences, and knowledge bases and often see the world in very different ways.² Perhaps most important, they must represent the widely varying interests of their respective stakeholder groups. This is a fertile ground for conflict. This potential can most clearly be seen in the often contrasting interests and objectives of the user team representatives and IT experts. The former know what the user teams do -- their work tasks, their constraints, and the resources and tools they have to work with. Most important, they understand their work needs and are responsible for ensuring that these needs are met by whatever team/technology designs emerge from the MDI team process. On the other hand, corporate IT experts know the IT infrastructure and are responsible for ensuring that the new technology can be integrated into the infrastructure and supported by the IT department.

Making a team out of these intensely disparate voices can be daunting. Diverse viewpoints, positions and goals need to be reconciled, compromises and tradeoffs need to be made. Compromise means that no one gets everything he or she wants, and everyone has to give up something he or she values. Conflict and tension are inevitable under these circumstances: this is true whether we are talking

¹ Since the role of senior managers is to legitimate, support, and oversee the project, rather than to be involved in the detailed tasks of design and implementation, their involvement is usually via the project steering committee than the MDI team itself. In addition, the composition of the MDI team, like other project teams, can be quite fluid to reflect the changing dynamics and agenda of the MDI process. As they move from issue to issue, new representatives may be added, others may drop out, some may rejoin as earlier issues are revisited and decisions reconsidered. Frequently, the project may have to be partitioned into component tasks and separate MDI teams created to focus specifically on each subtask. Therefore, when we refer to the MDI team we mean it in the broad, dynamic sense to include the steering committee, multiple task teams, and the changing composition of the team as the project evolves.

² See for example, Dougherty, D. "Interpretative Barriers to Successful Product Innovation in large Firms." *Organization Science*, 1992, 3, 179-202. In this paper she presents evidence on the different "thought-worlds" of research and development, sales, manufacturing, and marketing representatives in new product development projects.

about MDI teams or any other project team (Cohen, 1993). The good news is that innovative solutions can result from these conflicts -- if the parties to this collaboration have the skills to make it work.

"Laterality" is the expression we use to describe these skills. Laterality enables people to cut across functional boundaries and work effectively with people of different backgrounds, work experiences, knowledge bases and skills. People with this capability:

- can act as a bridge and interpreter between different functional areas;
- can rapidly learn the basic language and conceptual framework of their collaborators from other areas;
- are confident, but not egotistical, about what they know; and
- are not defensive about their lack of knowledge in other areas and are willing to learn.

Only if the participants possess these qualities can the MDI team expect to deal creatively with the tension and conflict technological and organizational change will inevitably engender.

What Organizations Can Do to Develop These New Competencies

Laterality is not only critical for the success of the MDI effort, but for any project that requires the integration of different knowledge bases and expertise. It is a key competence for organizations, a competence that the organization needs to develop via its HR systems, policies, and practices.

Training, especially, is an important means for developing lateral skills. This includes, for example, training to familiarize team members with the language, conceptual frameworks, and fundamentals of one another's specialties, as well as with the specialties of others in the organization with whom they will need to work. Particularly important are information technology skills for members of business units and teams. Similarly, corporate IT staff need training to learn about the work of the units and teams they serve.

Training is also needed to help employees transcend their differences. They need to learn how to appreciate their differences, communicate in spite of these differences, and creatively manage, not suppress, the conflict that inevitably emerges from them. Therefore, training programs in conflict resolution, group process, and diversity can be highly beneficial, especially if issues related to functional diversity are included.

Incentive and reward systems can also help develop employees' lateral skills, especially skill-based pay. Under these systems, employees are paid based on the skills they have rather than the jobs they hold. It is easy to see how they might be used to motivate people to take advantage of the training opportunities described above. Creating **lateral career paths** is another intervention that can help develop laterality. Rather than moving up an increasingly constrained career ladder, employees can also move laterally from one project team to another or periodically rotate through different work units. In the process, they are exposed to different functions and to different people with other "languages" and points of view. They learn how to communicate with people with varying backgrounds and experience and to respect their knowledge bases and skills. In other words, they develop their lateral skills.

Individuals and organizations can do a number of things to foster lateral career paths. For example, to cultivate the kind of people who can "bridge the cultural gap" between the information technology department and the business teams it serves, Peter Keen (1991, p. 126) recommends that "firms must make crossing the 'cultural divide' a requirement for advancement." He proposes assigning

selected individuals from IT to a business department or team for periods ranging from 6 months to two years. Similar transfers would occur in the opposite direction as well -- e.g., technically proficient user team members could take a temporary assignment in the IT department to develop their contacts and skills. Eventually, they return to their original teams or units with the broadened perspectives and lateral skills they acquired during their transfer assignments.

Job rotation for developing lateral skills should not be limited to just IT experts. It can be used to build other bridges, to cross other boundaries, develop other skills. Lateral career moves from one team, project or department to another should be encouraged, regardless of the cultures or functions involved.

NEW PROCESSES

Organizations will have to adopt change processes that are up to the challenges of the increasingly dynamic and competitive environments within which they operate. New change processes are needed at both the macro and micro levels -- large scale change processes affecting many units and teams as well as the processes by which individuals and teams adapt their new tools to their tasks, and vice-versa.

Iterative, Open-Ended, Organizational Learning Processes

Effective organizations are open to change and committed to innovation. Instead of trying to minimize or resist change, these organizations encourage and nurture change and learn how to manage it so they can take advantage of the opportunities it presents. Therefore, all change efforts should be viewed as ongoing and continuous experiments which can produce learnings useful for the design and implementation of further change.

Change as Action Learning. Mohrman and Cummings (1989, p. 107) characterize the process as "action learning" -- "a process where organizational members try out new behaviors, processes, and structures; assess them; and make necessary modifications." In essence, the action learning approach treats the change process as an experiment where ideas, theories, hypotheses, and informed guesses are tested in the real world of organizational life. Therefore, team, technology, and organizational changes should be implemented in a way that enables implementers to learn from the consequences of their actions. The results of these action learning experiments are examined. If they diverge significantly from what was expected or desired, actions and plans can be modified based on what was learned from these analyses, and tried again. If successful, the learnings can be applied to subsequent steps -- steps that may increase in complexity and scope. This process continues until all the changes are implemented successfully.

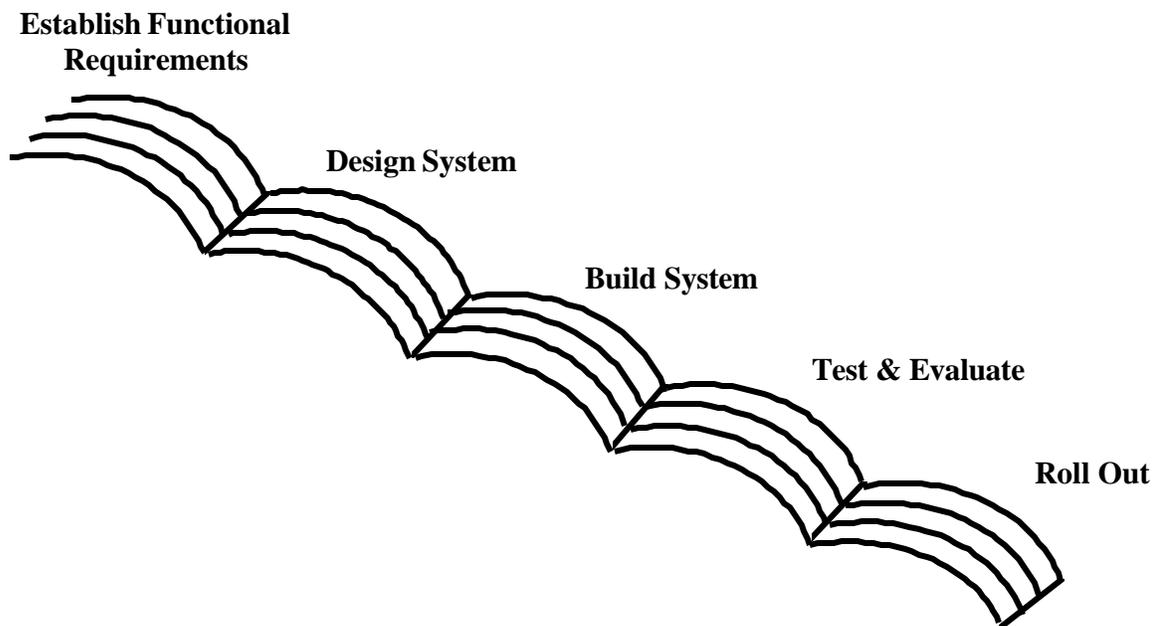
The implications of this action learning process extend the boundaries of particular projects. The experience of one implementation project conducted in this manner will make it easier for the next project, and so on. Eventually, the organization will develop the ability to implement increasingly complex innovations with less disruption and greater success. The end result, therefore, is not just better designs and interventions resulting from specific projects, but also enhanced knowledge and skills about how to implement change, in general, regardless of the particular changes being implemented.

This process does not progress in a linear fashion from a well-defined beginning to an equally well-defined end. Since technology and organizational environments are constantly changing, the process is never really complete. It continues indefinitely as the organization strives for a competitive technological advantage and adapts to, or tries to shape an increasingly turbulent environment. Throughout the project, things change -- the company, the environment, the team, or the technology. The project may need to pause, step back or sideways, or even go off in an entirely different direction. It may eventually end up with an outcome quite different from what was originally intended.

New Systems Development Processes. Emerging approaches to systems development illustrate these new change processes well. The traditional approach -- the "waterfall method of application development", as described by technology guru Patricia Seybold (1994, p.1) -- is characterized by a roughly linear sequence of steps. From Figure 3 we can see why the expression "waterfall" is used to describe this model. The process flows downstream, one waterfall spilling over to another in a one-way series of sequential steps. And therein lie some of the problems: The development process does not move from one step to the next until the prior one is complete, and none of the earlier steps can benefit from the knowledge gained in the performance of the later ones (Kanter, 1994).

Figure 3

The Waterfall Model of System Development

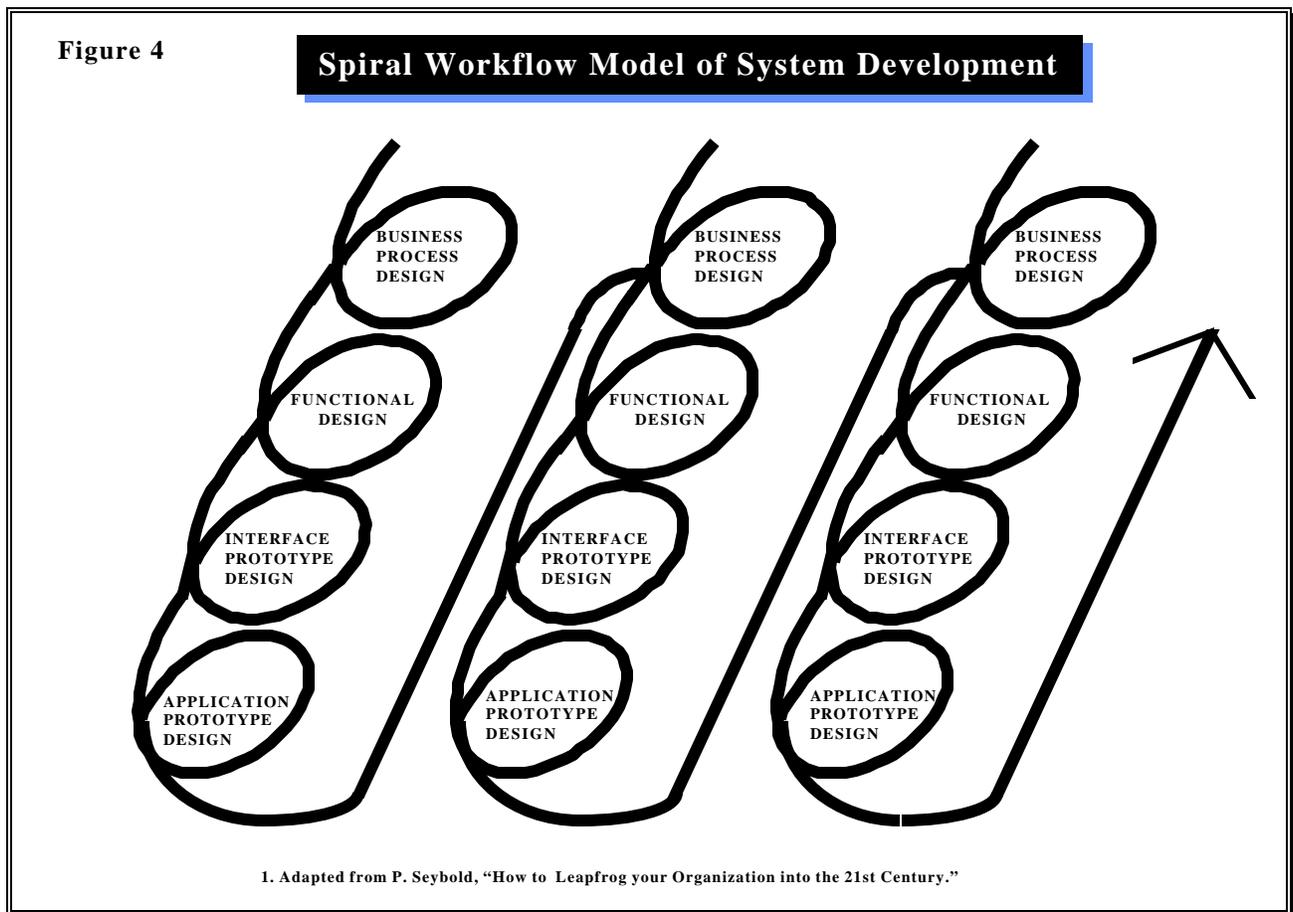


Don Mankin, Susan G. Cohen and Tora K. Bison, *Teams and Technology: Fulfilling the Promise of the New Organization*. Boston, MA: Harvard Business School Press, May 1996. Copyright 1996 by the President and Fellows of Harvard College

Other problems with this approach are that it requires a great deal of up-front planning time and is relatively inflexible. In addition, approximations of the final system are typically not available for user

reaction and feedback until too late in the process to have much impact. The system that results is likely to be costly, overdue, and possibly obsolete by the time it is finally ready for use. Furthermore, it will have benefited little from serendipity and unexpected opportunities. Horror stories about such projects abound. It should not be surprising, then, that organizations are desperately seeking alternatives to this traditional systems development model.

What many of them are finding is a constellation of new approaches which fall under the generic rubric of "rapid application development" (RAD). The various approaches, methods, models and techniques within this category go by such names as "spiral workflow", "iterative prototyping", and "joint application development" (JAD), to mention just a few of the most widely used. The following description of the spiral workflow method captures the critical elements of this new approach to systems development (see Figure 4).



You combine process definition, functional design, interface design and application development into a series of overlapping spirals, each one including the involvement and sign-off of the application's end-users. You cycle through each spiral in overlapping parallel, rather than serial, steps. And you don't iterate once: you run through the process at least three or four times. The resulting applications are designed faster, deployed sooner, map directly to the business process, deliver immediate business benefits, and are simpler to improve and less costly to maintain (Seybold, 1994, p.2).

Iterative prototyping is critical to this entire process and perhaps captures the defining nature of all of the alternative approaches to systems development. Prototypes provide potential users with an opportunity to actually experience the work in progress -- i.e., to "see, feel, and touch" aspects of the systems and tools they will eventually use in their work (Carey and Currey, 1989, p. 30). This is especially important when the purpose of the system is not just to automate what the users are already doing, but to enable them to do new things. The possibilities offered by new systems will be little more than abstractions to users in the early stages of the project. What better way then to get a handle on just what the new system has to offer than to try out a preliminary version to see what it can do -- and what users can do with it when they apply it to their work?

Prototypes can help users expand their horizons beyond immediate needs and existing technologies. In effect, prototypes "concretize the abstract." A prototype provides users with the opportunity to explore the system's potential, give feedback based on actual use, and make suggestions for how it can be modified to better fulfill that potential. It also gives designers a way to gauge how well they have understood users' verbally expressed needs and requirements and how well they have interpreted them in the technology prototype. This information can then be used by the MDI team to revise and refine its work.

Concurrent development of modules is another critical feature of most approaches to rapid application development. Systems can usually be broken down into relatively self-contained sets of functions (modules) which are relatively independent of other modules. The individual modules can then be developed independently and concurrently. Not all modules need to be developed at once. The MDI team can focus initially on the development of only a couple -- using iterative prototyping, of course. Other modules can be added as the project takes on additional staff, and as both the project and user teams move up the new technology learning curve. Throughout much of the midway to later portions of this stage, the MDI team will be implementing some modules at the same time they are developing others.³ The development process itself should be guided by agreed upon overall standards so that all system modules can be successfully integrated over time and remain open-ended for future extensions.

The benefits of rapid application development are clear. As the name implies, one benefit is speed. Another is cost. Redesign of a system in the final stages of development will be far more costly and time consuming than having a prototype surface problems early on. User involvement at all stages yields another benefit -- systems that more closely match user needs. Finally, the iterative nature of the process means that the development process can incorporate technological innovations and changing business conditions as they emerge.

In conclusion, this iterative, open-ended, learning model applies to all new design processes in organizations. For example, Takeuchi and Nonaka (1986, p. 137) apply this model to new product development, urging organizations to "stop running the relay race and take up rugby," the metaphor they use to compare traditional sequential approaches to newer, iterative ones. As in systems development, the benefits of these team-based cross-functional processes are speed, cost, and innovation -- in other words getting to market faster with new competitive products.

³ That the line separating design from implementation is far more fuzzy in RAD than it is in the waterfall model reflects the more dynamic and iterative nature of this approach to systems development.

Organizations may understandably be resistant to adopting these new change processes. Most large scale change efforts require significant commitments of effort, time, and large sums of money. As a result, there are enormous pressures to "get it right the first time." But "right" may well end up being far less than what they could have achieved and not enough to justify the costs of the effort. Furthermore, to learn from their change efforts, the effectiveness of these efforts should be evaluated frequently so that designs and implementation plans can be modified as needed. The problem is, most people, work units, and organizations feel threatened by the prospect of having their work evaluated.

Ultimately, the organization via its executive management needs to create a culture that supports risk taking, tolerates occasional failures, and enables all individuals and units involved to learn from experience. They need to instill this culture by creating systems for ongoing assessment and evaluation; rewarding innovative behavior, not just successful outcomes; and disseminating this information throughout the organization so that others can learn from these efforts.

Reinventing Tools, Tasks, and Teams

When new technologies are introduced into the workplace, they present an opportunity to develop new processes, to identify new tasks and responsibilities, and even to modify the technology itself. This reinvention can take several forms; modifications of the technology, of the task, of the job, and of the tasks, structure and mission of the team.

Tool, Task, and Job Reinvention. Tool reinvention usually happens as users gain experience with a new technology, begin to recognize its implications, and discover what it can and can not do in its existing form. As Tyre and Orlikowski (1994, p.98) note: "New technologies are almost never perfect upon initial introduction. Instead, users' efforts to apply technologies reveal problems and contingencies that were not apparent before introduction ... These problems, in turn, require adaptation of the technologies already in use." Tool reinvention often goes hand-in-hand with task/job reinvention. One can lead to the other which, in turn, can then reinforce the first. And, given the close interrelationships between knowledge-based tasks and information technologies, the distinction is often hard to make.

An example of task reinvention are the "local" IT experts that spontaneously emerge when new technologies are introduced into a work unit or team. They are the individuals who seem to be particularly interested in and facile with their new information tools. They are the ones who come to work early or stay late to "play" with the new system. They master the basic operations of the system before anyone else does and then move on to more advanced functions and applications. These local experts or "gurus" often think of new ways to use the system and modify it to do new things. Increasingly, their co-workers turn to them for help in learning how to get the most out of their new technology. In time, the local experts will be the first to recognize the limits of the existing system and lead the way in developing upgrades, or even new systems, to meet the evolving needs of their units. As experts in both the technology and their team's tasks and responsibilities, they can provide a previously unavailable, but now indispensable service to their teammates.

In what is possibly the most familiar example of job reinvention, secretaries of the 1970s and earlier have evolved into information assistants, coordinators, and managers. In the early 1980s, computers and word processors enabled managers and professionals to "type" their own letters, reports and documents. Voice mail in the 1990s has enabled them to "take" their own messages. In response to these technological developments, innovative and resourceful secretaries have reinvented their jobs. Instead of typing and taking messages, they control documents, organize data bases, service printers

and copiers, and teach others -- including the managers and professionals for whom they used to type - how to use the new technology. This reinvention by the few in the 1980s has become the formal job description for most all in the 90s (Johnson and Rice, 1986).

Team Reinvention. If team members are highly interdependent, reinventions by one member can lead to reciprocal and complementary reinventions by others. Eventually, these individual reinventions may reach a critical mass. At that point the team can decide to redefine and reallocate tasks among its members, and then redesign its structure to better accommodate and support these new tasks. In other words, the team can reinvent itself. Such was the case at XYZ, Inc. when new information tools enabled several work groups to take on new tasks and responsibilities and even widen or redefine their missions.

The Industrial Engineering department has redefined its mission to take in work "where the rubber meets the road." That is, making use of technical skills within its own staff, it is helping other work groups adapt PCs in unique ways to address specific XYZ objectives, filling a serious gap that could not have otherwise been closed by existing information support services.

This function was too small and short-term for the corporate IT department or for contracting to an external services vendor, so team members from Industrial Engineering stepped in to provide technical assistance. Nobody foresaw this need in the early stages of the project, and it would otherwise have gone unfulfilled if Industrial Engineering had not reinvented their mission and if management had not permitted this reinvention to occur.

The sales department also used the opportunities presented by new information tools to redefine its mission. By using portable computers, it was able to turn sales visits to customers, usually supermarkets, into data-based consultations. The sales representative would use the computers to download data about a range of relevant products (XYZ's and others) from commercial data bases to help customers analyze the potential profitability of different allocations of shelf space for various products. Instead of just selling a product, they now saw themselves as "information teams," providing their customers with useful knowledge and reinforcing XYZ's ties to their customers in the process.⁴

The Reinvention Dilemma and What Organizations Can Do. Reinvention has its downside. Users can get so absorbed in exploring the potential of the technology and testing the boundaries of their jobs that they neglect their formal job responsibilities. Not surprisingly, many organizations, managers, and technologists try to discourage reinvention because they fear that it will compromise the efficiency of the technology and the work process.

⁴ Adapted from T.K. Bikson, C.Stasz, and D. Mankin, *Computer-Mediated Work: Individual and Organizational Impact In One Corporate Headquarters* (Santa Monica, Calif: RAND Corporation, 1985), 47.

Others recognize the vitality and potential of reinvention and try to find ways to encourage and channel it into productive directions. Organizational theorist Claudio Ciborra (1991, pp. 288-289), for example, urges organizations to encourage and support the reinvention process (he calls it, "bricolage," French for "tinkering") so that "new ideas from the bottom of the organization (can) bubble up. . . . The more volatile the markets and the technologies, the more likely it is that effective solutions will be embedded in everyday experience and local knowledge. This is the petrie dish for tinkering; here creative applications that have strategic impact will be invented, engineered, and tried out."

What should organizations do? The first thing they can do is recognize what many elementary and kindergarten teachers have long known, that the most successful learning often takes place in the context of play rather than work. Translating this insight to the world of work means that people best learn how to use a new technology when they have the opportunity to explore its capabilities and potential -- in other words, to play with it.

However, they can not do this if they are under the gun to get work out. Therefore, organizations and managers should build some slack time into their daily schedules and change efforts, when possible, to give users the psychological "space" they need to explore and experiment with their new ways of working. The problem is that this runs counter to the culture of downsizing where less is more and lean is as important for corporations as it is for movie stars.⁵ Innovative managers and companies can take an alternative approach encouraging users to take advantage of the possibilities offered by their new tools and work arrangements to do things they have not been able to do before. In time, these new functions and tasks can be formally incorporated into their jobs, then their job and pay levels upgraded to reflect their new responsibilities and skills.

This is especially important for local experts who rightly see their particular form of job reinvention as critical to the long term effectiveness of their work units. Opportunities for learning and professional development can be especially rewarding for them. For example, liaison and dotted line relationships with the corporate IT function can enhance their access to technical seminars and colleagues; temporary assignments and job rotation into the IT department would develop their skills and network of contacts even further.

In conclusion, reinvention often occurs but is rarely rewarded. Those organizations with the foresight and flexibility to support the boundary-busting initiative and creativity of their more inventive employees will reap significant benefits. Cost-savings and quality improvements are the most obvious, new products and services that emerge as users tinker with the technology and push the envelopes of their jobs are the most dramatic. Nurturing these activities may rub against the grain in many companies, but for those who can develop the necessary culture, structures, and policies, the potential payoff will be well worth the effort.

NEW ROLES

⁵ As a sobering counterpoint to the self-congratulations with which many organizations laud their own downsizing efforts, James Brian Quinn offers the following comment in the December 1993 issue of *Catalyst*, the newsletter of the Centre for Corporate Change (published by the Australian Graduate School of Management, University of New South Wales): "I am personally very concerned at the U.S. tendency to think managers have done some great managing when they downsize an enterprise radically. I think that is basically wrong. It means they (or their predecessors) haven't done the job right. They haven't built new markets or groomed people with the skills customers want." We strongly agree with Quinn's point.

Teams and new information systems help break down formal, well-defined specializations and categories. At the very least, they make the boundaries that separate them less relevant. By increasing interdependence and collaboration, one team member's tasks become inseparable from another's. The same holds true for technology: access by some users to information and tools previously available only to others blurs the boundaries between specializations and changes professional identities. Together, they add up to a new logic for work and organizations. The essence of this new logic -- flexibility, permeable boundaries, and uncertainty -- has significant implications for those responsible for the policies, procedures, and systems that make up the very infrastructure of the organization (Galbraith, Lawler, & Associates, 1993).

Corporate Functions and Staffs

Over the years, the **HR function** has been the antithesis of this new logic. The very tasks and tools of the trade -- e.g., affirmative action plans, the *Dictionary of Occupational Titles*, functional job analysis, compensation packages, etc. -- reflect the largely formal, specialized, reactive, and hierarchical nature of traditional HR work. The role they typically play in systems developments development projects is particularly illustrative. As Peter Keen (1991, p.139) notes, their role is usually reactive, and most of them become involved only after implementation, "mainly to deal with consequences of the new system such as increased turnover, job dissatisfaction, stress, and a mismatch between available and needed skills and resources." Like Keen, we recommend a more proactive role for HR departments and professionals. By getting involved early on, they can contribute to the MDI process in many ways. For example, they can help design the user interface, identify functions and tasks to be augmented by the technology, develop teams, redesign tasks and jobs, plan implementation, develop training programs, and generally remind all participants of the importance of balancing social and technological objectives and issues.

The challenges to HR practice do not stop there. The dynamic and ambiguous nature of organizational change means that HR professionals will be working under very different and potentially unsettling circumstances. The formal, static, well-defined categories and guidelines they are used to working with reflect an organizational world that no longer exists, if it ever did. Their authoritative role as the final word on the application of and compliance with these definitive rules and standards is growing increasingly irrelevant. As if all of that were not enough, the issues they will address -- IT and organization design -- are largely unfamiliar and go well beyond their traditional scope. Fortunately, they will not be alone in navigating, adapting to, and shaping this unfamiliar territory.

Joining them in this exploration will be the **corporate IT function**. Probably no corporate entity is changing as rapidly. Indeed, no function has been in greater need of change. Arrogant, aloof, patronizing, and uncommunicative are just some of the expressions used to describe corporate IT staff over the years. Narrow and overly specialized are others. Criticisms of their "technology uber alles" attitude suggest a profession under siege.

But the onrushing waves of technological change sweeping over the IT function in progressively shorter intervals is changing how some IT staff view their role and go about their business. They are leading the way for their beleaguered colleagues through the brave new world of networks, end-user applications development, and client server architecture. The model that is emerging from these leading edge efforts is proactive, collaborative, integrative, and customer-focused.

There is an underlying theme, a communality, in the preceding discussion of the changing roles of both human resources and corporate IT. An excellent description of these new roles and behaviors is offered by Markus and Robey (1995), who adapt the work of Peter Block and apply it specifically to IT staff professionals. We can see that it applies to HR professionals as well.

In what Block calls the collaborative role, consultants work with clients, actively applying their knowledge and skill to **help** (emphasis theirs) clients diagnose and solve problems. Rather than separating out and distributing the roles of expertise, direction, and effort to either the client or the consultant, collaboration involves both parties sharing the responsibility for performance improvement. Communications between the partners is intense and bi-directional; conflicts are resolved in a constructive fashion. The outcome of a collaborative relationship between client and consultant is a more thorough understanding by both parties of the problem being addressed and the solution being designed. This understanding forms the basis for future collaborations and future improvement efforts (p. 607).

Clearly, a different kind of staff professional is needed to work in partnership with the business units and user teams they serve. The kind of person who will fit comfortably in this new role can:

- reach out to clients and help them identify potential problems and opportunities that would otherwise go unrecognized;
- speak the client's language and interpret their needs;
- adopt a cross-functional perspective -- i.e., work effectively in cross functional teams and be able to integrate different functional systems across critical processes;
- focus on client needs rather than on her/his own particular preferences; and
- develop client's ability to solve problems and improve work processes without depending on the help of internal and external consultants.

In sum, HR and IT staff professionals will have to change from experts who know the answers to cross-functional collaborators who can work with their clients in a process of mutual problem solving. How to bring about these transition will involve changes in individual behavior, departmental missions, and relationships at the highest levels of the organization.

How to Change Staff Behavior And Roles

Changing the roles and behavior of IT and HR departments and their staff requires initiatives at several levels -- from the overall organization as well as from the departments and their staff. Several of these initiatives have already been discussed earlier: for example, rotating corporate IT staff through business units and creating dotted line relationships with team-based IT experts. Other initiatives can also be pursued that will help develop the consultant/collaborator skills, behaviors, and perspectives of HR and IT staff.

One of the most important initiatives that corporate IT departments can pursue is to redeploy some of their resources -- money and people -- to user departments and teams. For example, IT can physically and functionally locate some of its staff in user departments. Or, that portion of the corporate IT budget normally devoted to applications development can be distributed to the user units for whom these applications are intended. The portion of the budget reserved for development of IT infrastructure would remain with the centralized IT department. User teams could then use their own IT budget to

contract with external vendors to develop their applications, especially if the IT department is too busy or lacks the specific expertise to address their needs adequately.⁶ With the purse strings clearly in the hands of the user teams, they can exercise more control over what they get and minimize contractor's confusion about who their customer is.

The role of the internal IT function would be to broker the relationship between the user teams and the external IT experts. Specifically, they could help identify potential contractors, assist in the contracting process, facilitate the relationship and act as advisors during the project, insure compatibility with existing systems, and help the user teams maintain the applications after the contract has been concluded.

A parallel case can be made for the redeployment of HR resources. As in the case of IT applications development, trainers located within business units or hired directly by them would be better able to develop training programs specific to the business unit's operations and work tasks than a corporate trainer. With local trainers taking on responsibility for the training needs of their units, the corporate HR would be able to devote more time to research and development -- i.e., scanning the latest research on training, developing training innovations, disseminating this information to the local trainers (e.g., via a newsletter), and training the trainers and providing them with professional development opportunities (e.g., seminars on the latest techniques). HR would also maintain responsibility for the development of generic training programs that are applicable to all departments (e.g., communications skills, team design, leadership development) and help units find and contract with external training resources. The main thrust of all of these initiatives, for both HR and IT, is to build collaborative relationships by reaching out and connecting with their local counterparts to capitalize on their shared interests.

Ultimately, the organization needs to encourage, enable and reinforce these new, collaborative roles and behaviors. Therefore, the most important corporate level initiative may be to change performance assessment practices and reward systems. The best way to change behavior is to stop rewarding old behavior and begin rewarding desired new behaviors. What this means for staff professionals is assessing how well they serve the needs of their customers and rewarding them for their good performance.

As logical as this may sound, and as much as particular departments may espouse customer service, actual assessment and reward practices often belie the logic and rhetoric. For example, IT staff members are often rewarded for increased levels of technical proficiency regardless of whether these advanced technical skills actually bear any relationship to their ability to serve their customers. We do not mean to suggest that they should not develop their technical skills, only that this should be balanced with measures that assess the quality of the services they deliver. Similarly, HR staff are often rewarded for achieving functional objectives such as developing a new training program regardless of how well it serves the needs of employees and teams. Other initiatives and policy changes might include: skill-based pay for learning lateral skills, incentives for acquiring knowledge about work team tasks, and policies that make lateral career moves into business units and teams as attractive as moving up within

⁶ Even if the IT department is not too busy and does have the expertise, there are still good reasons for requiring them to market and sell their services internally and compete with external sources for the user teams' business -- better quality and lower cost services, in particular.

departments. Without these policies and programs, preaching to IT and HR staff about customer service and collaboration will have little long run impact on their actual behavior.

Building collaborative relationships is not just an issue for IT and HR staff. The senior level managers responsible for the corporate functions will also have to change how they act and what they do. The key to developing their new role is building relationships, engaging in dialogues, and helping colleagues understand new technologies and HR innovations (Keen, 1991; Earl and Feeny, 1994). If IT and HR departments need to change their relationships with the business units they serve, so must their senior managers change their relationships with each other and their colleagues on the senior management team.

This team provides the vision and direction that will lead the organization into the 21st Century. To do this effectively, senior management must appreciate the significance of two of its most important strategic resources -- people and technology -- and of the synergies that can result from integrating them. The senior management team can not do this unless the members themselves are committed to learning about these resources in a very personal way. All members of the senior management team have to model the very behaviors they expect from those they manage; they have to use the technologies and work together as a team. Collaborating among themselves and supporting collaboration among those they manage may be the most important new role to be played by senior management as they lead their organizations into the 21st Century.

NEW DESIGNS

The cumulative effect of the changes and recommendations we have presented in the last several pages suggests no less than a new and different kind of organization. We can't just fit revolutionary technology and innovative practices, processes and programs into the old structures. The changes we have described here require what Nadler, Gerstein and Shaw (1992, p. 4) describe as a new organizational "architecture" that looks beyond the formal structure of the organization -- "what is in the boxes and which lines connect them" -- and includes work processes and practices, social relationships, and culture. In other words, what they and a growing number of managers, researchers, writers and consultants are describing are new organizational forms for the 21st Century.

The defining feature of these new organizational forms is flexibility. Almost all speculations about organizations of the (near) future offer a vision of work free of artificial and counterproductive boundaries. New technologies combined with new understandings about management, organization, and the psychology of work behavior create options never before feasible. They reduce the boundaries and constraints that limit how, where, when, and with whom we work.

The Nature of Work: From the Physical to the Abstract

Work in industrial economies requires metal, steel, machinery and muscle. The sheer physicality of the work is its defining characteristic. In postindustrial economies, the raw material is information, the product is knowledge, the machinery is the computer, and physical labor is replaced by intellectual effort. Most knowledge-based work involves the manipulation of symbols and abstractions, not things. The production machinery is software not assembly lines. Inventory and stores are represented in databases on disks several inches in diameter, not in warehouses covering acres of land. The defining

characteristic of post-industrial work, in short, is its lack of physicality. Nowadays, it often involves little more than eyes scanning a computer screen, fingers moving across a keyboard, and the occasional furrowing of a brow.

The critical difference is flexibility. The design of knowledge-based work is not constrained by unwieldy physical materials and objects. The raw material, information, is infinitely manipulable. Even the machinery is flexible and can be "retooled" by writing new software code. Work can thus be designed, structured, and organized in any number of ways. For example, expert systems can deskill work by automatically generating decisions; or, they can upgrade it by providing information to help individuals or teams make the decisions. Computers can be used by managers as an instrument of control, or by teams as a means of self-control.

The conclusion is clear. Information technology puts no constraints on where, when and how we work. Quite the opposite. Technology expands the options for work design. The limits are more likely to be imposed by the values, culture, expectations, and imagination of the designers, than by the technology or the raw materials on which it operates.

Limits on Where and When to Work

Telecommuting is possibly the most visible demonstration of the inherent flexibility of knowledge-based work. With new communications technologies employees and independent contractors alike can work at home or in neighborhood satellite work centers. They can communicate with others in real time when necessary, or asynchronously by responding to e-mail messages, downloading reports and analyses, and writing memos as needed. Their schedules are set by due dates and milestones, not by the availability of team members.

The images are now commonplace -- working at home, sometimes at great distance from the office and co-workers, sending out and responding to messages at any hour of the day or night by fax or e-mail. Whether actual or conjectured, the benefits associated with lowering work barriers of time and space are many. Workers can go at their own pace, adapt their work schedules to fit their lives rather than the other way around, and save money on clothes and commuting expenses. Their increased productivity contributes to the company's bottom line. We all gain from reduced traffic and auto emissions. While evidence concerning the ultimate economic impact of time- and space-independent work is still emerging, its potential impact on our lives and the flexibility and options it offers are unmistakable (Nilles, 1994).

Spanning Functions and Departments

The relatively impenetrable boundaries of department and function have become less formidable in recent years. In many organizations they now serve primarily as indicators of position, role and level of expertise, rather than as barriers to collaboration. Competitive pressures are behind this development, just as they have driven many of the other enlightened developments that have swept the business world in recent years. At the very least these pressures have helped sensitize managers to the benefits of cross-functional collaboration. Innovation, adaptability, time to market -- it's the rare manager these days who does not recognize how rigid intraorganizational boundaries can threaten a firm's long term viability.

It is no coincidence that this awareness comes as new boundary-spanning technologies proliferate. Information technology breaks down barriers. As it becomes easier for people in different

work units to communicate, it becomes easier for them to collaborate. Teams form and spread, reinforcing the perception that intraorganizational boundaries can be easily crossed. In time, these formal distinctions will act less as barriers to collaboration than as facilitators. They will provide convenient indicators of useful expertise that can be drawn upon as needed, rather than as barriers that keep people with diverse expertise from working together on issues of mutual concern and benefit.

The Emergence of the Meta-Organization

Essentially the same information technologies can be used to cross boundaries that separate one organization from another. What better indicator of the growing importance of technology-based interorganizational communications than the business card. Not long ago, addresses and telephone numbers were enough. Then fax numbers were added. Now Internet e-mail addresses are almost as ubiquitous. Individuals need to communicate easily and rapidly not just with co-workers in their own companies, but with customers, suppliers, strategic partners, and colleagues in other organizations.

Internet addresses and cross organizational collaboration are just the early indicators of an organizational change of potentially far greater significance. The same business imperatives that have lead to the deconstruction of so many organizations in recent years are now driving the formation of alliances, strategic partnerships, and joint ventures. In effect, the slimmed down, reengineered organizations of the 80s and 90s are now being combined and reconstructed into meta-organizations for the 21st Century (Nadler, Gerstein, & Shaw, 1992).

Authority, Power, and Influence

New team and technology designs can also change the political dynamics of the workplace and of the organization. Teams often decentralize authority and distribute power. By increasing access to information, new technologies have similar effects. The consequences are most easily seen with networked designs, both technological and social. Instead of the static, one-directional, hierarchical relationships of more traditional work structures, network relationships tend to be dynamic, diffuse and lateral. Technical expertise, access to information, and the ability to apply these to the tasks at hand take the place of formal roles and job titles as the primary source of power.

The net result can be quite profound. For example, new power relationships can change how work gets done and who does it. In traditional, hierarchical organizations the formal organizational charts and process flow diagrams indicate -- in theory, at least -- the pathways to be followed and the individuals to contact to accomplish certain tasks. In a readily discernible series of straight lines one moves the forms, pursues the inquiries, and so forth from point A to point Z. In practice, of course, there are frequent end runs around the formal organization via unofficial networks of people and unwritten rules that do not show up on charts or in policy manuals. In addition, the results often run counter to the company's overall goals and objectives.

Teams and new information technologies help close the gap between the informal and formal organization and align the outcomes of one with the goals of the other. In networked organizations the pathways are designed as webs rather than straight lines. Since power is diffuse and collective, approaching one individual or pursuing one particular path may not be enough to get things done. Instead, "working the room" is the more appropriate metaphor -- moving around, making contact with many individuals and groups and pursuing several alternative pathways, never sure that you are getting to the right one, in the hopes that one will pay off. While the uncertainty may be unsettling, the potential

payoff is well worth it in terms of higher levels of knowledge throughout the organization, better solutions to problems, broader commitment to actions pursued, and more effective implementation of change.

CONCLUSION

In sum, the role of traditional boundaries and formal distinctions, such as hierarchical and functional position, are greatly diminished. Access to power and influence is unfettered by such often irrelevant symbols of authority and based instead on knowledge and skill. The ability to enhance knowledge and skill by collaborating with new colleagues and using new technologies becomes critical. For those used to navigating traditional corridors of power the new terrain of work may be quite unsettling, even more so for those who are well placed within these corridors. They have a lot to lose with the advent of new team and technology designs. But they also have a lot to gain if they can learn to collaborate and use the new information tools that have been literally placed at their collective fingertips.

No one really knows for sure what the organization of the future will look like. We have identified a few critical features, raised several key issues, and asked a number of intriguing questions. But ultimately all of this is new territory. Although a handful of organizations are bravely exploring this new frontier, they have barely begun the trek. The way will be difficult and uncertain, and no one knows for sure where their trip will take them. As they make the journey, they will become the new organizational forms that will show the way for the others to follow.

One thing we can say for certain is that the potential is great. The organization's performance can be as unrestrained as the conditions that help produce it. Knowledgeable people working together, armed with powerful new tools, supported by a flexible, nurturing environment -- capitalizing on this synergy will help create the new organization.

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