

**Managing New Technology  
and Labor Relations:  
An Opportunity for  
Mutual Influence**

Richard E. Walton  
Harvard Business School  
and

Robert B. McKersie  
MIT School of Management

90s: 88-062

502-112096  
October 1988

*This paper to be presented at an October 1988 conference sponsored  
by the Panel on Technology and Employment of the U.S. National  
Academy of Sciences and the U.S. Department of Labor*

©1988 Massachusetts Institute of Technology

Management in the 1990s  
Sloan School of Management  
Massachusetts Institute of Technology

## Management in the 1990s

Management in the 1990s is an industry and governmental agency supported research program. Its aim is to develop a better understanding of the managerial issues of the 1990s and how to deal most effectively with them, particularly as these issues revolve around anticipated advances in Information Technology.

Assisting the work of the Sloan School scholars with financial support and as working partners in research are:

American Express Company  
BellSouth Corporation  
British Petroleum Company, p.l.c.  
CIGNA Corporation  
Digital Equipment Corporation  
Eastman Kodak Company  
Ernst & Young  
General Motors Corporation  
International Computers Ltd.  
MCI Communications Corporation  
United States Army  
United States Internal Revenue Service

The conclusions or opinions expressed in this paper are those of the author(s) and do not necessarily reflect the opinion of the Massachusetts Institute of Technology, the Management in the 1990s Research Program, or its sponsoring organizations.

## Introduction

New technologies are often essential to the effort of enterprises to become more competitive. How the technology is introduced, in particular, how labor-management issues are handled, will strongly influence whether the new technology makes its potential contribution. The purpose of this paper is to outline briefly what we have learned over the past decade about this subject.

We need to distinguish at the outset between two broad work-force management strategies, because what we have been learning applies more to one of these strategies than the other. We label one of these strategies "mutual compliance" and the other "mutual commitment." (Walton, 1987a) We propose that these alternative approaches to workforce management influence the design of technology as well as the way it is implemented. Conversely, we propose that the design and implementation of new technology can be a powerful force toward either a compliance or commitment organization.

The traditional employment relationship assumes no more than employer and employee compliance. Each agrees to comply with certain terms of employment, either prescribed or tacitly understood. Under mutual compliance employees are expected to give a fair day's effort for a fair day's pay and management is expected to supervise this bargain in a firm but fair manner. Mutual commitment goes well beyond such a traditional arrangement. The employee becomes committed to the organization and its goals, which is matched by additional commitment by the employer to the employee's welfare. Employee commitment takes many forms, including initiative to improve quality, reduction of scrap and other waste, and an increase in the productivity of their own labor. Similarly, the organization's commitment to workers can be expressed in a variety of ways,

including strong employment assurances, opportunities to participate in decisions, and programs for training and retraining.

Many organizations continue to rely upon control and compliance techniques that have been perfected over many decades--clear demarcations between planning and executing, narrow and deskilled jobs, individual accountability, standards of minimum performance, close supervision, and labor, in general, treated as a variable cost. While these techniques often are depersonalizing and demotivating, their adverse effects may be minimal in practical terms; moreover under control conditions, the organization has circumscribed its dependence on the competence and internal motivation of the individual. Therefore, some corporations and government agencies still regard mutual compliance as the most practical approach available to them for managing at least a fraction of their work force.

While a few companies have practiced mutual commitment for many decades, the trend toward relying upon policies that elicit employee commitment and less on ones that impose control really began in the early 1970's, as management sought to extend to other workers an approach long idealized in relations with the professional work force--challenging work, self-supervision, open communication, and mutual influence. In effect, labor is treated as a resource to be developed rather than as a variable cost.

The above distinctions are important for the present discussion of new technology. The choice between contrasting management strategies--control versus commitment--will determine the labor relations dynamics that will be encountered in the process of introducing new technology, and therefore the

steps that are appropriate in order to make the process as constructive as possible. Also, some of the new work place technologies, especially those utilizing advanced information technologies, usually can be exploited significantly better with the mutual commitment approach than with control and compliance. Therefore, while we will also discuss the dynamics and techniques associated with new technology introduced into a stable framework of mutual compliance, we will emphasize situations where management is attempting to initiate or strengthen a commitment organization.

Mutual compliance is found in both non-unionized and unionized companies. Similarly, mutual commitment is being pursued in companies that do not deal with unions as well as those that do. Often the mutual commitment approach is jointly sponsored by management and union.

Management's approach to its work force, which we have been discussing, and its strategy for dealing with unions are closely related. Beginning in the mid-1970's, American management's strategies toward unions developed along two contrasting paths. One strategy attempts to weaken the union, permitting management to manage as it sees fit. The other strategy attempts to expand the area of cooperation between management and the union.

These two strategies are alternative approaches to the same compelling problem confronted by management--a lack of competitiveness. Management's predicament is aptly portrayed in the framework in Figure 1. (Walton 1987b.) Consider that management's relations with its union can be either adversarial or cooperative (or some point on the spectrum defined by these

end points) and that the union can either have high relative power (meaning it can effectively prevent management from doing much of what it would like to do) or low power. Union-management relations in many American industries had become firmly established in the adversarial/high union power quadrant during the 1950s and 1960s. As long as American auto makers and steel companies, for example, were only competing with other domestic producers who had similar labor relations, this condition created no serious competitive problems. However, once these companies confronted tough foreign competitors in the U.S. market, their managements began to recognize that the combination of powerful unions and adversarial relations was a non-competitive position.

Two routes are available to escape this condition. The first is to attempt to weaken the unions' power and accept the possibility that adversarial attitudes may be intensified, at least for a period of time. This route is best dramatized by an example outside the private sector, namely President Reagan's actions to break the air traffic controller strike and the PATCO union, but it also is exemplified by actions taken by Continental Airlines, Phelps Dodge, Greyhound, and perhaps U.S.X.

The second escape route is for management to accept the union's strength and to attempt to transform the relationship into one that emphasizes the parties' mutual interests to strengthen the competitiveness of the enterprise. This strategy has generally characterized the relations in recent years between Ford and the UAW, LTV and USW, ATT and CWA, and Xerox and the Amalgamated Clothing and Textile workers (ACTWV) - to cite several examples.

Different advantages and disadvantages are associated with these contrasting strategies. By attempting to confront and prevail over the

union, management usually seeks deep economic concessions and work rule changes. However, the adversarial climate usually is not conducive to initiatives by management to enlist employees in other productivity improvement activities. In contrast, by attempting to structure collaborative relations with its union, management hopes that it can implement commitment policies and practices and enlist the spontaneous cooperation of employees in performance improvement activities. With this strategy economic concessions and formal work rule changes usually are relatively modest, at least in the short term.

#### The Mutual Compliance/Adversarial Scenario

Certain patterns characterize the introduction of new technology into companies which adhere to a mutual compliance approach for at least part of its work force and which accept an adversarial relationship with the union, if one is present. (Walton 1985.) Managers tend to be preoccupied by technical and economic criteria and deal with social issues only if and when the reactions of employees or unions require action. Unions attempt to impose conditions on implementation in order to limit the technology's adverse effect on the work force; e.g., slowing the introduction to ameliorate employment effects, grieving working conditions for health and safety reasons, enforcing bidding procedures to protect traditional seniority rights, and protesting technology-based monitoring in order to reduce job pressure.

Responding to--or anticipating--employee and union resistance, management adds social control to the other criteria that shape the design of new technology and generally intensifies the adversarial battle over managerial prerogatives. Management finds itself in one or both of the

self-reinforcing cycles depicted in Figure 2. In mutual compliance situations, managements tend to hold pessimistic assumptions about workers' motivations and skills. These assumptions lead management to develop technologies that deskill and routinize work, which in turn generate worker apathy or antagonism, thereby justifying management's earlier assumptions and its control strategy. The development of intense adversarial labor relations in many unionized companies has reinforced the dynamics surrounding technology design. An assumption of adversarial relations by management leads it to pursue objectives and utilize tactics that increase the union's tendency to challenge and constrain management actions.

Each of the two self-reinforcing loops depicted in Figure 2 is robust by itself, but in combination, they are especially formidable. For example, preoccupied with its position in an adversarial union relationship, management will be especially interested in work technology that deskills jobs, controls workers more closely, and permits the removal of tasks from members of the bargaining unit, because these effects will increase management's operational flexibility and minimize certain labor relations "hassles."

By way of elaboration, the dynamics associated with mutual compliance and adversarial relations lead to the following patterns of work-technology development:

First, in the design of new work technology, jobs tend to be deskilled, fragmented, and routinized. This increases management's control over the work force, but the new jobs also demoralize employees and limit the positive contribution they can make to service and cost effectiveness.

Second, as new technology is designed and implemented, the full potential of retraining employees is seldom realized, even though such



retraining could be advantageous to both the company and the employees. In addition, management fears that contract provisions will force them to fill positions with unqualified persons.

Third, the design of new technology sometimes moves tasks out of the bargaining unit. This shift may give management certain tactical labor-relations advantages, but it assigns to professionals and supervisors work that neither uses nor develops their potential and takes away from workers in the bargaining unit some work that would have utilized and developed their potential.

Fourth, electronic monitoring capabilities are built into the work system that may ensure achievement of minimum performance but that discourage workers from providing any more than the minimum.

What advice can be given to planners of new technology where the employee-management relationship is for some reason locked into a mutual compliance pattern and the union relationship, if one exists, is locked in an adversarial mode? In a competitive business environment it is still in the interests of all parties to make effective use of new technology. It is clearly in management's interest to minimize employee resistance to the new technology.

The ingredients of effective introduction of technology in this scenario include (1) careful communication by management of the competitive rationale for the technology and the implementation plans; and (2) practical compromises that respond to workers' major concerns, such as advance notice and buffering the employment and income effects of the technology, and at the same time ensuring that workers comply with major operational priorities, such as the staffing patterns for new technology.

Another ingredient is adequate training of the users to operate the new technology. Certainly, training is a key intervention for the mutual commitment/cooperation scenario that we will consider shortly. But training also serves an important function in the mutual compliance situation, namely, to set the stage for holding the workers accountable for specified results because they have been instructed in the relevant knowledge to operate the new equipment.

Most fundamentally, however, we advise managements and unions presently in the compliance/adversarial scenario to continue to explore the feasibility of moving in the direction of mutual commitment and cooperation. The reasons for this recommendation become apparent in the next discussion of the commitment/cooperation scenario.

#### The Mutual Commitment/Cooperation Scenario

Advanced information technology, which is integral to most new work technologies today, is strengthening management's incentives for creating a commitment organization. (NRC, 1986; Walton and Susman, 1987; and Zuboff, 1988). The nature of computer-based work technology has been changing in a way that places a higher premium on an internally motivated and intellectually competent workforce. The trend has been away from automation applications that simply substitute capital for labor toward more complex applications that augment the role of labor in the production process or the delivery of services.

Computer-based work systems primarily oriented to cost reduction often attempt to automate as completely as possible functions previously performed by individuals. In contrast, systems oriented to adding value (by increasing effectiveness or generating new products) often emphasize a

dynamic interaction between the technology and its users, including the generation of new information by the system to be used in cognitively complex ways by the users. Zuboff (1985) has referred to these options as "the two faces of intelligent technology" and labelled them "automate" and "informate." By automate she means: "The application of technology that increases the self-acting, self-regulating, and self-correcting capacities of systems." In contrast, informate means "The application of technology that translates objects, events, and processes into data and displays that data." She has demonstrated in a convincing way how these two technology strategies have profound implications for the nature of work and power relations in industrial society. (Zuboff, 1988.)

Sharply different types of organizational requirements are associated with different forms of information technology. Technology that is almost exclusively designed to automate operations usually reduces both headcount and the dependence of the production system on the judgements of the remaining operators. It is likely to reduce the amount of training operators needs. Under these conditions of automation adequate performance can often continue to be obtained by close supervision and control oriented organizational rewards and punishments.

A contrasting organization is needed when new technology is designed not only to automate certain functions (including storing, retrieving, and manipulating information) but also, and more importantly, to provide operators with new forms of information to upgrade their decisions and the goods and services they produce. For this type of technology to be operated effectively, the human resource policies and practices must elicit a high level of spontaneous commitment, provide for higher level cognitive

skills, and encourage substantial influence on the part of those who operate the new system.

A case in point is computer integrated manufacturing (CIM). A National Research Council (NRC) committee composed of executives, labor leaders, and academics and chaired by one of the authors studied human resource practices in 16 state-of-the-art installations of advanced manufacturing technology in the United States. A majority of these installations were computer integrated manufacturing systems. The committee found that certain features of this advanced technology make a number of high commitment practices especially appropriate. For example, elements of the manufacturing system become more closely coupled with CIM technology. The tighter interdependence of tasks makes broader jobs and more flexible assignment patterns extremely advantageous. In addition, the more integrated the system, the more alert and ready to act workers must be. Therefore, it is crucial that workers be internally motivated.

As indicated earlier, close supervision can compensate for lack of motivation where the technology involves repetitive, short-cycle activities, but it cannot obviate the need for individual responsibility in the complex CIM environment. Fortunately, the increased capital intensity of CIM and the smaller crew typically required to operate it make it easier for management to devote the time and resources to develop high commitment.

Therefore the advanced forms of computer-based work technology are more effectively exploited by commitment organizations. Many forms of advanced information technology not only depend for their effectiveness upon users who are internally motivated, but they must be designed and managed in a way that elicits that type of motivation. Advanced information technologies not only benefit directly from an operator's

understanding of the unit's business; they also can impart such understanding. These technologies not only require continuous learning; they also promote and reinforce it.

However, whether these potentially positive relationships between a general commitment orientation of the organization and the new technology are realized depends upon how the technology is introduced and managed. The following are offered as constructive practices.

Articulate Organizational Ideals. In an increasing number of corporations top management has formulated a vision of the type of organization which it believes will enable the corporation to compete. For example, these visions often call for some combination of the following: fewer levels of management, delegation of decisions to the lowest level where information and expertise can be provided, more teamwork, more entrepreneurial spirit, more self-supervision, and a stronger customer service orientation. It is our contention that a new technology can either promote or frustrate the movement toward some of these ideals, depending on how it is designed and managed.

The existence of an explicit statement of ideals, whether it is called a management philosophy or an organizational vision, can serve as a set of social criteria to guide the development of new technological systems. These social criteria can be applied in the approval and assessment processes in a way similar to technical specifications and economic justification.

Unfortunately, even corporate organizations that have clearly articulated philosophies and use them to drive quality-of-work life efforts and other organizational development activities seldom ensure that they are

applied in the design and implementation of new technology. Thus, in the early 1980's when ATT was trying to revise its managerial style to be less controlling, and was sponsoring QWL activities jointly with the Communications Workers of American (CWA), the Bell Labs and ATT central staffs were designing automated technologies and computer-aided administrative systems that ran counter to these new ideals. The automation deskilled, routinized, and paced workers and more closely monitored their behavior. Such an experience is not atypical. American managers and union officials generally have been slow to appreciate that technological choice is social choice. They fail to appreciate that many technical solutions exist for a given economic problem, and that each technical solution has a unique set of social consequences. Therefore, education about the relationship between organizational and technological choices is needed for line managers, systems developers, human resource managers, and union officials. Both private and public sector institutions should give priority to responding to this need for new understanding of these important relationships.

Address Threshold Issues. Certain issues are often so crucial in determining the response of employees and their representatives to new technology that they should be addressed in policy terms, ideally in advance of any specific new technology project.

The first threshold issue is employment security. No other aspect of the context for implementing new technology is more important than the presence or absence of assurances about employment. Workers hold similar concerns whether we are talking about non-union or unionized workplaces, although the presence of a union usually ensures that employment security

issues and their relationship to new technology are addressed more explicitly. The NRC study concluded that "to build and preserve human commitment and skills required to operate advance manufacturing technology, the policies that govern employment security and ease labor dislocations must be as favorable as the competitive circumstances of the enterprise permit." (p.4) Robert Zager's paper in this series, "Continuous Learning and Employment Security", outlines innovative practices in this area.

During the 1980's we have seen the evolution of a number of key principles re employment security in several bell weather collective bargaining agreements. In the auto industry the employers have agreed to the premise that no layoffs should occur as a result of the introduction of new technology. Management has been willing to agree to this principle since it can control the pace of technological change and the displacement effects for the workforce can be planned for and handled via a variety of redeployment efforts involving job banks, retraining, transfer and even out placement to work in other industries.

Another principle that has emerged recently in some labor agreements is that before work is moved out of the bargaining unit (e.g., subcontracting, shift to overseas operations, etc.), the workers whose jobs are at risk should be given a chance to form task forces to study the situation and to formulate a restructuring plan for their operations so the in house costs come within range of the competitive benchmarks. Xerox and the ACTWU have followed this procedure with the result that a number of departments have "saved their jobs".

A second threshold issue occurs in a unionized context. It relates to the effect of new technology on the bargaining unit. New technology often changes the nature of work so fundamentally that it creates ambiguities

about whether the new tasks are appropriately placed within or outside the bargaining unit.

Recall that in the adversarial scenario both parties view the introduction of new technology as an opportunity to redefine the effective scope of the bargaining unit in their favor. In the cooperative scenario they are more likely to address other issues without emphasizing where work ends up in relation to the bargaining unit. For example, if management is otherwise trying to delegate functions to lower levels of the organization, it may willingly move new activities such as programming and new decision-making responsibilities into the work of bargaining unit members. Similarly, if some computerized functions previously performed by bargaining unit members are now more naturally packaged electronically in the work of supervisory or professional personnel, the union is relaxed about that outcome.

This can be a highly sensitive issue. The important point is to recognize that management's willingness to embrace more work in the bargaining unit depends in part upon the prospects for union-management cooperation; and that the union's readiness to enter into a cooperative relationship depends upon management actions that respect the integrity of the bargaining unit.

As the traditional demarcation lines between blue collar, white collar, and professional work become blurred a number of tension points and opportunities are presented to the parties. In an instrument factory studied by one of the authors where a compliance pattern existed the following sequence occurred. When first generation technology was ordered from the vendor, the breakin and customizing was performed by the operators, all members of the IAM local. As more specialized and advanced



equipment began to be introduced, the company found it necessary to perform the customizing work in house but decided to have it be performed by specialists located in the "model shop" - not a part of the bargaining unit. Conceivably, the equipment operators could have been trained in the advanced skill areas of electronics and optics but the company chose to maintain (and even intensify) the adversarial relationship with the union - in part, because this was the only unionized plant of this multi-plant company and the corporate approach emphasized containment (and if possible shrinkage) of union influence.

Contrast this example with the experience of Cummins Engine and its independent white collar union. With the same trends mentioned above more and more work was naturally falling within the domain of engineering associates, a position not normally within the bargaining unit of technicians. The solution reached by the parties was to include the engineering associate position in the bargaining unit (a gain for the union) but not cover it with the existing bargaining contract provisions (a gain for management). (Cappelli and Sherer, forthcoming.)

Initiate a Constructive Climate. Many steps in addition to those described above can serve to create a climate generally favorable to the introduction of new technology. We will discuss several.

Employment security may relieve some of the anxiety associated with technological change, but many employees are anxious about their ability to operate in the new computer-based environment. An IBM facility with which the authors are familiar provides an example where management either encouraged or supported a large fraction of the work force to become educated about the information technologies that would in the future become

the bases for new work processes and jobs. The positive motivational effect of this education was at least as important as the enhanced competence it produced. Motivation and competence were, of course, both important dimensions of the social context for the specific new technology projects.

Some of the most powerful initiatives for creating a social context favorable to new technology are those that involve employees directly in problem-solving activities designed to improve the working environment and performance. These activities, encouraged under such umbrella concepts as quality of work life (QWL), employee involvement (EI), participative management, and quality circles, help develop the increased social and cognitive skills and the attitudes of self-confidence and self-reliance that will contribute to effective use of the new technology. Naturally these positive effects occur only when the activities reflect the genuine commitment of management to the spirit of participation, are also sponsored by the union if one is present, and are accompanied by other supportive changes such as training. The value of establishing a pattern of employee participation as a prelude to the effective introduction of new technology was confirmed by the NRC study and has been demonstrated in other experiences of GM, Ford, ATT, Cummins Engine, with which the authors are familiar.

Management initiatives to change its relationship with unions usually must occur in parallel with those designed to involve employees. Illustrative are the Common Interest Forum (CIF) initiated in a number of union-management relationships, including those involving UAW with GM and Ford and the CWA with ATT.

In the case of ATT and CWA the parties agreed in 1983 to institute CIFs in the many separate entities of the Bell System. The forums have been used in practice to varying degrees. The CIF at Pacific Bell became a major vehicle in 1985 and 1986 for jointly addressing employment security issues and for expressing a new "business partnership" between the parties. (Kanter, 1988). Local CIFs were established to deal with other matters including the introduction of technology. The CIF was also the setting for developing joint ATT-CWA training and retraining efforts, finalized in one form in the 1986 collective bargaining agreement as a non-profit organization, The Alliance for Employee Growth and Development. AT&T committed \$7 million per year to the Alliance.

Based on these and other similar experiences, the CWA Executive Board Committee reviewed the general requirements for moving its relations with management from adversarialism to cooperation and the specific contributions that CIFs can make, and concluded:

This cooperation between union and management depends in large part on management's attitude to the union. Cooperation must be a two-way street. Just as the union leadership must understand and respect the company's need to remain profitable and competitive, so the company must understand and respect the union's need to further the goals of members and to organize new members. Companies cannot form non-union subsidiaries at the same time they expect the union to support their competitive strategies. Both company and union need to trust each other so that management does not undermine the union and the union does not hold mutually beneficial programs hostage to collective bargaining demands.

Ongoing Common Interest Forum discussions can build understanding and deal with differences in a non-adversarial manner. The union will be better able to serve its members and help the company's position if it has an early knowledge of and a voice in company strategies that affect employment, work processes, and life on the job. This requires that union leaders talk directly to the line managers who make these decisions before they are made. This cannot be achieved if the union related only to the Labor Relations department. While management leaders in Labor Relations took the lead in bringing the union together with line managers, the CIFs must include line managers. In similar fashion at local levels, the CIF works only when local CWA

leaders develop a working relationship with line management. (CWA Resolution, April 14, 1988. p. 4.)

A concrete example of how the common interest forum approach works in practice comes out of the experience of Pacific Northwest Bell and the CWA. The position of systems technician had experienced considerable change as a result of new technology and testing procedures. The initial approach to upgrading skills emphasized individual learning with a battery of tapes and learning modules. A number of technicians expressed via the work relations survey a need for a different approach to new skill acquisition. As a result a task force was created consisting of technicians appointed by CWA, line managers, and representatives from the local vocational educational system. As a result of the recommendation of this group a telecommunications course was started on company time for any technicians who volunteered. It has been very successful and a follow up course has been launched. (Hilton and Straw, 1987.)

Management sometimes uses improvements in the union relationship as a criterion for deciding whether to invest in new technology in a particular plant. It may also use the prospect of the investment to induce the union to agree to special conditions favorable to the implementation of the new technology. For example, when Allen-Bradley started up a computer integrative manufacturing (CIM) facility in April 1985 to manufacture contactors and relays, it wanted to manage the system with innovative organizational and human resource practices. (Goldstein and Klein, 1987). UE officials agreed to give management carte blanche in designing the CIM work organization during the pilot stage of the project because they wanted to encourage the company to place new technology in established unionized locations rather than greenfield sites. The parties subsequently agreed to

such matters as jobs classifications and selection procedures when the system was moved from the development unit to the production department where it was covered by the union contract.

This arrangement between Allen-Bradley and the UE illustrates another condition helpful to the introduction of new technology, namely a willingness to give planners space to experiment and learn. In this case, both management and the union could withhold judgement about what departures from their conventional working arrangements--job classifications, flexibility of assignments, pay systems, and selection criteria and procedures--would be operationally desirable and politically acceptable. They could learn from experience the operational advantages of certain practices and workers' reactions to them before deciding which of them to institutionalize for the CIM system.

The Allen-Bradley example also illustrates the reciprocal relationship between technology and social variables, in this case the tenor of union-management relations. The introduction of new technology is certainly influenced by the extent of cooperative labor-management relations - but the major event or the occasion of new technology also provides an opportunity to create new arrangements and understandings which help elaborate mutual commitment that may only be at a formative stage.

#### Structure Participative Planning, Implementation, and Assessment.

User involvement has long received at least lip service by technology developers. The concept is being broadened to call for the participation of not only users but other stakeholders in the process, and not only in implementation activities but also in the design process. Participation can take many forms, as the examples below illustrate.

The NRC study found that employees are sometimes involved as early as the selection or adoption decision of technology. At five unionized sites included in the NRC study workers or union officials accompanied engineers on trips to vendors and rendered opinions on what equipment to buy. Employees and union representatives also were consulted on how to operate the equipment and how to organize the work.

When the union is consulted early in the technology development process, it is more likely to become an advocate for the new technology, reassuring union members that the technology will secure more jobs than it threatens. Union officials who participate in the selection or preliminary implementation process do this recognizing that they may be taking political risks in order to serve the long term interests of their members.

Since new technology may increase the job evaluation point value of the impacted jobs, some union leaders are reluctant to become involved at the design stage for new technology for fear they will become co-opted and unable to represent member interests when the bargaining issues come on the table.

At Boeing this dilemma was resolved by instituting an annual technology briefing for top IAM officials. Long term trends in CAD/CAM, robotics, and composite materials were dealt with in these annual sessions. However, for specific technology projects union officials were not involved at the strategic stage, thereby leaving them free to pursue the distributive issues of staffing and pay levels.

Deal with Potential Constraints. We have mentioned the many aspects of the organization that may need to be redesigned--including jobs, pay schemes, selection procedures, training, structure, and performance

management. The ideal organization can be introduced readily in a greenfield site with a new work force in a favorable labor market. More typically new technologies are introduced into more constrained environments requiring adaptations. We treat here how constraints may be imposed by union contracts on the one hand and the existing skills and attitudes of supervisors on the other.

Unions often limit to some extent the flexibility that is otherwise appropriate for operating new technology, precluding for example the integration of operating and maintenance work. The union principle of seniority also often constrains the selection process. Where the technology raises skill demands, increases capital intensity, and renders the system more sensitive to mistakes, effective utilization of manufacturing technology is more dependent than ever on selecting the best talent available for operating positions.

In some cases management has been unable to negotiate change in the traditional way ability and seniority are balanced. An appliance plant's procedures are typical of facilities where management introduced only modest changes. The managers classified the new, multiskilled operator position above other jobs--in part to minimize bumping during layoffs--but they instituted no new selection procedures. Accordingly, they encountered problems when the new pay rate for this job attracted 50 bids for the first 6 positions--many from applicants who lacked the basic verbal and quantitative skills to absorb the training. The labor contract mandated training for the senior employees who bid on the job, however, so management's only screening option was to spell out the job's multiple duties and encourage self-selection. Although about half the applicants withdrew, the managers realized that in the future they would need to

negotiate a change in the selection process so that the most proficient operators would have a chance at the training.

The NRC study found more innovative selection processes in other unionized plants. At an axle plant, for example, applicants for skilled jobs completed an eight-hour assessment of their technical and interpersonal skills, conducted by a local community college. They were given a four-to six-hour skill-level inventory, which included simulated problem-solving exercises, and then attended a family night with their spouses to discuss the program. The 45 applicants who remained from an initial group of 100 were then ranked by seniority. Some of them declined the new jobs; 16 were eventually placed. Many dropped out because working in the new plant involved shift work or demanded higher performance standards than they were prepared to accept. Others declined because they felt unqualified or had only a few years to go before retirement and did not want to waste the company's investment.

A unionized diesel engine plant devised a multistep process in which the 250 initial applicants were divided into small groups and given a four-hour briefing on the technology and the new job's duties and expectations. Those who persisted were interviewed by a committee of two manufacturing supervisors and two union representatives. The union representatives went out of their way to warn applicants how different the new operation would be and cautioned them to reflect on their interests and aptitudes. Taking the interview results into account, as well as attendance records, seniority, experience, and any evaluation records, the same committee made the final selection.



The general point is that managements and unions can devise ways to consider criteria other than seniority without losing workers' confidence in the fairness of the selection process.

Another juncture for these creative arrangements arises when workforce reductions are required. At an auto plant with a CIM system the parties worked out a procedure whereby senior workers could not bump CIM system operators, but would "back fill" positions vacated by individuals who were on a "qualifiable" list - in turn the latter moved into the unit to displace the junior people who would then be placed on layoff.

The unions involved pursued these innovations because union officials, as much as their counterparts in management, appreciated the importance of selecting people who would be able to perform well. They understood that the effectiveness of the new technology--and thus the plant's competitiveness--would depend on the performance of the operators. And they were concerned about wasting money training the wrong people.

Supervisors' predispositions can be as much a constraint on the effective utilization of certain technologies as the union contract. We have emphasized the importance of a set of organizational ideals to guide technology development. However, even if the system is designed to be managed in a prescribed way, there is no guarantee the managers actually in charge of the system will manage in the intended spirit. An aspect of the organization that is especially susceptible to differing managerial predispositions is the approach to performance management.

In a case involving a decision support system for paper machine operators, which gave them the cost information and process expertise they needed to operate with more autonomy, supervisors of the operators felt threatened by their loss of relative power and began to use the monitoring

capacity of the system to tighten their supervisory control. (Bronsema and Zuboff, 1984.)

A study of the Internal Revenue Service's (IRS) implementation of its Automated Collection System (ACS) by Chalykoff (1988) found that supervisors differed in terms of their use of the computer-aided-monitoring feature of the ACS. This feature enabled supervisors to monitor an employee's terminal work and phone interactions with taxpayers. Some supervisors tended to use this capacity in ways that developed employees, while others used it in ways that made employees feel controlled and subjugated. These patterns reflected the dispositions of supervisors, dispositions that would be influential even if the ACS planners had been more prescriptive about how the monitoring capacity was to be used.

In another technology introduction at IRS - the issuance of lap top computers to 14,000 examiners - the Treasury Workers' Union insisted on an agreement that use or lack of use of the new PC's could not be considered in performance appraisals. While such a policy was understandable given the union's concerns that supervisors might exert undue pressure on the examiners to use the new tool, such a restriction is certainly untenable for the long run and illustrates a generally adversarial relationship and lack of involvement by the union in the early phases of decision making regarding new technology.

Thus the paper mill and IRS cases underscore the need for implementation methods that include efforts to enlist the support of all stakeholders.

Conclusion

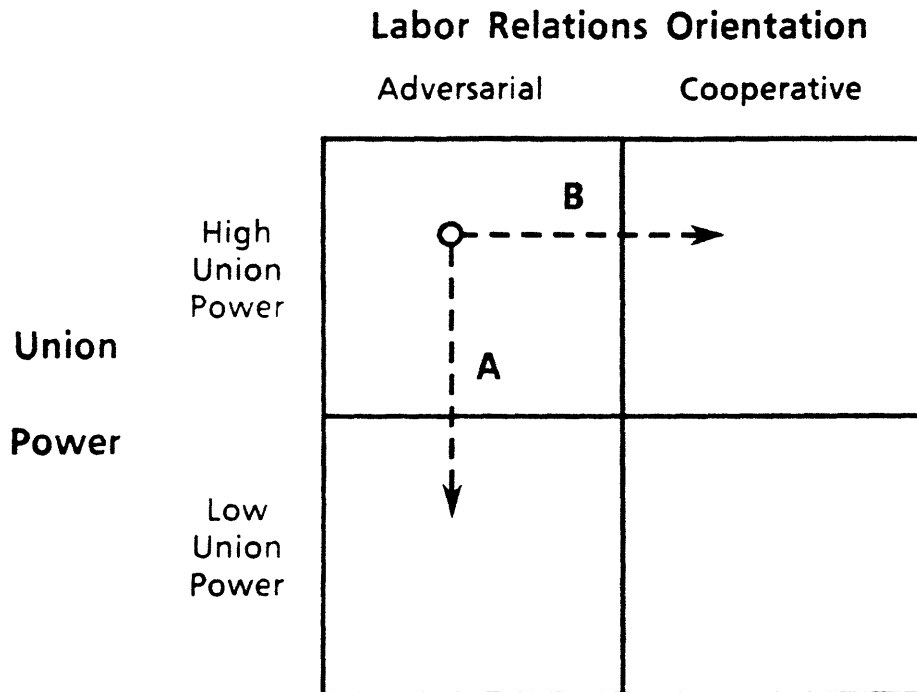
The current scene presents many opportunities for introducing new technology via constructive labor relations. It was only several decades ago that a number of unions actively opposed new technology or at best sought to control its introduction with various work rules and crew size requirements. Today, such stories by unions are much more the exception.

Some relationships remain locked in an adversarial mode that prevents the realization of the full benefits of new technology but this is due as much to habit or management's desire for an arm's length relationship as to union policy.

REFERENCES

- Bronsema, Gloria and Shoshana Zuboff, "The Expense Tracking System at Tiger Creek" Harvard Business School Case Services, Harvard Business School, 1984.
- Cappelli, Peter and Peter Sherer, "Spanning the Union-Nonunion Boundry at Cummins Engine". forth coming in Industrial Relations.
- Chalykoff, John, "Determinates of Employees' Affect Response to the Use of Information Technology in Monitoring Performance" Management in the 1990's Working Paper, Sloan School of Management, MIT, February 1988.
- CWA Executive Board Committee Resolution. Quality of Worklife and Employee Participation, Motion passed and adapted April 14, 1988.
- Goldstein, Sabra and Janice Klein, "Allen-Bradley" Harvard Business School, 1987.
- Hilton, Margaret and Ronnie Straw, "Cooperative training in telecommunications: case studies". Monthly Labor Review, May, 1987. pp. 32-36.
- Kanter, Rosabeth Moss, "The New Alliances: How Strategic Partnerships are Reshaping American Business." in Herbert Sawyer, Ed., Business in the Contemporary World, University Press of America, Inc., 1988, pp. 59-82.
- National Research Council, "Human Practices for Implementing Advanced Manufacturing Technology," Washington, D.C.; National Academy Press, 1986.
- Walton, Richard E. "How can Worker and Union Commitment be Encouraged to Contribute to Industrial Competitiveness?" in, Competitiveness and Human Values. A Symposium Summary, Washington, D.C. U.S. Department of Labor Bureau of Labor-Management Relations and Cooperative Programs, 1987a, pp. 16-17.
- Walton, Richard E. and Gerald I. Susman, "People Policies for the New Machines", Harvard Business Review, March-April 1987, pp. 98-106.
- Walton, Richard E., "Challenges in the Management of Technology and Labor Relations," in Richard Walton and Paul Lawrence, editors, HRM: Trends and Challenges, Boston: Harvard Business School Press, 1985, pp. 199-216.
- Walton, Richard E., Innovating to Compete: San Francisco: Jossey Bass, 1987.
- Zuboff, Shoshana, "Automate/Informate; The Two Faces of Intelligent Technology," Organization Dynamics, Autumn, 1985, pp. 4-18.
- Zuboff, Shoshana, In the Age of the Smart Machine, New York: Basic Books, 1988.

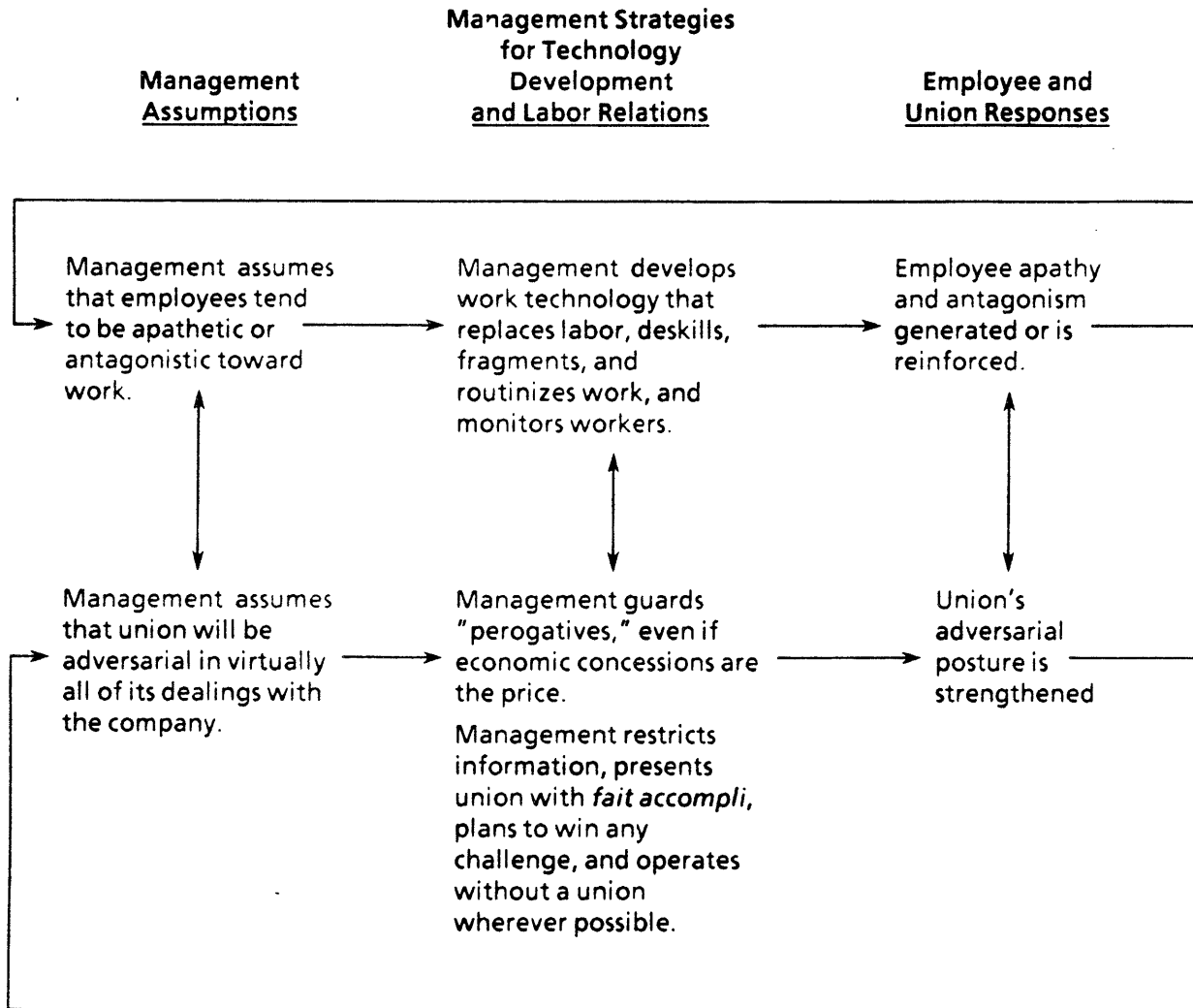
Figure 1



Strategy A - Attempt to weaken union power in order to secure deep economic and work rule concessions; and accept adversarial relations.

Strategy B - Attempt to generate a cooperative relationship with union in order to support participative improvements in quality and productivity; and accept that economic concessions and formal work rule modifications may be modest.

Figure 2  
Management of Technology and Labor Relations  
*Some Self-reinforcing Dynamics*



Source: R. Walton, 1985, p. 208

Management in the 1990s  
Working Paper Series

90s No.	Title	Author(s)	Date	Title	Author(s)	Date
85-001	Management in the 1990s Mission Statement	-----	7/85	Information Technology, Integration, and Organizational Change	Benjamin Scott Morton	4/86
85-002	Sponsors' Vision Document	-----	5/85 (Rev 1/86)	Electronic Markets and Electronic Hierarchies: Effects of Information Technology on Market Structure and Corporate Strategy	Benjamin Malone Yates	4/86
85-003	Management in the 1990s Program Research Themes and Request for Proposals, Fall 1985	-----	8/85	Toward a Cumulative Tradition of Research on Information Technology as a Strategic Business Factor	Treacy	4/86
85-004	A Survey of Current Trends in the Use of Executive Support Systems	DeLong Rockart	11/84	Executive Support Systems and the Nature of Executive Work	Rockart DeLong	4/86
85-005	Expert Systems and Expert Support Systems: The Next Challenge for Management	Luconi Malone Scott Morton	9/85	Electronic Organization and Expert Networks: Beyond Electronic Mail and Computer Conferencing	Stevens	5/86
85-006	Future Directions in DSS Technology	Treacy	1/85	Economic Issues in Standardization	Fairrell Saloner	10/85
85-007	Information Technology and Corporate Strategy: A Research Perspective	Bakos Treacy	3/85 (Rev 3/86)	Floor Lay-out Design for Effective Software Production: Applying the Implications from the Optimal Communication Pattern of a Software Project Team	Hauptman	6/86
85-008	Supporting Senior Executives' Models for Planning and Control	Treacy	6/85	Intelligent Information Sharing Systems	Malone Grant Turbak Brobst	11/86
85-009	Designing Organizational Interfaces	Malone	9/85	Semi-Structured Messages are Surprisingly Useful for Computer-Supported Coordination	Malone Grant Lai Rao Rosenblitt	11/86
85-010	Out of print. Superceded by 86-025			Cognitive Science and Organizational Design: A Case Study of Computer Conferencing	Crowston Malone Lin	10/86
85-011	Organizational Structure and Technology: Elements of a Formal Theory	Malone	8/85	Strategy Formulation Methodologies	Scott Morton	11/86
85-012	Computer Support for Organizations: Toward an Organizational Science	Malone	9/85	Some Thoughts on the Information Technology Revolution in Standard Oil	Horton	11/86
85-013	Influence of Task Type on the Relation Between Communication and Performance	Hauptman	5/85			
85-014	Implications of Changes in Information Technology for Corporate Strategy	Scott Morton Rockart	1/83 (Rev 3/84)			
86-015	Identifying the Attributes of a Successful Executive Support System Implementation	De Long Rockart	2/86			
86-016	Out of print. Superceded by 86-025					

<u>90s No.</u>	<u>Title</u>	<u>Author(s)</u>	<u>Date</u>	<u>90s No.</u>	<u>Title</u>	<u>Author(s)</u>	<u>Date</u>
86-030	The Value-Added of Strategic IS Planning: Understanding Consistency, Validity, and IS Markets	Henderson Sifonis	11/86	88-045	Toward the Perfect Workplace? The Experience of Home-Based Systems Developers.	Bailyn	3/88
86-031	A Common Agenda for an Uncommon Future: Address to the Sloan School of Management	Whitmore	11/86	88-046	The Impact of Technological Change on Employment Structure in Telecommunications: Whatever Happened to the Wichita Lineman?	Lynch Osterman	4/88 (Rev 9/88)
87-032	Managing the Data Resource: A Contingency Perspective	Goodhue Quillard Rockart	2/87	88-047	The Competitor Intelligence Function in the Very Large-Scale Organization: Assessments and Uses	Westney Ghoshal	5/88
87-033	Information Technology in Marketing	Little	2/87	88-048	Adding Value in an Information Function	Westney Ghoshal	5/88
87-034	Finding Synergy Between Decision Support Systems and Expert Systems Research	Henderson	3/87	88-049	Compatibility Standards and the Market for Telecommunications Services	Besen Saloner	5/88
87-035	Data Envelopment Analysis for Managerial Control and Diagnosis	Epstein Henderson	5/87	88-050	Assessing IT Performance: What the Experts Say	Wilson	6/88
87-036	Managing the IS Design Environment: A Research Framework	Henderson	5/87	88-051	The Moral Fabric of the Office: Organizational Habits vs. High-Tech Options for Work Schedule Flexibilities	Perin	6/88
87-037	Freeing Work from the Constraints of Location and Time: An Analysis Based on Data from the United Kingdom	Bailyn	6/87	88-052	Employment Security at DEC: Sustaining Values Amid Environmental Change	Kochan MacDuffie Osterman	6/88
87-038	The Influence of Communication Technologies on Organizational Structure: A Conceptual Model for Future Research	Hauptman Allen	5/87	88-053	An Economic Study of the Information Technology Revolution	Jonscher	6/88
87-039	The Line Takes the Leadership	Rockart	8/87 (Rev 3/88)	88-054	An Assessment of the Productivity Impact of Information Technologies	Loveman	8/88
87-040	Information Technology and Work Organization	Crowston Malone	10/87 (Rev 12/87)	88-055	Involvement as a Predictor of Performance in IS Planning and Design	Henderson	8/88
88-041	Out of print. Superseded by 88-055.			88-056	Planning and Managing Change	Schein	8/88 (Rev 10/88)
88-042	The Realities of Electronic Data Interchange: How Much Competitive Advantage?	Benjamin DeLong Scott Morton	1/88	88-057	Information Technology: From Impact On to Support For Organizational Design	Invernizzi	9/88
88-043	Determinants of Employees' Affective Response to the Use of Information Technology in Monitoring Performance	Chalykoff	2/88	88-058	Information Technology and the New Organization: Towards More Effective Management of Interdependence	Rockart Short	9/88
88-044	How Expectations About Microcomputers Influence Their Organizational Consequences	Carroll Perin	4/88				



<u>90s No.</u>	<u>Title</u>	<u>Author(s)</u>	<u>Date</u>	<u>90s No.</u>	<u>Title</u>	<u>Author(s)</u>	<u>Date</u>
88-059	Dimensions of IS Planning and Design Technology	Henderson Cooperider	9/88	89-075	The Role of the CEO in the Management of Change: The Case of Information Technology	Schein	8/89
88-060	Issues of Gender in Technical Work	Ballyn	10/88	89-076	Strategic Alignment: A Framework for Strategic Information Technology Management	Henderson Venkatraman	8/89
88-061	More than Just a Communication System: Diversity in the Use of Electronic Mail	Mackay	10/88	89-077	Strategic Alignment: A Process Model for Integrating Information Technology and Business Strategies	Henderson Venkatraman	10/89
88-062	Managing New Technology and Labor Relations: An Opportunity for Mutual Influence	McKersie Walton	10/88	89-078	Building and Sustaining Partnership Between Line and IS Managers	Henderson	9/89
88-063	Information Technology, Human Resource Management, and Organizational Learning: A Case Study in Telecommunications	Villiger	10/88	90-079	Corporate Reform in American Manufacturing and the Challenge to Economic Theory	Piore	1/89
88-064	Innovative Cultures and Organizations	Schein	11/88				
89-065	Computer-Aided Monitoring: Its Influence on Employee Job Satisfaction and Turnover	Chalykoff Kochan	1/89				
89-066	Partially Shared Views: A Scheme for Communicating among Groups that Use Different Type Hierarchies	Lee Malone	3/88				
89-067	What is Coordination Theory?	Malone	2/88				
89-068	Joint Ventures in the Information Technology Sector: An Assessment of Strategies and Effectiveness	Koh Venkatraman	12/88				
89-069	Implementation of End User Computing in the Internal Revenue Service	Pentland	3/89				
89-070	A Process Model of Strategic Alliance Formation in Firms in the Information Technology Industry	Wilson	3/89				
89-071	Object Lens: A "Spreadsheet" for Cooperative Work	Lai Malone Yu	9/88				
89-072	Electronic Integration and Strategic Advantage: A Quasi-Experimental Study in the Insurance Industry	Venkatraman Zaheer	4/89 (Rev 12/89)				
89-073	Electronic Mail and Organizational Cooperation: A Case Study	Invernizzi Luberto	6/89				
89-074	Cotechnology for the Global 90s	Stevens	7/89				