Introduction

Here the focus is on work; how it is organized, how it is managed and questions that systems developers need to consider when designing computer systems for workplaces. This paper is a broad-stroked sketch, whose overall purpose is to better understand how social, political and economic choices have influenced the design of computer systems.

Cooperative work, as a form of work organization, is not an idea whose time has just come. The notion of how people cooperate in getting work done has been around since early humans coordinated their tasks in hunting, fishing, gathering and rudimentary agriculture. And the use of technology to support cooperation among work tasks is as old as the tales anthropologists can tell us about the tools that humans have used. What is new, however, is that the current focus on 'computer-supported cooperative work' gives us the chance to revisit our analysis of what forms cooperation now takes in the workplace, and to ask questions that can lead to envisioning computer support for working practices that encourage cooperation rather than isolation at work.

During the last decade, studies of work have increasingly pointed to the importance of communication, tacit knowledge and the shared and group nature of work activities [15,21,29]. This focus on human, mental and interconnected aspects of work, we loosely lump under the heading of 'cooperative work'. While these aspects of work have been important throughout history, the extent to which management strategies allow for, and encourage them, and the degree to which technology can be used to support them, have changed over time.

This article takes as its starting point the idea that work organization is increasing shifting away from a focus on individual and isolated tasks towards more group-based activities. The idea of designing computer support for groups instead of isolated individuals is useful and challenging. Indeed it breaks from design approaches that, in the past, focused on centralized and bureaucratic systems. But, as this paper will illustrate, it is important to understand at least a little of the recent history of work organization and management strategies, in order to realistically propose questions about designing computer systems that support group activities.

As an economist I have studied the way work is organized in order to enable people to understand and change the conditions of their work. As a computer scientist, I try to use my technical knowledge to support situations where people can learn to get some influence over the kind of computer systems used in their workplace. This article reflects the action-orientated bias of my research. I don't see cooperative work as a static concept, but rather as one which has been shaped and molded by conflicts between workplace activity and managerial control over work.

Wearing the hats of both my trades and carrying experiences from my work, this article has two focal points. The first is to outline a history of management strategies that, I believe, has strongly influenced the way work is organized and the ways that computer systems have been designed. This historical section looks at industrial management policies of hierarchical, technical and bureaucratic control, and traces the contradictions within each period which have given rise to current group-based policies. The second part raises questions about design of computer systems, focusing on issues of information flow, planning, pace of work and skill.

But in order to sketch this landscape, I have chosen to narrow the frame by looking at cooperative work through the eyes of the Scandinavian tradition on work organization. There have, I believe, been two parallel traditions in the approach to computer support for cooperative work. One tradition, perhaps the dominant one in the United States, stresses that user participation enhances system design because it lets us build better *user-centered* systems[18,20]. The other, coming from the Scandinavian tradition, argues that user participation is part of the process of *building democracy in the workplace* [3,9].

The user-centered and the Scandinavian traditions are indeed different. Just how different they are is difficult to measure, for coming from different perspectives they, of course, use different semantics and grow out from a base of different assumptions. But it is not the measurement of the differences that is the focus of this article. Rather, I would like to use the Scandinavian tradition as a *way of seeing*, and through this way of seeing, focus on the organization of work, with special attention to the *meaning of cooperation for workplace democracy and the implication of this for the design of computer support*.

The purpose is not to critique the dominant user-centered tradition, but instead, through comparison, to build a base of alternative ways to look at work activity and the questions we ask in the design process.

Preface: A Question of Workplace Democracy

Beginning in the mid '70's, the Scandinavian tradition experimented with ways to involve users, as *workers*, in the construction of computer systems. Infact, the emphasis was so worker-centered that the word user was not to make much of an impression in the literature until the early eighties! And clearly the worker oriented approach had its roots in the wide-spread social democratic practice of trade union membership.

But trade union membership alone was not sufficient to encourage active worker participation in design, as the early Scandinavian projects were to prove[9]. For the issue of 'better' system design demanded situations where workers were *knowledgeable* about computer systems and *actively interested* in participating in the design process. And the path to developing action-oriented design methods led to the need for workers to become involved in the *planning and control* of how computer systems are actually used.

This last assumption, the need for planning and control of the use of systems, was a major moving force in creating and reinforcing demands for workplace democracy. *In other words, 'better' systems were not simply ones that functioned better for the users, but systems that could work towards changing the nature of work itself.* And the model to accomplish this was one where it was necessary for workers to actively participate through planning, control and decision-making, not simply sitting in a passive capacity as observers in a reference group.

The successes and failures of the last 10 years of this approach, [9] are many. On the positive side, participation in the form of the much talked-about Trade Union Agreements opened the door for workers to negotiate with management over the introduction of new technology.[6]. The idea that workers should have a say in whether or not systems were introduced, and how they should be used, is a base for thinking about systems design in Scandinavian countries. Yet, on a slightly less positive note, the notion of actual worker participation in planning and design is not so easy to bring about. And more difficult still, is the concept of how system design can encourage greater democracy in the workplace.

The central issues, I believe are that ,

- *democracy needs to be viewed as active participation in planning and decision-making, thus making worker or user involvement far more than techniques for improved human-computer interfaces* and,
- *computer-supported cooperative work means that computer systems need to reinforce forms of cooperation that enhance the chance for a more democratic workplace,.*

In this way, the question of the form that workplace cooperation takes is a criticial one for computer system designers. I will return to the issue of democracy after the next section because it is central for interpreting forms of work cooperation and analyzing types of computer support. Here I turn my attention to an understanding of the labor process view of work organization. This view represents one of the analytical roots of the Scandinavian tradition.

Work Organization : A Labor Process View

Labor process is the way that we look at *how* work is done. It includes how workers relate to each other, how the work is organized, and most importantly, how the work process is controlled and coordinated. Harry Braverman's work[5] in the mid 1970's set the stage for examining work as a series of activites where tasks were divided and management sought to gain increased control of the way work was done. Main themes in this view of work activity included the idea that as the division of labor increased, deskilling of work activites and workers occurred. And as this process of centralization and rationalization took place, management acted to separate conception (ideas about planning work) from work execution (carrying out the work).

Braverman's deskilling explanation struck many resonant chords during the '70's. From the 1950's when Daniel Bell's *Work and Its Discontents* [2] was published, through the U. S. government's shattering report on *Work in America*[26] in the early 1970's, the cry of increased worker dissatisfaction was sounded louder and louder. And indeed, Braverman's explanations, and the multitudinous examples of increased work rationalization were more than alarming. From the vantage point of the 1970's it was easy to see that the history of work organization, beginning during the industrial revolution, was a history where centralization and rationalization of work, for the most part, increased management's control over the labor process.

And from the perspective of computer systems design, it was discouraging to see that, up through this period, computer systems mimicked centralized work organization strategies. Mainframe applications, were primariy based on the concept that division of labor and work rationalization *preceeded* computer system design[11]. The resulting systems were clearly top-down structures where planning functions were separate from the tasks that workers were to carry out. In fact planning, like control functions were generally built into the database design or assumed, by management to be part of management's use of information system design. I believe that the metaphor that best describes this period is the focus on centralized 'Management Information Systems'.

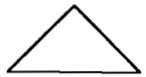
But the limits of this stream of work rationalization were, at least, temporarily reached by the beginning of the 1980's. Workers' dissatisfaction with cut and dried tasks as well as managerial problems with controlling so many divided functions were playing roles in setting these limits. And micro computer-based systems could now be used to support other forms of work organization including decentralized and small group activity.

From a Labor Process perspective, separation of conception from execution is a way to increase worker output (and thereby profits) and, at the same time, control workers so they continue to produce. But the control aspect of increased rationalization was beginning to unravel during this period. And, as the economic crisis of the early eighties showed, profitability was a critical issue.

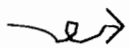
This turn of events was not new, for the history of work organization and managerial strategy is full of examples where worker resistance re-forms the organization of work. What is interesting, is the form that the current work organization is taking. For while we can call these activities, 'cooperative work', the characteristics of cooperative work are still in the process of being re-formed through the pressure of worker resistance to work rationalization and managerial attempts to restructure the organization. *Computer support for cooperative work in the context of workplace democracy* needs to be viewed in this light. Cooperative work is far from a static concept.

Management Strategies

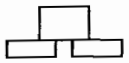
Within the Labor Process approach, general organizational theory is seen through the spectrum of managerial strategies to maintain control over the labor process. For the purposes of this paper, one such theory, that of Richard Edwards[8] is useful for looking at the dynamic interaction of organization theory and workplace change. Edwards' outline of modern management history traces management strategies from a period of *hierarchical control* through *technical control* and into a period of *bureaucratic* control. Each period is built on the base of the previous one and contains some of the unresolved conflicts of its predecessor. What is intriguing in this approach, is that all three types of managerial control clearly frame the dominant ideologies of the industrial and late industrial period, and at the same time, set the stage for the development of the current form of group or cooperative-oriented control. Let's take a closer look.



Hierarchical control is the, traditional, *top-down, single chain of command* strategy that developed to suit the birth of the industrial workplace. Simple hierarchical control has, of course, been replaced and modified since the industrial revolution, but its theme of central control and flow of authority from the top has dominated almost everything from military organization to corporate practice. By the end of the last century and the beginning of this one, the limits of simple hierarchy were quite apparent, as, for example, the use of Taylorist strategies were applied to supplement simple hierarchical management[5]. From a managerial standpoint, centralized workplaces had become too large for the chain of command to work effectively, and from the workers vantage point, the birth of a trade union movement presented a formal challenge to this form of industrial organization.



Technical control was superimposed on the notion of hierarchy with the introduction of continuous-process technology. The assembly-line in the factory setting, and the centralized call-monitoring data bases or key-stroke counting systems in offices, are examples of the adaptablity of technical control. If anything, it was known as the themesong of the first half of the Twentieth century, as characterized, for example, by Charlie Chaplin's film *Modern Times*. But just as hierarchical control left management open to union organizing thrusts, technical control raised the spectre of serious worker discontent leading to lowering of quality, as well as work-stoppages and lost time[22,24].



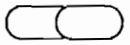
Bureaucratic control gained strength in the post World War II period within the incubator of the multinational and monopolistic firms. While systems of bureaucracy were introduced in the early part of the century[28] the notion of bureaucratic management strategy, according to Edwards, meant that *rule-based* systems replaced the old unilateral 'carrot and stick' of hierarchical mangement. Companies, like IBM, known for their paternalistic employment policies, could rely on a workforce of longer (and perhaps, better) educated workers who were trained to *internalize* corporate values. Rather than managers having to resort to threats, bureaucratic organization meant that workers should *know what was expected of them* according to company policy.

Today, the problems of bureaucratic control fill the pages of countless journals. From workers perspectives schemes for *worker self-management, job enrichment and job enlargement* have been put forward in ever increasing frequency since the '70's. From managerial perspectives, one can't help but notice that the bestseller list of the eighties reads like a guide to popular ideology on how to recylce worker discontent into more productive patterns[see 19].

At first American management literature turned to the Japanese 'challenge' for it was thought that the Japanese economic success would hold the clue to new American management practices. But it quickly became apparent that Japanese cultural patterns were not so adaptable to American corporate practices. Another wave of management literature then turned its spotlight on corporate culture, highlighting the role of charismatic leadership and stressing the individuality and uniqueness of company cultures.

What we see now are clearly newer management 'styles', but do they represent a shift in focus? The time of group-based work organization has come together with management ideology that emphasizes group coordination[15]. And both can be supported by decentralized computer systems that can rely on technical control through networks of centralized information. The next section briefly outlines the origins of the work organization that we lump under the heading co-operative work.

Toward Cooperative Control?



The economic crisises of the early eighties, coupled with shifts to politically conservative governments, and speeded-up world-wide competition, has placed new requirements on corporate organization[1]. The large centralized workplace, controlled through bureaucratic practices, has begun to look like a dinosaur. As competition increases and companies are forced to move fast or perish, the centralized office, like the centralized factory no longer looks like a viable entity. Thus the interest, from a managerial perspective, for an increase in decentralized work organization in order to meet the pressure of greater international competition.

During this period several ambiguous trends were noted in organizational literature. Trends like decreases in middle management levels, increased levels of communication within companies, and polarity between deskilling and job enrichment were reported from a wide range of case studies, but it was not clear for a variety of reasons, whether they represented the dominant thread of organizational change[7,25]. What was clear, however, in both the popular business press and the literature of organizational theory, was the fact that a focus on the *organization of work* was central for gaining better worker satisfaction, increasing organizational flexibility, and designing effective information systems[see 4].

From a Labor Process perspective, these trends can be seen as managerial attempts to balance the need for increased coordination and control with awareness of quality and output problems caused by worker dissatification. The strong-armed tactics of the industrial era, even in the paternalistic form of bureaucratic control, simply were not effective enough in the 'information age' workplace.

As mentioned earlier, the current workforce is better educated and, for the most part, better trained to internalize work-oriented discipline. While bureaucratic control relied on rule-based authority that could be *internalized by individual workers*, post-industrial management can effectively *transfer some forms of responsibility to the group*. Thus, the relationship between the individual worker and the

[1] in particular see issues of Business Week, Fortune and the Wall Street Journal, 1983-6, for repeated discussion of these concerns.

organization could be remolded to that between the *group and the organization*. The internalization and responsiblity for getting things done could be entrusted to the group as a whole. A process which many authors, writing from a variety of perspectives, have called 'transparency'[16]. In this transparent view of the organization the performance of the individual becomes clearer and therefore more accountable to his or her group, and, of course, to the organization.

The glue of transparent organization, is institutional control through the mechanism of peer pressure[17]. And this peer pressure, in turn, forms itself as 'collective control'[1]. Behind the scenes, but very much in evidence, lies the "information system as means to measure and evaluate the work of others"[16, p.179].

While the '70's was characterized by increased division of labor and rationalization, in the eighties we see the integration of some of these formerly divided tasks[13]. From insurance offices through municipal governments we find examples of work groups or 'teams' where workers, for example, handle a insurance case or tax problem from beginning to end. The term 'deskilling' seems no longer appropriate for individual jobs, as work groups carry out a wider range of tasks. *The formerly divided tasks of the individual worker, then come back together in the group where peer pressure or collective control makes the group accountable for getting the work done.* But what does this mean for workers who work in smaller groups, and what influence can it have on design and use of information systems?

Issues for System Developers

I think that most readers would agree that computer supported cooperative work implies that we design systems that *support cooperative work*, not that computer systems can *create cooperative work*. But if our role as sytems developers is not to directly create cooperative work, we are still active participants in the process of designing future-use situations that could encourage cooperative work organization. So what then are our options as system developers and in what ways do forms of cooperation enhance the possibilities for workplace democracy?

Based on the historical analysis of work organization I would like to look at four aspects of work that directly effect current issues in workplace cooperation. These are: information flow; planning functions; control of the pace of work; and the concept of skill. While there are many other aspects of work that are in the process of changing, these four provide a useful focus for looking at new and contractory forms of work cooperation that could have a influence on workplace democracy. Certainly they present a challenge for system developers.

For I aruge that cooperative or group-based work could result in increased pressure if not placed in the context of a more democratically controlled workplace. Here, traditional bureaucractic-based systems development will be contrasted with user-oriented development and suggestions given for design considerations that move cooperative work in the direction of workplace democracy.

Information Flow. The majority of systems designed up through the current period reflect, I believe, bureaurcratic and hierarchial forms of authority and information flow. Most Management Information Systems, are a typical example of *top-down* information flow, where authority is maintained through limited access to a centralized data base. These sytems, as well as production planning and control systems, are characteristic of the late bureaucratic period of the sixties and seventies. Some would argue that their design was primarily influenced by the restrictions of mainframe technology, and while this design restriction was a factor, it is not the whole picture. Many network and personal computer based information systems are still designed under the basic principle that information flow is top-down and that authority rests at the top of the bureaucratic pyramid.

If, on the other hand, we look at current systems like electronic mail, that could support newer models of work organization, we can see more of an emphasis on *lateral flow* of information. People within and outside of an organization can communicate directly with each other without authorization from either a 'boss' or clearance through a data base. I would argue that lateral information flow is more conducive to cooperation, but that it doesn't necessarily enhance workplace democracy. An intriguing idea, from both a design and democracy perspective, is the notion of *bottom-up information flow* and the implications that this may have for the way people coordinate their activities. If, for example, insurance workers collected their day-to-day knowledge about case handling and used this to make decisions or change previous decisions, this might be an example of how information could flow up towards policy making.

Planning functions. As we have seen, bureaurcratic forms of work organization assume that planning is a management function. In information system design this is usually carried out though controlled

access to data bases. It is also deeply reflected in *rule-based* expert systems, that assume rules can be routinized much the way industrial labor was. The assumption that expert systems can be based on rules, is much the same as the idea concerning separation of conception from execution; both assume that the workplace can be 'cut and dried' according to preset rules.

Newer management styles that encompass forms of cooperate work allow for planning functions to be subsummed within groups. Thus information systems theory, today, allows for the distribution of information to decentralized data bases and access to a wider range of groups (and, in some cases, individuals). But these systems mainly allow for *coordination* between groups and management. Policy decisions are still taken at the top. Most system development projects, for example, are carried out according to deadlines and objectives that are set by higher levels of management. While systems analysts and user groups may work cooperatively in planning how they will execute the work plan, the overall policy has been set for them.

In traditional management terminology cooperation encourages *responsibility* within groups, but retains *authority* in higher management functions. *Coordination and responsibility* then, are useful dimensions for planning cooperative work, but issues of *group-based policy* and *authority* are steps toward workplace democracy. Obviously, information systems design can not create these conditions. Rather, the extent to which policy planning and authority are group-based should be noted and encouraged in the design process through active, and when need be, offensive participation (rather than defensive response) of all of the involved work groups.

Control of the pace of work. Traditional bureaucratic planning built technical control of work processes into the system. Factory production systems were a classic example of this, but the impact has extended far into information systems design, where large organizations use information systems as ways of monitoring and measuring workers. Cooperative work practices, particularly those that are based on Personal Systems attempt to avoid this obvious mechanism of worker control. But, as noted in the preceeding section, the pace of work is still monitored--this time through peer pressure.

There are many examples where professional workers, like researchers and systems developers find themselves working longer hours, or pushing themselves harder, because the 'group' has set the deadline, and professional and group responsibility calls for it. What

reader has not experienced this? Yet the same is true for other groups of workers where, lacking the comparative 'freedom' of professionals, they, seemingly, push themselves toward increased output. In a study by the U. S. Office of Technology Assessment [25], secretaries, clerical workers and case workers were all found to have increased expectations when working with information systems. Increased expectations, like creating more attractive documents, handling more cases and producing more and longer documents, were carried out through peer control.

Simply designing systems that don't overtly monitor workers does not solve this problem. Indeed worker and managerial expectations of information systems exacerbate the issue, perhaps giving peer pressure more power than system monitoring ever had. The early worker participation projects in Scandinavia considered the issue of control. While they certainly could not resolve the contradictions inherent in the situation, they advised that worker participation models that encouraged increased worker knowledge about the system and allowed workers to veto the introduction of a system, were necessary considerations. And as suggested by the 'collective resource approach', the need for system developers to be active participants in the *learning process of workers*, and simultaneously be active participants *in learning about the work process*. is still necessary for designing towards workplace democracy.[10]

Skill. A central issue is the fact that most systems are simply not designed for small groups of people working cooperatively, but rather for managers in search of systems that meet broader organizational objectives. Whether or not one agrees with the long-term effects of Braverman's deskilling thesis, it is obvious that the dominant tendency in bureaucratic information systems design was one where systems were built to be as 'idiot proof' as possible. Even turn-key systems for micro computers repeated this theme by creating applications where users needed as little knowledge or skill as possible to carry out their tasks. And as we have seen, division of labor in offices up to the eighties attempted to recreate the model of centralized and rationalized factory production.

During the eighties the issue of *tacit knowledge* has received more attention as designers realize that work practice is more than the routine flow of information. Discussions of tacit knowledge or skill are directly related to the issue of user-centered system design, for studies have shown that workers, regardless of their formal job descriptions, rely a great deal on informal communication for problem-solving and

creating knowledge[21,29]. Thus information system design that takes informal communication and group relationships into account is a step toward better user-centered, and hopefully human-oriented systems. It sees the issue of skill as broader than a narrow definition of describable tasks.

But looking at cooperative work in the context of workplace democracy, I believe that there are problems with the concept of tacit skill. First, tacit skill should not be seen as something that has just come along with the information age. Workers have always had to rely on their common sense, abstract thinking and informal communication patterns to get work done. This was as important in the industrial workplace as it is today [22]. Secondly, exposing tacit skill to management reflection can make some groups of workers vulnerable to new waves of rationalization and job cuts. While most progressive designers and researchers would argue that they never intend this to happen, the simple act of studying working practice lays bare many secrets and activities that may best be left within the workers domain.

It seems reasonable to argue that computer systems should *support* the use of tacit skill, but this should be seen within the framework of existing power relations in an organization. Designing computer systems, in this context, can be seen as something like the confidential relationship between lawyer and client. Except that in the lawyer-client relationship the lawyer holds the professional responsibility, while in the democratic design situation the worker-client needs to actively participate in the process. How then, to be aware of issues of organizational power and conflict and design systems that truely support cooperative work and at the same time lead to workplace democracy? As Ehn puts it, "Designing for skill *and* democracy, not one without the other--that is the challenge to work-oriented design" [9, p.468]

Much literature on skill in the past decade has been concerned with arugments about 'upgrading','deskilling' and polarization of tasks[1]. But rather than get caught up in the 'deskilling versus upgrading' arguments, I think that it is more useful to see that skills that were thought of as *individual properties are increasingly being transfered to group control* . Consider the following : a'cluster' of secretaries may handle a range of documents for a work group; a group of customer-relations specialists may handle the complaints of policy holders with an insurance company; or a group of tax assessors may review tax cases from beginning to end[12].

[1] It is beyond the scope of this article to go into the discussions, often referred to as the 'Post-Braverman debates'. Some examples of this literature,in the form of edited collections include S. Wood (ed), *The Degradation of Work?*(Hutchinson, London, 1982); A. Zimbalist (ed) *Case Studies in the Labor Process*, (Monthly Review, N. Y. 1979), and in Swedish, G. Aronsoon (ed), *Arbetets Krav och Mansklig Utveckling* (Prisma, Stocholm, 1983)

The notion of collective skill, supplemented with informal group relations and tacit knowledge, helps us focus on design situations where we could encourage workers to interpret and describe their own activities rather than relying on professional opinions of outsiders like systems developers and researchers. In order to move in this direction, we need a rather extensive tool box of techniques that workers, themselves, can experiment with to better understand their own work[14]. And of course, we, the 'professional outsiders' would need to reflect on our knowledge and experience to heighten our awareness of conflicts within organizational power.

Concluding Remarks

To retrace the steps taken in the beginning of this article, we can see that *user participation was a necessary but not sufficient condition* to build better systems, just as better systems are a necessary, but certainly not sufficient base *to encourage democracy in the workplace*.

I think that similar things can be said about cooperative work, based on the historical analysis taken in this paper. That is that, computer support designed for cooperative work can help build better *user-centered* systems, but not necessarily move us in the direction of *workplace democracy*.

On a more concrete level, the historical view of work organization presented here, outlines how cooperative work can be seen as an emerging work form. Within the broad range of concepts grouped under the 'cooperative work' banner, we can see that it differs from bureaucratic-based, centralized work organization where industrial-style division of labor was a dominant theme. From a Labor Process approach the emergence of cooperative work represents a coming together of management strategies to control work processes and worker resistance in this period of increased competition.

Aspects of cooperative work such as group coordination and group-based skill can mean a step away from the deskilled work organizations of the previous period. But concepts of work cooperation have existed in pre-industrial and industrial settings. What is significant

from a design perspective, and particularly from the perspective of design for workplace democracy, is the dynamic possibilities and problems arising within the characteristics of the current period.

From a design standpoint, if we are to move cooperative work in the direction of workplace democracy the following need to be seriously considered:
1) shifting **information flow** from top-down to lateral patterns and to the possibility of bottom-up flow;
2) moving from rule-based and bureaucratic **planning functions** to situations where groups take on coordination and authority for planning;
3) encouraging on-going learning processes where the **pace of work** isn't intensified with cooperative control; and
4) understanding that tacit **skill** and collective skill is a double-edged sword that can take on different uses depending on the power relations within an organization.

I began by discussing some of the issues raised within the Scandinavian systems tradition. While that tradition, with its focus on workplace democracy, was developed explicitly for trade unions, I believe that it can be usefully considered in non union situations. Indeed cooperative work organization raises the possibility of collective participation through group activity. And these forms of participation may be more conducive to democracy than those that came about within the older, top-down bureaucratic trade unions. This may, in fact, be a particular advantage in the American situation.

In this article I have tried to focus on the more positive aspects of cooperative work organization. But I would like to close with a rather serious reminder that while we are intrigued with the possibilities offered by a cooperative view of work, the majority of jobs remain within a traditional definition of bureaucratically organized, rationalized work[27]. Jobs where workers have little chance for influencing work activity. This means that the majority of computer systems are currently used to support, for the lack of a better word, 'non-cooperative' work.

Author's Note

This article was written while I was on leave from the Computer Information Systems Department, LaGuardia Community College, City University of New York. It tries to combine my American experiences with those of my stay at the Computer Science Deparment at Aarhus University, Denmark. I want to thank my collegeaus on both sides of the Atlantic for their cooperative support, but of course, any misunderstandings and errors are purely my own.

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