Worker Autonomy and the Drama of Digital Networks in Organizations

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This essay considers the impact of digital networks in organizations on worker autonomy. Worker autonomy, the control that workers have over their own work situation, is claimed in this essay to be a key determinant for the quality of work, as well as an important moral goal. Digital networks pose significant threats to worker autonomy as well as opportunities for its enhancement. In this essay, the character and importance of worker autonomy is assessed, and it is assessed how digital networks can and do impact worker autonomy. The notion of worker autonomy is analyzed and evaluated for its importance and moral relevance. It is then considered how digital networks both threaten worker autonomy and offer opportunities for its enhancement. Three major opportunities (enhanced communicative powers, increased informedness, teleworking) and threats (electronic monitoring, task prestructuring, and dependency creation are discussed and analyzed. Finally, the dynamics that determine the impact on worker autonomy of the introduction of a digital network in organizations are investigated. A particular model for analyzing these dynamics and their impacts, Bryan Pfaffenberger's model of a technological drama. It will be illustrated how this model illuminates these dynamics by analyzing them as a dialectic of strategies of technological regularization by design constituencies and technological adjustment by impact constituencies. It will also be assessed what role network design has in this process.

Keywords: worker autonomy; digital networks; technological dramas; IT in organizations

There is now a vast literature on the impact of computerization and computer networking on work. Although part of this literature considers impacts on the quality of work, considering issues like deskilling, centralization or decentralization of

decision-making, teleworking, and electronic monitoring, few studies look systematically at one major determinant for the quality of work: worker autonomy. Worker autonomy, the control that workers have over their own work situation, is claimed in this essay to be a key determinant for the quality of work, as well as an important moral goal. Digital networks, including computer networks and computerized telecommunications networks, pose significant threats to worker autonomy as well as opportunities for its enhancement. In this essay, the character and importance of worker autonomy is assessed, and it is assessed how digital networks can and do impact worker autonomy. The structure of the essay is as follows. In section 1, I consider definitions of worker autonomy and argue for its importance. In section 2, I consider how digital networks both threaten worker autonomy and offer opportunities for its enhancement. In section 3, finally, I consider the dynamics that determine the impact on worker autonomy of the introduction of a digital network in organizations. I will introduce a particular model for analyzing such dynamics and their impacts, Bryan Pfaffenberger's model of a technological drama, and I will illustrate how this model can be used to analyze the impacts of digital networks on worker autonomy.

1 Worker Autonomy

Worker autonomy, or *job autonomy*, is the control that workers have over their own work situation. Worker autonomy is the topic of investigation of job autonomy studies (e.g., Breaugh, 1985; De Jonge, 1995; Hackman & Oldham, 1980), in which methods of assessment of worker autonomy are devised and applied, and the importance of worker autonomy for parameters like productivity, well being and health is evaluated. An influential definition of job autonomy in this field, formulated by Hackman and Oldham, defines it as "the degree to which the job provides substantial freedom, independence and discretion in scheduling the work and in determining the procedures to be used in carrying it out." (1975, p. 162). De Jonge, following up on this definition, has defined job autonomy more specifically as "the worker's self-determination, discretion or freedom, inherent in the job, to determine several task elements." (1995, p.13). *Task elements* refer to aspects of tasks such as the method of working, the pace of work, procedures, scheduling, work criteria, work goals, the workplace, work evaluation, working hours, kind of work and amount of work. Worker autonomy is then realized to the degree that employees have control over some or all of these different task elements.

Why should worker autonomy be seen as a desirable goal? Workers themselves find it desirable, as they often find it very important to have control over task elements in their work. Research has shown, moreover, that job autonomy is an important determinant of employee's well being and health (e.g., Johansson and Aronsson, 1991; Kahn and Byosiere, 1994). There is also evidence that serious limitations on job autonomy may decrease job performance, both qualitatively and quantitatively, because such limitations have a negative effect on stress levels, health and well-being of employees, and also because they tend to decrease work motivation, reduce flexibility and creativity, and create resistance (e.g., Karasek and Theorell, 1990).

Philosophically, job autonomy is important because autonomy in general is a desirable goal for individuals, and employees with no job autonomy are not autonomous individuals while at work. The ideal of individual autonomy has long been defended as fundamental to human flourishing and self-development (e.g., Dworkin, 1988; Hill, 1991). Individual autonomy is often defined as self-governance, that is, the ability to construct one's own goals and values, and to have the freedom to make choices and plans and act in ways that are believed by one to help achieve these goals and promote these values. Individual autonomy is often defended as important because such self-governance is required for self-realization, that is, it is a freedom one must have in order to create a life that is experienced by oneself as meaningful and fulfilling. As Dworkin has pointed out, moreover, individual autonomy may be a requirement for a conception of human beings as equals. If some human beings are not autonomous, they cannot give equal input into moral principles that are aimed to reflect individual preferences, and hence they cannot function as equals in moral life (1988, p. 30-31).

The philosophical ideal of autonomy implies that workers should be able to find room in their work to realize their own goals and promote their own values. They should have the freedom to contribute to the overall goals of the organization as well as to their own legitimate personal goals through plans, decisions and actions that they can give shape to themselves. This may imply that they should be able to give shape to the *goals* of the organization they work for, and thereby to the relevant evaluation criteria of the job they do. However, the possibility to shape organization and job goals will be limited, in most cases, because most workers are employees of an employer, who hires them and thereby has the right shape these goals to a large extent. Even if employees only have limited autonomy in shaping job goals and organization goals, however, they may be granted significant autonomy to determine the *means* by which they will realize their job goals (that is, task elements like method of working, work

procedures and work scheduling). This may also include a degree of autonomy for workers to combine job goals with personal goals, such as networking, personal learning, staying in touch with their home base, and socializing with co-workers, and to be allowed to make limited use of organization time and resources to reach such goals.

2 Digital Networks and Worker Autonomy: Opportunities and Threats

Digital networks offer both new opportunities for and new threats to worker autonomy. Which of these opportunities and threats are realized as actual harms and benefits depends not primarily on the technology in question, but to a large extent on the prior structure of the organization in which it is embedded, as well as the specific responses to it by the various involved actors. In this section, I will identify the major opportunities and threats posed to worker autonomy by digital networks. I will be very cautious however, about making controversial empirical claims concerning actual impact on worker autonomy. First, I will consider three major opportunities that networks offer for the enhancement of worker autonomy. They are enhanced communicative powers, improved informedness, and teleworking:

(1) *Enhanced communicative powers*. Digital networks may offer employees better communication lines with management and with co-workers. E-mail, for instance, is a medium that has lowered the threshold for many employees to communicate with upper management. E-mail also enables employees to quickly spread ideas and information throughout the organization, through postings directed at whole divisions, or to the whole organization. E-mail makes it easier for employees to communicate with others in remote divisions, to exchange work, and to make joint plans. E-mail moreover makes it easier to communicate with parties outside the organization. Networks also enable cyberspace meetings, which are brainstorming sessions over the network, in which participants key ideas and suggestions into their computers, and often may remain anonymous. In cyberspace meetings, employees low in the corporate hierarchy can have input that is more easily judged on its own merit rather than on the status of the sender. The enhanced communicative powers offered by digital networks, then, may help employees to reach out more to other members in the organization, including management, to influence them and be part of decision-making processes (Sproull and Kiesler, 1991).

(2) *Improved informedness.* Digital networks may not only help workers to exert influence through communication, they may also help them to be better informed about

facts relevant to their job and to their position in the organization. There are several ways in which they may help workers to be better informed. They may make it easier for workers to have access to all kinds of company documents, and to have a more transparent perception of the way the organization works. They also make it easier for workers to be informed by communicating with other members in the organization, even those in remote locations. They may also have better access to sources of information outside the organization, for example by using the World Wide Web, or gain information relevant to their position in the organization or relevant to their job performance by communicating with actors outside the organization.

Enhanced communicative powers and improved informedness may in themselves empower workers and enhance job autonomy by offering workers better opportunities to control aspects of their work. In addition, they may also compel employers to give workers more decision-making authority. After all, if workers are well-informed about the wider context of their work and are in a good position to contact and negotiate with relevant parties both inside and outside the organization, then delegating decision-making authority to them may be a good way to increase the responsiveness, effectiveness and efficiency of the organization.

(3) *Teleworking*. Teleworking is, in most cases, working for an employer at a computer-equipped office in the employee's home. Teleworking is made possible by the computer, which provides a powerful tool for work at home, and by digital networks that maintain communication links between the home office and the main office. Teleworking tends to enhance the autonomy of employees by giving them greater control over their work situation. Teleworking takes away the direct supervision by management and co-workers that exists in normal office work. It usually allows employees to have great control over the physical setup of the workplace, the pace of work, the scheduling of tasks, the method of working, and even the place of work. Control over the pace, place and scheduling of work makes it possible to combine work with home duties and allows parents to combine work with child care. Because employees have less control over the work situation, employees will be evaluated more on results than on the procedures they have followed. It should be emphasized, however, that many of these increases in job autonomy will only result in teleworking situations in which no extensive electronic monitoring takes place.

Next to opportunities for the enhancements of worker autonomy, networks also pose new threats. I will now identify three major threats, as based on discussion in (Brey, forthcoming). They are *electronic monitoring, task prestructuring,* and *dependency creation*.

(4) *Electronic monitoring*. Digital networks can be used by supervisors and managers to monitor employees and their work. Baase (1997, p. 275-81) distinguishes four major types of electronic employee monitoring. First, networks may be used to quantitatively monitor details of performance, such as keystrokes or time spent on customer service calls. Second, networks may be used for the physical surveillance of the movements and activities of employees. This is possible when employees use electronic identification badges that serve as door keys or even broadcast the employee's exact location. Third, telephone networks may be used to monitor customer calls. This type of monitoring applies particularly to telephone customer service workers. Supervisors may listen in to calls to check whether they are handled accurately, efficiently, and courteously. Fourth, networks may be used to monitor employee e-mail, voice mail, and files. In virtually all networks, the system manager can access anything on the system. Even individual hard disks can often be accessed through the network by the system manager. Employers may then, with help of the system operator, monitor or search the e-mail, voice mail, or computer files of their employees.

There are two ways in which electronic monitoring may reduce worker autonomy. First, it may reduce autonomy by giving employers greater control over task elements in their employees' work, such as the pace of work and the method of working (Barker and Downing, 1985). This greater control may result in corrective actions by supervisors to modify the way task elements are handled by employees. It may also cause employees to handle task elements in a way that is believed by them to conform to criteria expected by their supervisors rather than to their own criteria.

There is also a more profound way in which electronic monitoring may reduce worker autonomy. Monitoring may reduce what Van den Hoven (1995, p. 182) has called *moral autonomy*, that is, the control that individuals have over their own self-concept, and their moral identity. When persons are subjected to the gaze of others, then they may feel subjected to what they infer to be the judgment of others, and may experience an element of determination from without. They feel that even in their private sphere, their identity is partially fixed by the judgment of others. This may result in a conception of the self as dependent and dehumanized. Indeed, workers who are subjected to intense computer surveillance complain that it "causes a loss of a sense of dignity and independence and destroys confidence. They feel treated like machines, not people." (Baase, 1997, p. 276).

(5) *Task prestructuring*: Task prestructuring is the process by which computer systems predefine how tasks are to be handled, and impose limits to the control that

employers have over aspects of the task. A system with a high level of task prestructuring forces the employee to conform to the limitations posed by the system in working on a particular tasks, and hence reduces their work autonomy. Task prestructuring may be intentional or unintentional. When it is intentional, the software in use has been intentionally designed to rigidly scripts certain task elements, or has been acquired because it does this. Rigid scripts may be programmed to ensure that employees follow certain procedures or steps, to avoid certain types of errors, to standardize performance, to enforce certain divisions of labor, to facilitate the evaluation of work, and to limit independent decision-making by employees.

Two examples will serve to illustrate intentional task prestructuring. Wagner (1996) reports a case about a computer network in a hospital, which is used by nurses to log significant actions taken regarding patients. The relevant software for this is designed for individual entries only, making any action taken the responsibility of a single nurse. Wagner reports how nurses complain that this system does not support sharing of responsibilities and collective action, and individualizes responsibility and care for patients. In this way, the system reduces work autonomy for nurses by limiting choice about how work is done and how responsibilities are assigned. Hofmann (1995) discusses the WangWriter and Displaywriter, dedicated word-processing systems used in the early eighties. These systems, aimed at secretaries, simulated writing as a series of selection procedures. Starting with a main menu, users had to move to submenus until they found the right instruction. This menu-guided interface hence imposed a rigid sequential order on the operator. It enforced its own hierarchy on the user's goal, that could not be bypassed by users as they gained more experience. The WangWriter moreover did not permit users to copy, rename, or delete files. Such commands could only be executed outside the text editor, at the system level, to which writers were not necessarily given access. In this way, these systems allowed their users only limited control over many elements of the writing task.

Whereas the WangWriter and Displaywriter were intentionally designed to prestructure word processing so as to make it a foolproof activity, many computer systems have similar limitations that are unintentional. Unintentional task prestructuring is a consequence of poor design, or what Donald Norman (1993) has called *machine-centered design*. Norman claims that a well-designed computer system is experienced by its users as a natural extension of themselves that allows them to creatively put their ideas into action. A poorly designed system, in contrast, is experienced as an autonomous agent that is inflexible and imposes its own logic on the user. Norman calls computer systems in the first category human-centered, and

systems in the second class machine-centered. He argues that many computer systems suffer from a machine-centered approach to design that puts their 'needs' and idiosyncrasies before those of human beings. Computer systems are often designed around a machine logic that requires precision, orderliness, absence of error, and instructions that are meaningful for the computer but not for the user, and have little tolerance for the fact that users do make errors, and that they are often disorganized and forgetful. Computer systems also often fail to give users control over important system parameters. As a consequence, they may end up giving their users only limited work autonomy.

(6) *Dependency creation*. The introduction of new computer systems or software may bring it about that employees become dependent on third parties, such as system operators and managers. The use of computer systems may make employees dependent on others in at least two ways. First, the technical skills required for the operation and maintenance of the system may not be within the competence of the employee, so that the employee constantly has to appeal for help to the system manager or to others with technological competence. This may be the case for complex software packages, for error-prone software, and for functions that are only accessible at the system level, such as file-related commands in the WangWriter. Not in full control of the tools they work with, users constantly have to appeal to a guiding hand, and consequently experience reduced job autonomy. Second, computer systems may be used to transfer decision-making powers away from employees to their managers. For example, Johnson (1994: 156) considers a hypothetical case in which a large company with many outlets computerizes its inventory control system. Cash register information from individual stores is now sent to a main system operated at the company's headquarters, which keeps track of supplies at every store and decides on when and what to send to each store. As a result, store managers of individual stores no longer get to make decisions about their inventory.

3 Technological Dramas and the Politics of Digital Networks

There has been controversy over the question whether networks benefit workers and enhance their autonomy, or whether they work to take away worker autonomy. From the preceding discussion, it should be clear that network technology is sufficiently multifaceted to support either direction: it offers both serious opportunities for and threats to worker autonomy. Indeed, studies show that there are trends in both

directions. In some organizations, work has become more automated and less autonomous, whereas in others, worker autonomy seems to have increased (Garson, 1995; George and King, 1991; Kling, 1996; Zuboff, 1988). It is difficult to generalize from these studies to assess the net effect of networks on worker autonomy. Instead of asking this question, it may be more useful to ask why it is it that in some organizations, networks seem to enhance worker autonomy, whereas in others, they seems to have a negative impact on worker autonomy. In other words, how can effects of newly introduced networks in organizations on worker autonomy be assessed, explained and even predicted? Previously, I suggested that these effects are a product of the particular design of the network, the prior structure of the organization, and the dynamics of particular actor responses that take place within this setting. What is needed, then, is a better understanding of the interactions between these elements, that is, of the dynamics of the reconstitution of worker autonomy in organizations as the result of the introduction of network technology.

In the remainder of essay, I will present a model for the understanding of such dynamics, and illustrate how it may be applied to particular cases. This model is a slightly modified and extended version of a model presented by Bryan Pfaffenberger (1988, 1992). Pfaffenberger has proposed that the political consequences of the introduction of a new technological artifact or system in a social setting are the outcome of a *technological drama*, which is a battle between different actors to determine the meaning and implications of the technology. This battle is analyzed metaphorically by Pfaffenberger as a 'discourse,' in which actors produce 'statements' and 'counterstatements' to persuade each other about a particular way of 'reading' the technology, that is, of a particular way of interpreting and using the technology. A technological drama involves at least two major parties. They include a *design constituency*, a group of actors who are involved in creating, appropriating, or modifying a technological artifact or system with the intent to achieve certain politically sensitive goals, and an *impact constituency*, a group of actors who experience political losses when the new artifact or system is introduced. Loss of job autonomy can be one such political loss.

In organizations, the employer is usually a powerful actor within the design constituency, as the employer usually plays a major role in the introduction of the new technology into the organization, in advocating a particular conception of its significance and in setting initial standards for its use. The impact constituency usually consists of the employees, or subgroups of employees. The interests of the employer are usually to ensure higher productivity and economic gains, and may also include

gaining greater control over the workforce. These are goals to which the new technology is supposed to contribute. The interests of the employee are usually to retain autonomous in his or her work, and may or may not include an interest in performing well on the job (whether relative to standards set by herself or relative to the standards set by the employer). These interests of employers and employees may conflict (e.g., the interest of workers in work autonomy conflicts with the interest of some employers in retaining control over aspects of the work of their employees, and in case workers perform less well if they are not intensely supervised, may also conflict with the interest of employers in high productivity and economic gains). They may also coincide (e.g., the interest of employees to perform well coincides with the interest of the employer to maintain high productivity).

A technological drama usually has the following structure. First, the design constituency engages in a process of *technological regularization*, in which it tries to further particular interests through the introduction of the new artifact or system and accompanying actions to fabricate a *social context* for this technology. This social context consists of social structure, ritual behaviors, procedures, and prevailing concepts and ideas that jointly determine how the technology is *interpreted and used*. Design constituencies will try to shape this social context by various means, such as manuals and public statements about the technology, policies for its proper use, training sessions, and interventions on the job. Impact constituencies respond to regularization by acts of *technological adjustment*. Technological adjustments are strategies in which impact constituencies engage to compensate for their loss of self-esteem, social prestige or social power caused by the introduction of the technology. Technological adjustments include attempts to modify aspects the social context fabricated by the design constituency, or even of the technology itself. Acts of technological adjustment may result in a new, intensified round of technological regularization by the design constituency, in which it tries to modify aspects of the technology or its fabricated social context so as to counter technological adjustment strategies. This may again provoke new acts of technological adjustment. Technological dramas end when the different involved actors settle into routines and accept the technology together with its fabricated social context. They may also end with a (partial) rejection of the technology.

I will now try to show how Pfaffenberger's model of a technological drama can be used to capture the dynamics involved in the introduction and use of networks in organizations and their consequences for worker autonomy. To illustrate, I will describe acts of technological regularization and adjustment that relate to electronic monitoring. For one type of monitoring, monitoring of details of performance like the

duration of telephone calls or the number of keystrokes per minute, it is often required that a separate monitoring system is installed. The motivation for the employer to install the system will normally be to increase performance and cut costs. The process of technological regularization will consists of the installation of the monitoring system, along with the design of procedures for its proper use by management and new procedures for the evaluation of employee performance, and communication to employees about these procedures, about the reasons management has for installing the system, and about its anticipated implications. This is assuming that workers are properly informed about monitoring. For some types of monitoring, such as monitoring of e-mail, voice mail and files, it is sometimes chosen to do monitoring behind the backs of employees so as not to generate resistance.

In an actual case, reported in Spinello (1997, p. 64-68), a large travel agency, the Topper agency, worked together with Rockwell International to install a monitoring system. The system was installed because it was believed to be instrumental in cutting the length of telephone calls used for making airline reservations. It was estimated that a cut of 1 second per call would save the agency $ 1 million in labor costs per year. Regularization measures in this case involved installing the system, devising procedures for its use by management, and informing employees about the system and the way it would be used. Employees were informed that the standard time for completing a simple airline reservation and processing the tickets was 108 seconds. They were also informed about standard time limits for bathroom use, breaks, and lunch, and were told that management could listen in on employee phone calls to see if instructions for handling calls were followed. Regularization also included attempts to justify the new system to employees and define its meaning for the corporation and for them. For example, Chairman William Topper said about the system: "No company can succeed unless it changes with new technology, and this means that the employees must learn to adapt. We need the technology to stay competitive, to maximize profits, and to deliver quality service to our customers with greater efficiency." (Quoted in Spinello (1997, p. 67)). This statement does not just defend the use of the system by the company, it may actually work to modify the self-perceived interests of employees by making them believe that if they want to keep their job and if they want to do a good job, the system is necessary.

There may be employees who do not feel negatively impacted by autonomy-reducing measures like monitoring, and will quietly adapt to the new work regime it brings along. Employees who feel negatively impacted, however, will respond to monitoring by processes of technological adjustment, in which they try to compensate

for losses in self-esteem or social power. Pfaffenberger distinguishes three major strategies of technological adjustment: countersignification, counterappropriation, and counterdelegation, which I will now discuss in order.

Countersignification is the substitution by impact constituencies of a more favorable frame of meaning for a technology, in which their self-esteem does not suffer as much, and which may be used to legitimize resistance to the technology. It is an attempt to conceptualize and put into words the negative experiences provoked by the technology, experiences that are not adequately accounted for in the frame of meaning put forward by the design constituency. To arrive at such alternative conceptualizations, impact constituencies may make us of contradictions, ambiguities, and inconsistencies in the frame of meaning presented by the design constituency. Countersignification can sometimes be a mere coping strategy, in which the alternative frame of meaning is used to maintain a positive self-image in spite of the negative effects of the technology on one's social status and social power. It can also be used, however, to legitimate resistance to the technology and its fabricated social context.

In the Topper case, countersignification involved conceptualizations of the negative effects of the monitoring system on employee well being, quality of work, and self-confidence, and voiced doubts concerning the morality and effectiveness of the system. Employees claimed that the system caused them stress and anxiety. One employee claimed that the system functioned like a 'digitized whip to make us work faster,' and claimed 'It produces incredible stress and I'm afraid sometimes that I'm going to crack under the strain.' Another employee claimed: 'This new technology is terrible! It invades my privacy - this company knows everything I do even how long I spend in the bathroom.' The same employee claimed that clients would disagree with the system, as they would not liked being listened to by third parties. It was also claimed that the system would reduce the quality of work: '[W]e are under constant pressure to get the call over with and move on to the next customer. It makes it real difficult sometimes to be courteous and thorough with each of our clients." (1997, p. 66-7). All these are examples of countersignification: They are meanings assigned to the technology and its fabricated social context that highlight negative personal experiences and reasons against its current use that are obscured or denied in the framework of meaning offered in technological regularization.

A second adjustment strategy, *counterappropriation*, is defined by Pfaffenberger as the effort by an impact constituency to try to get access to an artifact or system from which it has been excluded. I believe that this definition is unnecessarily restrictive, however, because in many cases of technological regularization the problem for impact

constituencies is not that they are excluded from using an artifact or system, but rather that the artifact or system is used or regulated in a particular way that is against their interests. Counterappropriation is an instance of a more general type of strategy, which I will call *counterstructuration*, which are attempts by impact constituencies to counter the adverse impacts of a technological artifact or system by modifying the social context in which it is used. This may involve attempts to change rules, policies, regulations and standard practices surrounding the use of the artifact or system. These are attempts at changing the system of power and authority surrounding the technology that determines which uses are legitimate or acceptable, and hence who can do what with the technology. Counterstructuration even includes attempts to have the technology be removed.

The counterstructuration measures taken by the Topper employees initially consisted of protests to management about aspects of the system. Employees particularly objected to the use of the system to listen in on calls. In the end, a petition was drawn up, signed by 75 percent of employees, that registered all complaints and requested that the monitoring system be removed. A more customary counterstructuration action would have been for employees to negotiate with management about rules and policies for use of the system. The Topper employees might, for example, have proposed particular monitoring guidelines, such as those advocated by worker organizations, that would reduce the adverse impacts of monitoring on workers to an acceptable minimum (Baase, 1997, p. 277-8). Another method of counterstructuration is the marginalization of a technology in work practices. Employees may simply not use the technology, and do their work in ways that do not depend on the technology. For example, it was found in a survey of the use of hospital information systems in 23 hospitals that only 20 % of physicians used the systems (Jay and Anderson, 1982).

Counterdelegation, finally, is a strategy aimed at subverting coercive functions imposed by an artifact or system. Counterdelegation involves the technical modification of artifacts or system functions, or it may, with information systems, include attempts to 'deceive' the system. Zuboff reports a case of workers who subverted a computer performance-tracking system by getting a computer password, logging on to the system, and changing a performance-rating multiplier so that the system always rated their performance as excellent (1988, p. 353). Another example is the practice in some word-processing pools subjected to performance monitoring to keep pressing the space bar when taking a break, as the system cannot distinguish purposive from random typing (Pfaffenberger, 1992, p. 303).

Pfaffenberger's model of a technological drama is aimed to apply to situations in which technological regularization threatens the interests of one or more impact constituencies. However, new technologies do not only bring new threats to impact constituencies, they also bring new opportunities. Perception of such opportunities by impact constituencies may also lead to strategies of technological adjustment, that are not aimed at countering a threat, but at seizing an opportunity. Many employees are recognizing the potential of networks to make them more informed and enhance their communicative powers, and to hence enhance their job autonomy. They are responding to these opportunities by using the technology to this purpose. This may sometimes require attempts to change aspects of the social context of the technology, or even the technology itself. Such actions may create new impact constituencies, however, that may take counteractions. For example, Zuboff reports a case of a company in which 130 professional women used information technology to form a private women's conference. Male managers felt threatened, and upper managers discouraged woman from participating. Soon, many participants dropped out (Zuboff, 1988, p. 382-3).

In a third type of technological drama, there is no is no major oppositions between design constituencies and impact constituencies, because the new technology or application is perceived as beneficial by all parties in the organization. In this case, actors do not normally engage in opposing strategies, but cooperate in order to create *win-win situations*. Digital networks help create win-win situations when they, together with a manufactured social context, increase worker autonomy in such a way that worker productivity and the effectiveness of the organization improve. There is evidence that such win-win situations are being created in many organizations. As they increase in size, many organizations are facing the problem that hierarchical procedures of decision making may hinder their competitiveness. They thus find it in their interest to delegate decision-making authority to lower-ranked employees in the organization. As Garson puts it, "Instant availability of information is turning hierarchical organization into a liability. Rather, in a competitive world, strategic advantage goes to forms and agencies which can take advantage of multidisciplinary problem-oriented teams that can exploit technological opportunities as they occur." (1995, p. 72-3). It should be added, however, that such decentralization of decision-making will not always enhance worker autonomy. There are also instances of pseudo-decentralization, in which decision-making is delegated to employees, but employees are seriously constrained by strict rules and procedures, monitoring, and computer software that prestructures their work.

It should be observed, however, that applications of networks that reduce worker autonomy often generate *lose-lose situations*: Worker autonomy is diminished, and performance worsens. Reducing worker autonomy may create a lose-lose situation when it generates resistance, affects mental and physical health, and reduces job motivation, when it results in work evaluations that emphasize quantitative aspects of performance, and when it delegates choices and decisions to management or computer systems that are best made by employees themselves. Electronic monitoring of telephone calls or keystrokes, for example, is documented to have such adverse effects: Office workers are more likely to suffer from stress and ill health, suffer from declining morale, and emphasize quantity of work over quality, and they often actively or passively resist monitoring systems (Grant, Higgins and Irving, 1988). Likewise, a computer system like the WangWriter will in the long run be an inefficient tool because it does not permit secretaries to develop the skills to become effective autonomous workers.

So far, I have emphasized the importance of manufactured social context and the various regularization and adjustment strategies in technological dramas, but I have said little about the importance of the particular design of a digital network. I have already noted in the previous section, however, how design may be important. The design of a network may result in task prestructuring or dependency creation, and of course for a network to be used for purposes like teleworking, electronic communication and electronic monitoring, it must be equipped with the right technical capabilities. Designs are rarely determining for particular positive or negative impacts, but rather create opportunities and constraints that help determine the form that technological dramas take. For instance, a network with a decentralized, ring-shaped topology and 'intelligent' workstations is more likely to enhance worker autonomy than a network with a centralized, star-shaped topology with centralized processing and 'dumb' workstations. Design hence matters, and choices in design may have political consequences (Sclove, 1995; Winner, 1980).

4 Conclusion

A significant degree of worker autonomy is desired by employees and defensible as a moral right. Moreover, it may often be against the interests of employers to reduce

worker autonomy, certainly in the current economic climate, because reduced job autonomy may deteriorate performance, and because the spread of information technology supports a selective decentralization of decision-making authority. Digital networks generate both opportunities for and threats to worker autonomy. Which of these opportunities and threats come to reality within a particular organization is determined by the technological drama that is played out in that organization when a digital network is introduced. The outcome of this technological drama depends on the prior structure of the organization, the design features of the network, and the particular strategies of regularization and adjustment in which different constituencies within the organization engage, as they try to give shape to both the technology and its social context.

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