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**TEAMS AND TECHNOLOGY: TENSIONS IN
PARTICIPATORY DESIGN**

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Abstract

Year after year, organizations increase their investment in new information and communication systems (IT) and use teams to do more and more of their work. But few organizations are getting the bang from the many bucks they spend each year to create teams and develop new IT. The challenge facing organizations is how to fulfill the potential of these two promising and complex developments. The key is in recognizing that each is necessary to take full advantage of the possibilities created by the other. That is, new IT can make teams more effective, and teams can help fulfill the promise of new IT. Together, teams and IT can dramatically catalyze organizational performance. Organizational structures, policies, and processes also must change to support teams and their technologies as they operate within, and increasingly across organizational boundaries. Flexible, high-level infrastructures are needed to integrate teams and their technology to serve overall organizational effectiveness. Therefore, achieving high levels of organizational performance requires the coordinated development of teams, technology, and the overall organizational context. Carrying out such mutually adaptive development processes is not easy. All complex change processes involve the balancing of hopes, expectations, and ideals against the imperatives of performance and the constraints of people, resources and organization. This balancing act will create tensions and conflicts. This article examines three such tensions: the ideal of empowerment versus the reality of constraints; the desire to control outcomes versus the certainty of uncertainty; and the wish to remove barriers vs. the need for structure and boundaries. This balancing act need not be limiting, however. The article demonstrates that with ingenuity and resolve the conflict and tension can produce solutions that are creative, innovative, and highly productive.

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 and communication systems and use teams to do more and more of their work, with the expectation that their impact on the bottom line will eventually justify the expense. 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 technologies. The challenge facing organizations is how to fulfill the potential of these two promising developments.

In our recently published book, *Teams and Technology: Fulfilling the Promise of the New Organization*, we argue that each is necessary to take full advantage of the possibilities created by the other. That is, new information technologies can make teams more effective, and teams can help fulfill the promise of new information technologies. When they are integrated with each other their joint impact will be much greater than the sum of their parts. Together, teams and new IT can dramatically catalyze organizational performance.

Further, while creating synergies between team and technology development is an important step toward high performance, it is not enough. The growing use of teams and IT has significant implications for the organization itself. Its structures, policies, and processes must change to support teams and their technologies as they operate within, and increasingly across, its boundaries. Team-based, technology-enabled organizations require flexible, high level infrastructures to integrate teams and their technology in ways that serve overall organizational effectiveness. In effect, this "macrostructure" should do for the organization what our skeletons and sinews do for our bodies — support and connect our muscles and organs. Therefore, **achieving high levels of organizational performance requires the coordinated development of teams, technology, and the overall organizational context.**

The Challenge of Complex Change

Carrying out such mutually adaptive development processes is not easy. Implementing successful change in any one of these areas is difficult, but when it involves all three — technology, teams, and the overall organization — the challenges can be overwhelming. The sheer complexity of multidimensional change efforts is one problem. But more than that, fundamental tensions arise when team, technology, and organizational development must be coordinated. When diverse interests must be balanced and merged, when intentions and beliefs come up against the reality of everyday organizational life, the consequences are often messy and difficult. This is true regardless of the focus of change. Whether it be teams and technology or something else — good intentions and ideas rarely survive intact the effort required to implement them. All complex change processes involve the balancing of hopes, expectations, and ideals against the imperatives of performance and the constraints of people, resources and organization.

This balancing act, and the compromises and tradeoffs that inevitably result, is especially visible on the large screen of team, technology and organizational change. By now, the challenges are all too familiar — cultural differences and competing interests between technology developers and technology users, lingering uneasiness of some users with new technology, the sheer scale of the changes involved,

and the risks associated with such mammoth undertakings. Tensions and conflicts are inevitable when so much is at stake, so many people are affected, and such profoundly different perspectives must be weighed against each other. This balancing act need not be limiting, however. With ingenuity and resolve the conflict and tension can be transformed into solutions that are creative, innovative, and highly productive.

EXHIBIT 1

Three Tensions in Team, Technology and Organizational Change

- the ideal of empowering employees vs. the constraints of participation and interdependence;
- the desire to control outcomes vs. the inevitability of uncertainty; and
- the wish to remove barriers vs. the need for structure and boundaries.

In this article we examine three tensions inherent in the processes of team, technology, and organizational change. These tensions emerge from the conflict between: 1) the ideal of empowering employees vs. the constraints of participation and interdependence; 2) the desire to control outcomes vs. the inevitability of uncertainty; and 3) the wish to remove barriers vs. the need for structure and boundaries. As we will see shortly, balancing these tensions can lead to innovative resolutions that enhance organizational performance far more than the initial notions, ideals, and desires with which the project started.

The Constraints on Empowerment

To understand the constraints on empowerment, we must first recognize that the expression "empowerment" masks a complex, multifaceted concept. There are at least two aspects to empowerment as it is played out in the decision making processes of modern organizations.

Limits on Participation

Individuals and groups can be empowered by giving them the opportunity to participate in decisions that will affect them. But their participation is typically limited by the number of people who can be effectively involved in the decision-making process. Teams and groups generally operate more effectively when their size is limited to the smallest number needed to do the work. When everyone participates, nothing gets accomplished. Therefore, not everyone can be involved in every decision that affects him or her.

Let us examine how this limit on participation plays out in the development process for teams, technology, and organizations. In our book we offer a framework to help organizations mutually

develop all three. One of the critical features of this framework is the ongoing involvement of key stakeholders in the development process. The stakeholders are those people and work units who will be most impacted by the changes, who have critical knowledge and skills relevant to the change effort, and whose commitment to the changes will play an important role in their success. They literally have a stake in the outcomes and are critical to the project's success. Since everyone can not be directly involved in the project, however, representatives need to be selected from the stakeholder groups to participate in the development process. The mechanism for their participation is the project team — i.e., the team or teams responsible for developing the technology, for designing the teams that will be the primary users of the technology, and for recommending the organizational changes needed to support them.

Limits on Autonomy

Another constraint on empowerment emerges as the project team begins its work. Given the opportunity to participate, the team members find that their degree of decision-making latitude — their autonomy — is constrained by the other team members. In team technology development, this constraint is especially apparent in the interactions between the user representatives and information technology experts on the project team. They are the most important stakeholders in the process.

The problem is, their objectives, interests, and concerns are often at odds. That is, teams want applications that best meet their needs, while IT experts often prefer sophisticated technologies that are easy to support and fit well into existing platforms. These differences constrain the autonomy of the user representatives and the IT experts. On the one hand, the user representatives need to consider the existing technology infrastructure as they help develop new applications for their use; on the other, the IT experts may need to select a less sophisticated technology that better fits the users' needs. Neither party can get exactly what they want, so they need to compromise.

To complicate matters further, their negotiations, compromises and tradeoffs are constrained by the stakeholder groups they represent. Any solutions worked out within the project team must also be acceptable to the users who are not on the team and with the IT department or group that will ultimately be responsible for systems support and integration. This can be a real challenge given how easy it is for representatives to lose touch with their constituencies as they begin to work more closely with their team members and become absorbed in the demands of the project.

Choosing Good Team Mates

Balancing the needs of stakeholders calls for special people. Those selected to participate on team-technology design teams must be able to span the functional chasm between users and IT experts. We use the expression "laterality" to describe this ability. People with lateral skills can relate and work effectively with team members with different backgrounds, perspectives and agendas. They are willing to limit their personal autonomy to achieve the overarching goals that link everyone on the team. The following example, based upon an actual project in a large, international manufacturer of consumer goods, illustrates these project-critical skills.

Ken seemed to be an excellent choice to serve as user representative on the project team developing the new information system for the production teams in the

plant. As a production manager who had worked his way up through the ranks in the fifteen years he had been with the company, he was highly regarded by the workers in the plant and well liked. He had experience with just about every stage of the production process and was one of the most computer literate managers in the plant. His familiarity with basic information technology concepts enabled him to act as bridge and interpreter between the eventual users in the plant and the IT experts on the team. He could express the needs of the production teams in terms that could be translated into systems solutions and he was able to understand the user implications of the various design options under consideration. Perhaps most important, he was confident about what he knew, while acknowledging that his was not the only relevant expertise. At the same time, he was not defensive about his lack of knowledge in other areas and was willing to learn. By all accounts Ken seemed to work very well with the other members of the project team.

However, as we will see in the following, good lateral skills by themselves may not be enough.

As he became more and more involved in the project, and increasingly absorbed in the technical challenges of the project, Ken's contacts with the users back in the plant grew more infrequent. When he joined the project team, he planned on keeping the users regularly informed about what was happening in the project and soliciting their input as needed. But his good intentions were frequently buried by the more immediate, day-to-day demands of the project. When he was finally able to get back to the plant to talk about the project, more than six months later, it was too late. His credibility with the users was shot, and the possibility of their buy-in was looking increasingly remote.

Creating Linkages with Stakeholders

In any system of representative participation, delegates can lose touch with the groups they represent unless they consciously, aggressively and proactively strive to maintain these connections. That is why members of Congress often undertake extraordinary efforts to stay connected with their constituents, via frequent mailings and trips home, for example. Similarly, user representatives on team-technology project teams need to work closely with their "constituents" to develop activities and mechanisms that will keep them in touch with each other (e.g., e-mail, newsletters, meetings, etc.). With these linkages, the project team can keep users informed about key issues and design options under consideration, and the users can provide feedback on the options and offer their expertise when needed. The important point is not to leave these linkages to memory and good intentions. They should be built into the implementation plan as tasks, scheduled activities, milestones and deliverables. This way, they will not be overlooked when push comes to shove and the immediate challenges of the design task overwhelm most everything else.

While these linkages will limit the autonomy of the user representative, it will have the opposite effect on those for whom it is most important — the ultimate users themselves. These linkages give them some influence over the decision processes, even though their direct participation in the decisions may be limited. Without them, the project can not fully benefit from users' knowledge and insights.

Without them, users will not feel as if they are an integral part of the development process and, therefore, be less inclined to buy-in to the technology and work design changes that result from the project.

In summary, we began with the goal of empowering users by involving them in the team/technology development process. We saw that their involvement was constrained, however, by the limits of effective participation. The solution, selecting representatives to participate on the project team, led to other challenges and constraints, then additional solutions. To implement the relatively straightforward notion — user empowerment — required a complex set of compensatory actions. While the end result is a somewhat compromised version of the empowerment ideal, it is a reasonable, feasible version, nonetheless. Not incidentally, it also offers the best hope for a timely, integrated, sociotechnical design that balances the needs of users, managers, technologists and others. The gains in organizational performance should more than justify the effort, tension, and expense.

The Futility of Control

Other fundamental tensions can be seen in the way in which organizations approach the change process itself. The tension here is between the desire to control the process, make it predictable, and predetermine the outcomes, versus the inherent uncertainty of the process. We argue that organizations should embrace the uncertainty of change instead of trying to control it. We propose alternative approaches to the change process that can transform the uncertainty of team, technology and organizational change into opportunity and innovation. These alternatives can be found at both the macro and micro levels — i.e., large scale change processes affecting many units and teams as well as the smaller scale processes by which individuals and teams learn how to use their new tools and create contexts for their use.

Large Scale Change as Action Learning

"Action learning" is an approach being used by a growing number of companies for carrying out large scale organizational change. In their book, *Self-Designing Organizations*, Sue Mohrman and Tom Cummings describe action learning as "a process where organizational members try out new behaviors, processes, and structures; assess them; and make necessary modifications" (p. 107). 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. This means that change should be implemented in a way that enables implementers to learn from the consequences of their actions. Evaluating the results of these action learning experiments is essential. If they diverge significantly from what was expected or desired, actions and plans can be modified, based on what is 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 should continue until all the changes are implemented successfully.

General Mills has used an action learning approach in designing new greenfield manufacturing plants and transforming many of its existing plants to high performance work systems. After the consumer foods division developed its initial vision, employee

task forces in the plants designed key elements of the new work systems and used the feedback from periodic assessments to refine their designs. Amoco Corporation also used an action learning approach to revise its performance management system. After the new system was implemented, the company collected internal assessment data and external benchmark data to refine its design and improve its alignment with other human resource systems.

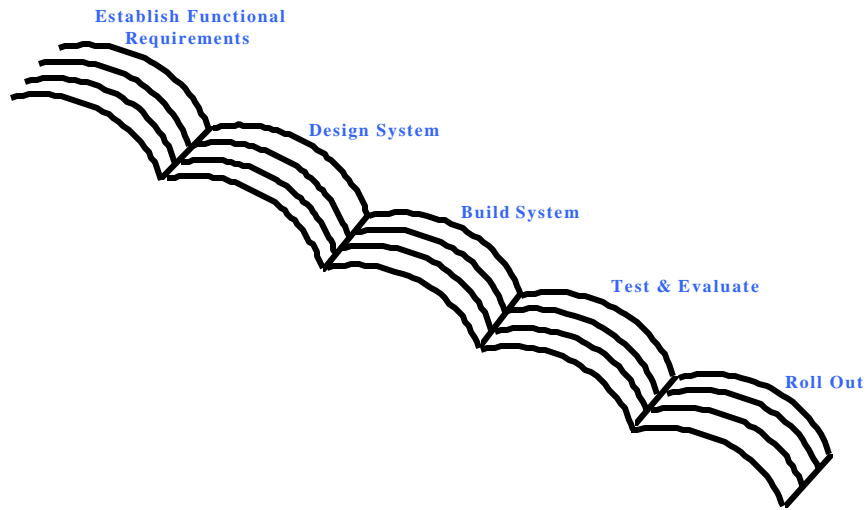
The action learning process does not unfold in a linear fashion from a well-defined beginning to an equally well-defined end. Since technology and organizational environments are constantly changing, the process is never really complete. It continues indefinitely as the organization strives for a competitive technological advantage and adapts to, or tries to shape an increasingly turbulent environment. Throughout the project, things change — the company, the environment, 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.

Systems Development as a Model for Change

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 — is characterized by a roughly linear sequence of steps. From Figure 1 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 lies 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. Furthermore, the process is highly inflexible and makes it difficult to take advantage of serendipity and unexpected opportunities. Even when successful, the gains are often modest at best and rarely justify the costs of the effort — financial and otherwise. It should not be surprising, then, that organizations are desperately seeking alternatives to this traditional systems development model.

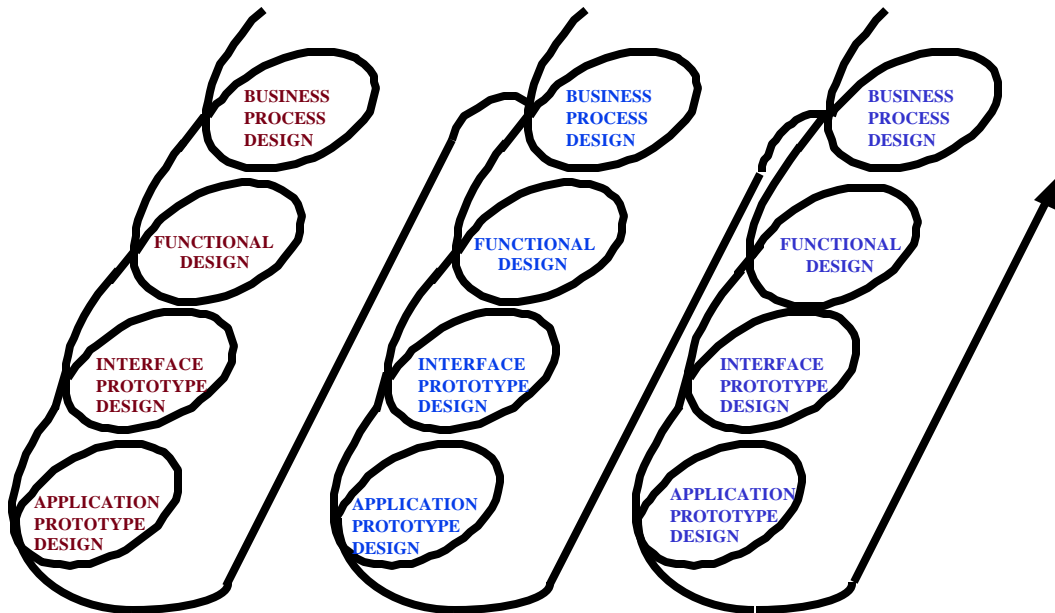
What many of them are finding is a constellation of new approaches which fall under the generic rubric of "rapid application development" (RAD). Regardless of the specific approach or methodology, they share several characteristics (see Figure 2). One is that the process looks more like a series of overlapping spirals that are repeated as often as necessary to produce a satisfactory result, rather than a linear flow from one step to another. Another common characteristic is that prototypes are used throughout to 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. 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. Finally, in RAD approaches the systems are modularized. That is, they are broken down into relatively self-contained sets of functions which are relatively independent of other sets of functions. The individual modules can then be developed independently and concurrently.

FIGURE 1
The Waterfall Model of Systems Development



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FIGURE 2
Spiral Workflow Model of Systems Development



Adapted from P. Seybold, "How to Leapfrog your Organization Into the Twenty-first Century. Highlights from Patricia Seybold's 1994 Technology Forum."

EXHIBIT 2

Comparing Traditional and Emerging Approaches to Systems Development

TRADITIONAL (Waterfall)

- a sequential flow from one step to another
- prototypes, if used at all, are used late in the sequence to help design the interface
- systems are typically developed as a whole, all functions and modules at once

EMERGING (Rapid Application Development)

- looks more like a series of overlapping spirals that are repeated as often as necessary to produce a satisfactory result
- prototypes are used throughout to provide potential users with an opportunity to actually experience the work in progress
- systems are broken down into modules which can be developed independently and concurrently

The following example, based on an actual project for a large international non-profit organization, illustrates this new, more flexible approach to systems development.

The project involved the development of a new, integrated system for acquiring, processing, and disseminating data on economic and social conditions in various regions of the world. The new system was planned as a modular, user-driven system that would enable users to choose the applications and tools that best suited their tasks, to modify the way these applications and tools functioned, and to integrate compatible external products, existing and future, into their work.

The development strategy involved two converging tracks, referred to by the development team as the "technology" track and the "substantive" track. The technology track included all of those activities concerned chiefly with the development of the system's core components. These activities were independent of specific end-user applications, which were the main focus of the activities in the substantive track. In the substantive track, user representatives would work closely with the systems experts but were less involved in the activities within the technology track.

Each track involved three stages. In general, the first two stages in each track would proceed independently, although high-level decision making and consultation would be conducted across tracks throughout the entire effort, particularly during the

first stage. The teams and the products of the two tracks would be merged in stage three to produce a prototype of the system for pilot testing.

In this example we can see all of the critical elements of the rapid application development approach. The system is divided into separate core and application modules which are then developed concurrently. Users are intensively involved in the process, especially in application development. And perhaps most important, prototypes are used throughout, to test designs, to elicit user feedback, and to generate new ideas and uses for the system.

Organizations adopting rapid application development — including GTE, CIGNA, UPS, General Motors, American Airlines, Andersen Consulting, among others — are discovering its many benefits. 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 reveal problems early on. User involvement at all stages yields another benefit — i.e., systems that more closely match user needs. Most important for the purposes of this paper, the iterative nature of the process means that the development process can more easily incorporate emerging opportunities, such as technological innovations, and respond to unanticipated changes in business conditions.

From Systems to Organizations

The new approaches to systems development offer flexibility, are open to change, and can take advantage of the unexpected. They are perhaps best characterized as opportunistic design. That is, rather than trying to eliminate uncertainty, these approaches try to capitalize on it. This iterative, open-ended, learning approach applies to all new development processes in organizations — new product development, for example — not just to the integrated development of teams, technology, and organizations.

Organizations may understandably be resistant to adopting these new change processes. Most large scale change efforts require significant commitments of time, effort, 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.

Play, Performance, and Innovation

To this point, we have described change processes in broad, macro terms — large scale projects affecting many people and units. But new teams and technologies also mean new ways of dealing with change at a more personal level, at a level that affects the day-to-day work experiences of individuals and their team mates. These micro level change processes share characteristics in common with the macro level processes we have just described; they too involve learning from experimentation, taking advantage of unexpected opportunities, and unpredictable but ultimately beneficial results.

Elementary and kindergarten teachers have long known that the most successful learning often takes place in the context of play rather than work. This is not just true for kids in school but for employees learning to use new technologies. If given the chance, users will play with their new technology, try it out, and explore what it can do. They will experiment with it to see what new people they can communicate with, what data bases they can access, and what functions and operations it

offers. As a result, they will be able to apply these new features to their work, to do it better, easier and faster. By playing with their new technology, users learn the system and discover its capabilities and limitations. As their knowledge grows, they may "reinvent" or modify the technology to better fit their tasks. They may even reinvent their jobs by using the technology to create new ways to work, new things to do, new relationships with their co-workers, and new co-workers.

One of the consequences of play is a more effective integration of people with their tools. If it happens with athletes, artists and musicians, why not workers with their tools, users with their new technology? With the familiarity, the sense of mastery that accompanies play, the separation between users and their tools begin to blur. The tool becomes an intrinsic extension of the users' capabilities and enables them, depending on the nature of their tools, to exert more force, see better, work more precisely, and so on.

The same is true of new information and communications tools. Users play with them, gaining mastery and familiarity as they do. Their web of collaborations spreads, the information that informs their work becomes richer, and their analytical capabilities both broadens and deepens. As they adapt their tasks to their tools, and vice-versa, processes and interactions flow more naturally. In effect, the users have psychologically merged with their tools; they have become an intrinsic extension of the users' cognitive and intellectual capabilities. The end result is not only smarter, more efficient work, but new kinds of work that can transform businesses and create entire new industries. One need only look to the rapidly expanding multimedia and Internet service industries to witness the transformative power of play.

When we think of play in these terms, we get a very different picture of its potential. Rather than viewing play as an expensive waste of time, this perspective suggests that play can be a powerful catalyst for peak performance that should be encouraged by managers and corporate policy, rather than suppressed and punished. As organizational theorist Claudio Ciborra argues, users "tinkering" with their new technologies can produce creative applications that may have profound strategic impact in the long run. Teams can accelerate this process. Team members can tinker collaboratively, they can spread new applications around faster and further, and they can build upon each others efforts.

Striking a Balance

Of course we are not arguing that organizations and their managers should permit unlimited, pointless play nor completely give up any attempt to control processes and outcomes. They still need to set the general direction and the broad parameters for change and monitor results to ensure that projects stay on course. The point is to be careful about overcontrolling and micromanaging the process. Managers need to be flexible enough to recognize and respond to opportunities when they occur, rather than insisting on slavish adherence to budgets, timetables and plans to produce certain but insignificant results.

How might this play out in practice? First of all, to learn from their change efforts, organizations should frequently evaluate the effectiveness of these efforts so that designs and implementation plans can be modified as needed. The problem is, the designers of change — individuals or project teams — can feel threatened by the prospect of having their work evaluated. The remedy, according to Mohrman

and Cummings, is to reward corporate leaders not only for their performance but also for how well they carry out the action learning process — e.g., by quickly discovering problems and making necessary adjustments. They also recommend that leaders allow some time for designers to learn how to make their designs work. Since performance can actually decline during implementation, it would not be fair, nor productive to unduly punish designers for their performance shortcomings during this learning period.

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

Another thing organizations and managers can do is allow and encourage play... then step back and let it happen. To do this, they need to build some slack time into their daily schedules and change efforts whenever possible. This will give users the psychological "space" to explore and experiment with their new ways of working. Admittedly, this can be difficult to do in a downsized, highly competitive business environment, but users can not experiment and innovate if they are under the gun to get work out. Although organizations can not ignore the competitive pressures that drive their performance needs, they can at least explore ways to carve out limited and temporary reprieves from such performance imperatives for their new technology users.

Clearly, for most organizations this requires a paradigm shift in their basic views about how to manage people and their performance. But as some companies have demonstrated, the outcomes justify the effort. 3M is a good example of a company with a culture that supports risk taking, tolerates occasional failure, and enables learning. Over the years, it has developed the ability to innovate and create and market new products — Scotch Tape[™] and Post-It Notes[™], to mention just two of the most familiar. 3M budgets time for experimentation then rewards innovative behavior when it occurs. While companies such as 3M are still the rare exception, they have demonstrated that it can be done, and be done quite profitably to boot!

In conclusion, management can encourage 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, to find ways to work more efficiently and improve the quality of their products and services. In time, these new functions and tasks can be formally incorporated into their jobs, and their job and pay levels then upgraded to reflect their new responsibilities and skills. Those organizations with the foresight and flexibility to support the 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.

Breaking Down Boundaries with Teams and Technology

In the last several pages we have described pragmatic processes and interventions for implementing complex change. This has included a collaborative learning process that embraces differences, emphasizes experimentation and iteration, and encourages users to play and tinker with their new technologies. But we can't just fit revolutionary technology and innovative practices into old structures. In effect, what we have described requires no less than new organizational forms for the 21st Century.

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 *very lack of physicality*. Nowadays, it often involves little more than eyes scanning a computer screen, fingers moving across a keyboard, and the occasional frowning of a brow.

The critical difference is flexibility. The design of knowledge-based work is not constrained by unwieldy physical materials and objects. 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. 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. Essentially the same computer that monitors employee performance by counting their key strokes can also be used to provide them with data they need to monitor and improve their own performance. The constraints 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 people can transcend the traditional constraints of space and time by working 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 and responding to messages at any hour of the day or night by fax or e-mail.

In recent years many companies have turned to telecommuting, among them Tandem Computers, the advertising agency TBMA/Chait/Day, and the thousands of companies that have continued the programs they began when the 1992 Northridge earthquake devastated southern California's freeway system. The benefits they and others have experienced 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. Telecommuting has its downside, of course — e.g., some people drop out of telecommuting programs because they feel isolated, others complain that work too easily creeps into homelife when their office is just down the hall. Furthermore, evidence concerning the economic benefits are still sketchy. Whatever the case, the potential impact on our lives and the flexibility and options it offers are unmistakable.

Spanning Functions, Departments, and Distance

The relatively impenetrable boundaries of department, function, and geographical distance have become less formidable in recent years. In many organizations they now serve primarily as indicators of position, role and area 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 collaborating across distances and functions. 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.

Information technology can play a particularly important role in breaking down these barriers. In companies as diverse as Compaq Computers, Phillips Petroleum, and Coopers & Lybrand, new videoconferencing and groupware products are enabling team mates to work together regardless of where they work and for whom. 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 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 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 led 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.

Nike, for example, controls the design of its athletic shoes and clothing but contracts with a wide range of suppliers throughout Asia for its manufacturing and with others for its distribution, shipping

and selling. Similarly, Apple Computer is essentially a design, engineering and marketing company, not a manufacturer in the true sense of the expression. Movie production is carried out by meta-organizations made up of independent contractors (actors, writers, directors, crew), catering companies, equipment suppliers, post production houses, and so on. Construction projects involve general contractors and their networks of subcontractors.

The shape of the organization of the future can be seen in these networked companies today. Large, vertically integrated companies that do everything from market research and product development to sales and shipping, and everything in between, are sinking into the tar pits of turbulent change, much like the dinosaurs of old. Slimmed down, agile organizations that can quickly find partners to form flexible meta-organizations are the ones that will thrive in a business environment where opportunities emerge with little warning and fade just as quickly.

But No Limits Has Its Limits

It's not possible to create a completely boundaryless organization — and we wouldn't want one if it were. In many organizations pushing their employees toward virtuality, some employees are already beginning to push back. Some, perhaps many, want to get out of their houses at least a couple of days a week, to come into the office and schmooze with their co-workers. They want the emotional connection, the immediacy, the rich context of nonverbal information that can only come from face-to-face contact.

Employees also want an office or work space they can call their own, where they can leave their work on their desktop and know that it will be there, in the same orderly or chaotic fashion they left it in, when they return. In the face of continual and often dramatic change, they want some constancy, a safe harbor where they can withdraw from the turmoil around them. Most people need to identify with some entity — if not the organization, at least with the team members they work with on projects. But like everything else the projects and team members may change far too often for most people's tastes. People are also more comfortable knowing where they stand in the hierarchy, who they are accountable to and responsible for, the limits to their authority, and who they need to go to gain more authority and resources.

What people really want, what is too often lost in the rhetorical excess of futuristic speculation, is a flexible organization not a chaotic one. Our point is not that the boundaries, constraints, and limits typically imposed by work and organizations can or should be completely eliminated. Our position is that the constraints can be far more flexible than they are at present. Instead of barriers to behavior, opportunity and performance, we are talking about guidelines and indicators that structure our environments so that we can find our way. Furthermore, these guidelines will be far more effective if the people who will have to live by them participate in their design. The limits we help set on our own individual behavior as a member of a team work better than limits imposed on us by others.

Conclusion

Exhibit 3 summarizes the three tensions in team, technology, and organization design discussed in this article. The exhibit also includes the design approaches we offer for resolving the tensions and the benefits that can be gained by pursuing these approaches.

EXHIBIT 3

Summary: Tensions, Resolutions and Benefits

TENSIONS	DESIGN APPROACHES	BENEFITS
<ul style="list-style-type: none"> • ideal of empowerments vs. constraints of participation and interdependence 	<ul style="list-style-type: none"> • select project team members with lateral skills • create ongoing linkages with stakeholders 	<ul style="list-style-type: none"> • wider user involvement • better informed decisions and designs • broader commitment to final designs • designs that better fit user needs
<ul style="list-style-type: none"> • desire to control outcomes vs. the inevitability of uncertainty 	<ul style="list-style-type: none"> • action learning approach to change • rapid application development • encouraging play and reinvention 	<ul style="list-style-type: none"> • systems and work designs developed within budget and implemented quicker • more effective systems and work designs • innovation that is particularly useful for individuals and teams
<ul style="list-style-type: none"> • the wish to remove barriers vs. the need for structure and boundaries 	<ul style="list-style-type: none"> • involve participants in design of flexible organizational structures 	<ul style="list-style-type: none"> • high-performing organizations • adaptive organizations • committed employees

This complicated process of action-reaction-resolution illustrates that despite the simple nostrums offered by many consultants and popular business books, organizational change is messy and

unpredictable. The more complex the effort, the more unrealistic the expectations and uncertain the outcomes.

This is especially true for integrated team and technology change. The sheer scope of these efforts, the multi-faceted nature of the changes involved, and the diversity of the stakeholders ensure that the change process will be rife with tension and conflict. But with anticipation, sensitivity and flexibility, project teams can use this tension and conflict as a source of creativity and an inspiration for innovative solutions. The process will look untidy, but in the end, it will work. The gains in organizational performance and innovation will more than justify the difficulties, tensions, and effort required to get there.

Selected Bibliography

The themes of this article reflect the convergence of two contemporary research traditions. One of these traditions focuses on the social, managerial and organizational issues involved in information technology development and implementation. Richard Walton and Dorothy Leonard-Barton's work is seminal to this tradition, particularly for understanding the role of user participation. See R. Walton, *Up and Running: Integrating Information Technology and the Organization* (Boston: Harvard Business School Press, 1989); D. Leonard-Barton, "Implementation as Mutual Adaptation of Technology and Organization," *Research Policy*, 17, 1988, pp. 251-67, and "The Case for Integrative Innovation: An Expert System at Digital," *Sloan Management Review*, 29, no. 1, 1987, pp. 7-19.

The other emerging research tradition focuses on the design of teams. Unlike much of the popular literature and conventional wisdom which focus on the role of internal group processes and dynamics in team performance, this work demonstrates the critical role of such factors as composition, structure, task, and resources. Richard Hackman's work is as central to this tradition as Walton's and Leonard-Barton's is to the technology tradition. See especially, J.R. Hackman, "The Design of Work Teams" in *The Handbook of Organizational Behavior*, ed. J. W. Lorsch (Englewood Cliffs, N.J.: Prentice-Hall) and *Groups That Work (And Those That Don't): Creating Conditions for Effective Teamwork* (San Francisco: Jossey-Bass, 1990).

Complementary bodies of research deal with new approaches to the change and development processes in each area. For organizational change processes in general we strongly recommend the book by Sue Mohrman and Tom Cummings, *Self-Designing Organizations: Learning How to Create High Performance* (Reading, Mass.: Addison-Wesley, 1989). For systems development insights see P. Seybold, "How to Leapfrog Your Organization into the Twenty-First Century: Highlights from Patricia Seybold's 1994 Technology Forum," Patricia Seybold Group, 1994, 1.

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Numerous people have written in recent years on the new organization. We especially recommend R.E. Miles and C. Snow, "Organizations: New Concepts for New Forms," *California Management Review*, 28, 1986, pp. 62-73; P.F. Drucker, "The Coming of the New Organization," *Harvard Business Review*, 66, no. 5, 1988, pp. 45-53; J. Galbraith, *Competing with Flexible Lateral Organizations*, 2d ed. (San Francisco: Jossey-Bass, 1994).

All of these themes and issues are discussed in detail in our book, *Teams and Technology: Fulfilling the Promise of the New Organization* (Boston: Harvard Business School Press, 1996). In this book we present a framework — "mutual design and implementation" — for the integrated development of teams, technology and organizations and specific recommendations on how to successfully carry out such a difficult and complex change effort.