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# TECHNOCRATIC TEAMWORK: MITIGATING POLARIZATION AND CULTURAL MARGINALIZATION IN AN ENGINEERING FIRM

Gerhard Daday and Beverly Burris

## INTRODUCTION

In recent decades, the ongoing restructuring of production in workplaces around the world has inspired a considerable body of empirical research and theoretical innovation. Some social scientists have concluded from their research that we are now seeing the emergence of a new type of postindustrial, postbureaucratic, post-Fordist workplace characterized by decentralization, reduction in hierarchy, upskilling of work, a new centrality of educated “knowledge” workers, and more flexible and democratic forms of work organization (Attewell, 1992; Bell, 1973; Block, 1990; Clegg, 1990; Hirschhorn, 1984; Piore & Sabel, 1984; Powell, forthcoming; Smith, 1997). Others, however, have found that some workplaces have remained highly centralized, with a polarized workforce and new types of stringent managerial control, especially of non-expert sector workers (Burris, 1993, 1998; Vallas, 1993; Vallas & Beck, 1996; Prechel, 1994; Hodson, 1988, 1996). How are we to reconcile these divergent conceptions of contemporary workplaces so as to better understand contemporary changes in work organizations?

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One important dimension of workplace restructuring which is central to the post-Fordist paradigm is the increased prevalence of various employee involvement practices, such as self-directed teams, quality circles, and job rotation. Clearly employee involvement has become more widespread in recent years; Lawler et al. (1992) found that whereas in 1987 only 23% of all Fortune 1,000 firms included even 20% of their employees in a participatory structure, by 1993, 43% did so; and Appelbaum and Batt (1994) found that 85% of these firms had at least one form of employee involvement by 1990 (see also Osterman, 1994; Smith, 1996, 1997; Vallas, 1999). The significance and implications of these innovations, however, are less clear. Some have found that worker teams may create new types of co-worker control (Barker, 1993; Graham, 1995; Smith, 1990) and intensification of work (Endo, 1994; Graham, 1995; Parker & Slaughter, 1988, 1994), whereas others have found that worker teams tend to have generally positive effects, such as more meaningful work and skill enhancement, especially for low-level workers (Smith, 1994; Hodson, in press).

Most of the existing research on teams has focused on small homogenous teams of blue-collar workers, such as automotive workers (Gottfried & Graham, 1993; Graham, 1995; Parker & Slaughter, 1988, 1994), and has therefore typically not explored the operation of larger teams composed of heterogenous types of workers. Powell (1990, forthcoming), however, analyzes the emergence of a new type of decentralized work organization centered around project teams and networks, an emergent form which he argues is most prevalent in knowledge-intensive sectors of the economy. In a similar vein, Barley and Orr (1997) and Stewart (1997) speak of "communities of practice" to describe new types of collaborative work centered around technical expertise and project-based work. An issue that has only begun to be explored concerns the question of how workers with varying types of expertise and occupational status interact in the context of these larger and more heterogenous project teams.

The present case study of a large engineering firm focuses on three distinct groups of workers: engineers, engineering technicians, and administrative assistants. All three groups are represented in various product development teams, and each group had different experiences with and attitudes towards teamwork. Through content analysis of corporate communications, interviews with ten workers in each group, and participant observation within the company, this study was designed to explore worker experiences of team work in the context of a technocratic organization. Only by analyzing how disparate groups of workers respond to post-Fordist organizational innovations can we reach a comprehensive understanding of contemporary changes in the workplace.

In what follows, we begin by reviewing some of the relevant recent literature on workplace reorganization and team work. Next, we describe the company studied and the main methodological dimensions of the case study. In the following section, we present the results from the interviews. We conclude with a discussion of the implications of our findings for an understanding of contemporary workplace restructuring.

## **FROM TECHNOCRACY TO TEAMWORK**

Burris (1993, 1998) has argued that in recent decades, a new organizational structure called technocracy has emerged within some workplaces, particularly those centered around advanced technology and computerization. In technocratic organizations, technical experts have the authority and control to make technical and business related decisions, and they are rewarded with special benefits (see also Hodson, 1988, 1996; Noyelle, 1987; Colclough & Tolbert, 1992; Zuboff, 1988) . Conversely, non-expert sector workers are typically not seen as important or valued members, and tend to be treated as marginal (Kunda, 1992; Hodson, 1988). Moreover, it is extremely difficult for non-expert employees to move from the non-expert to the expert sector in a technocracy because this division is maintained and legitimated by credential barriers, and job ladders are truncated or non-existent (Hodson, 1988; Noyelle, 1987; Burris, 1983a, b, 1993).

Kunda's (1992) ethnography of an engineering firm added qualitative depth to our understanding of technocratic workplaces. He explored the relationship between the expert sector (the engineers) and the corporation he names TECH, and demonstrated how the engineers received special rewards and privileges, such as autonomy and a relaxed work environment, in exchange for long work hours and devotion to the needs of the corporation: a normative control structure. Conversely, Kunda found that the clerical workers at TECH were marginal to the overall culture of the firm, received little or no special treatment, and experienced a very regulated and routinized work environment. These workers were primarily interested in remunerative rewards and benefits and had no interest in being a part of the dominant engineering culture. Kunda states that for clerical workers at TECH the "exchange is a standard one: employment, benefits, and guarantees in return for prescribed effort; beyond that, there is open detachment" (Kunda, 1992: 206).

Another feature of technocratic workplaces that has been documented is the correlation between the division into expert and non-expert sectors and gender inequality, with technical experts being primarily male and non-experts being

primarily female (Colclough & Tolbert, 1992; Glenn & Tolbert, 1987; Hodson, 1988; Noyelle, 1987; Smith, 1993). Hodson (1988: 267) found that: "lower-level production positions and poorly paid clerical positions are heavily female dominated in high-tech companies, while professional and managerial hierarchies are staffed entirely by Anglo males." Although women have entered high-tech fields such as computing in recent years (Wright, 1994), they are still in the minority; within the field of engineering, for instance, women currently account for less than 10% of the engineering population.

Hacker (1989, 1990) devoted much of her career to the study of women in the field of engineering and the ways in which they work as marginal members. The engineers in Hacker's studies described the field of engineering "as a male activity because of its hard, clear, predictable, abstract, technical, mathematical, and controlling" work environment (Hacker, 1989: 36). Perlow and Bailyn (1997) also present data which suggests that although "women bring their strongest qualities to the field of engineering, mainly their communication, team coordination, and interpersonal skills, these values were not considered to be important in a male-dominated, mathematical, and rational engineering culture" (Perlow & Bailyn, 1997: 240-241). McIlwee and Robinson (1992) also found that the workplace culture of engineers tends to be masculinist, and serves to disadvantage female engineers.

In recent years, it has become clear that workforce divisions in high-tech workplaces are more complex than the simple expert/non-expert polarity. Several researchers have recently focused attention on an intermediate group of employees within these corporations: technicians. Barley defines a technician as "a person qualified in the practical application of one of the sciences or mechanical arts, now especially: a person whose job it is to carry out practical work in a laboratory or to give assistance with technical equipment" (Barley, 1996: 409). Barley (1996) has found that technicians serve two primary roles: (1) they work as brokers; and (2) they work as buffers. Technicians work as brokers when they work on or fix problems pertaining to machinery, computers, or equipment that is foreign to other employees or coworkers. They work as buffers when they assist with the transfer of information between the practical application of a theory and the theory itself.

Technicians exist somewhere in the middle of the dichotomy between experts and non-experts. While the engineers are the technical experts and the clerical workers are the "marginal members," the non-experts, the engineering technicians are "intermediate members" and have been found to be conflicted in their loyalties (Creighton & Hodson, 1997). Given the increased prevalence and salience of technicians in the workforce, sociological research about their experiences and attitudes is clearly needed (see Barley & Orr, 1997).

In order to address certain limitations of technocratic workplaces, many firms have experimented with decentered and flexible organizational structures in recent years. The team-based organization is one of the most prevalent of these recent organizational innovations: “Currently, the most popular planned organizational change to a post-bureaucratic structure is the transformation of a traditional, hierarchically based organization to a flat confederation of concertively controlled self-managing teams” (Barker, 1993: 412–413). The team structure, along with other “employee involvement” practices, has become increasingly widespread in recent years (Applebaum & Batt, 1994; Lawler et al., 1992; Osterman, 1994; Smith, 1996, 1997), although the impact and significance of teamwork has not yet been fully explored. Worker responses to teaming environments have been found to vary dramatically, ranging from “cynicism and active resistance to grudging acceptance and even enthusiasm” (Hodson, 1995: 101; see also Smith, 1996). As Smith (1996) points out, most research on teamwork has focused on white, male, blue collar workers; clearly we need to study different types of workers and their experiences with team work.

Teaming structures were created to address “the inflexible hierarchical and bureaucratic constraints that stifle creativity and innovation” that were predominant in the old organizational structures (Barker, 1993: 413). Researchers have found teamwork to be a mixed blessing, however. In some cases, teams have been associated with work intensification and increased production pressures (Endo, 1994; Graham, 1995; Smith, 1996), what Parker and Slaughter (1988, 1994) call “management by stress.” Moreover, in a team environment, these production pressures have been found to be legitimated by the peer relationships of the teams: “the team encouraged workers to push themselves to the limit for ‘the good of the work group’” (Gottfried & Graham, 1993: 613). Graham (1995) found that three types of control were associated with the teams of automotive workers that she studied: internalized norms of one’s responsibility to the team, peer pressure from team members, and direct control by the team leader (when the first two forms of control were insufficient).

Barker (1993) coined the term *concertive control* to convey the complexity of control in a teaming work environment. Concertive control “represents a key shift in the locus of control from management to the workers themselves, who collaborate to develop the means of their own control” (Barker, 1993: 411). In his case study of a small manufacturing company called ISE Communications, Barker (1993) found that the teaming environment starts off with informal rules created by all the team members that are meant to keep order among the group. However, over time, these guidelines were intensified into rational and objective rules which strongly bind the members of the group to the organization. In

effect, each member of the self-managed team became a manager and supervisor, as they watched and critiqued the actions of those working around them. Barker suggests that this form of concertive control is more dangerous than the bureaucratic control of the past because concertive control is more covert: "employees are under and in the eyes of control" every day (Barker, 1993: 435). Similarly, Smith (1990) found that the apparent autonomy of team work and organizational decentralization may mask new types of coercion and "coercive autonomy," a Foucauldian situation of decentered and insidious power (see also, Smith, 1997). Another danger that has been found to be associated with the lessening of bureaucratic controls is the heightening of capricious and prejudicial behavior on the part of those in powerful positions; McIlwee and Robinson (1992) found that the erosion of bureaucratic controls in the engineering firms they studied was associated with the increased salience of a masculinist engineering culture which tended to marginalize female engineers.

Other researchers have found more positive effects of team structures. In a study of 108 workplace ethnographies, Hodson (1996, 1997, in press) found that employee involvement structures in general, and team environments in particular, are associated with "more meaningful, creative, and positive work life experiences" (in press: 143, draft manuscript). Smith (1990, 1996, 1997) found that flexible organizational structures such as teaming could benefit a corporation greatly because of the pooling of resources and decision making and the increased efficiency of collaboration. In these organizational structures, the corporation can come out looking like "the good guy" because it attempts to empower people and make them feel like members of a larger whole. Smith (1996) found that low-level workers, particularly women and non-whites, clearly value the team structure and see it as promoting their skill acquisition, cultural capital, and mobility prospects, even in the context of objectively limited mobility opportunities. As Stewart (1997: 95) points out, "learning happens in groups," and team environments therefore have the potential to expand a firm's intellectual capital through synergistic sharing of knowledge among workers with varying types of expertise.

Recent work on project teams and network organization in knowledge-intensive workplaces suggests that worker interdependence is becoming more important than ever before, and collaboration more integral to the process of work (Powell, 1990, forthcoming; Stark, forthcoming; Stewart, 1997). Is such collaboration smooth and conflict-free, or is it conflict-ridden and dominated by coercive autonomy? Powell (1990: 326) suggests that network arrangements will be likely to operate optimally in homogenous groups: "The more homogenous the group, the greater the trust, hence the easier it is to sustain network-like arrangements." If this is true, then how do heterogenous project teams operate,

teams in which dramatic differences in occupational status and pay exist? “How do people cope with relationships that are both collaborative and competitive . . .?” (Powell, 1990: 328).

Stark (forthcoming: 12) discusses the heterogeneity of project teams as both a strength and a challenge for emergent high-tech work organizations, what he calls “heterarchies:”

The capacity for self-redefinition is grounded in the organizational heterogeneity that characterizes heterarchies. Heterarchies are complex adaptive systems because they interweave a multiplicity of organizing principles. . . . The challenge of a new media firm, for example, is to create a sufficiently common culture to facilitate communication among the designers, business strategists, and technologists that make up interdisciplinary teams – without suppressing the distinctive identities of each. A robust, lateral collaboration flattens hierarchy without flattening diversity.

Stark, then, sees diversity as potentially a creative strength, although the challenge for heterarchies is to effectively combine the “diverse worldviews of different professional identities” (Stark, forthcoming: 39). Moreover, when non-professional identities are also involved, the challenge of successful cultural integration might be expected to be even greater.

From the foregoing discussion, a number of questions concerning teamwork environments emerge. First, how do worker experiences with and attitudes about the team structure vary according to the type of worker? Most research has focused on small, relatively homogenous teams of (typically blue-collar) workers. In more heterogenous, high-tech workplaces, how do engineers, technicians, and administrative assistants vary in their experiences with larger project teams? Second, how do these groups interact in a teaming environment? Does the teaming environment counteract or mitigate the divisions of occupational status and cultural marginalization which have been found in high-tech workplaces? Third, how do women fit into the sex-segregated high-tech workplace, and how do the teamwork experiences of women differ from those of men?

### **SYS CORPORATION: A CASE STUDY**

The corporation that we will call the SYS Corporation is a large, multinational company, with 50,000 employees worldwide. The division that we studied, located in the southwestern United States, employs 1,600 workers. This division’s primary business is software development, hardware design, and complete software and hardware integration. SYS’s customer base includes domestic and international corporations, as well as the U.S. government and foreign governments throughout the world.



The local division of SYS is comprised of nine team-based units: finance; process quality, resource administration, strategic planning, site services, legal, public relations and communications, customer satisfaction, and project management unit. Each unit has a leader who is responsible for its management and operation. These unit leaders, as well as the Vice-President and General Manager, comprise the division's General Management Team, or GMT.

Prior to 1993, SYS was organized into several functional groups with deep layers of hierarchy and a large sector of middle management. Each functional group was responsible for one aspect of the division's business, and each group had several layers of management, including section leaders, upper-managers, and assistant managers. All employees, regardless of rank, position, or status, worked within this hierarchical structure. In 1993, management instituted a massive reorganization around a team-based structure, which brought different groups of workers together to develop a given product for a specific customer.

For the purpose of this study, the focus was on the Project Management Unit, which is the unit charged with product development and manufacture; engineers, engineering technicians, and administrative assistants from the Project Management Unit participated in the study. The Project Management Unit is where employees from various occupational groups work together to develop the products that meet the requirements and wishes of a specific customer. Of the 1,600 employees in the division, 950 work within this Project Management Unit. Of these 950 workers, 440 (46%) are engineers, 40 are engineering technicians, and 10 are administrative assistants. The remaining 460 employees in the unit represent various other occupational groups, including project leaders, configuration managers, production technicians, contract representatives, and aides.

In the Project Management Unit, employees are divided into twelve project teams, each based on a different type of technology that is being developed. A typical team includes thirty to thirty-five workers: twenty to twenty-five engineers, three to five technicians, one administrative assistant, and three or four workers from the other groups listed above. Meetings of the entire team are typically held once or twice a week; smaller sub-groups of team members interact more frequently, particularly the engineers and the technicians, who work together on a daily basis to design and concretely create new technology.

Teams are organized based on an integrated product team (IPT) structure, with a project leader and his or her IPT leaders overseeing the entire development effort. The project leader is solely responsible for maintaining development schedule commitments with the customer, managing the program's budget, assisting with the career development activities of the team members, and regularly informing management of the program's status. In most cases, project

leaders are drawn from the ranks of the engineers, particularly those engineers with experience as IPT leaders and/or those who have obtained a Master's in Business Administration (MBA).

The IPT leaders report directly to the project leader, and they are experts in a specific type of engineering development (e.g. hardware engineering, software engineering, systems engineering, etc.) These IPT leaders are primarily responsible for acting as the technical interface between the customer and the team, and they work with the rest of the team to develop a product that satisfies the needs, requirements, and wishes of the customer. Within the teams, decisions are made collectively by all members, with the project leader and the IPT leaders providing guidance and leadership.

Structurally, SYS fits the model of the technocratic organization. The workforce is divided into management and engineers (who have at least a four-year engineering degree), who together comprise the "expert" sector; and technicians (for whom a two-year associates degree is the standard credential), production workers, and administrative support staff, who combine to form the "non-expert" sector. To a certain extent, the technician group bridges the expert/non-expert divide.

The first phase of this research was a content analysis of several types of communication that the GMT uses to disseminate information, ideas, and directives to the employees. These media included: a weekly newsletter, a monthly newspaper, a daily email announcement, a monthly all-employee forum, an internet web page, and four "rumor boards" located throughout the facility, which enable employees to communicate anonymously with the GMT. The main purpose of this phase of the research was to determine the central dimensions of the corporate culture at SYS. The dimensions that emerged as most central were: (1) the significance of the organizational structure (2) the communication between management and employees (3) the importance of teamwork, and (4) the need to "stay technical" and continually increase one's overall knowledge of technical developments in the field. One purpose of the interviews was to assess the relative importance of this communicated organizational culture to each group of workers.

The second phase of the research was the interviewing. Thirty interviews were conducted, ten with each group of workers: engineers, technicians, and administrative assistants. Probability samples were drawn randomly using printouts listing all employees in the unit in each category. In the engineering category, women were oversampled, and three of the ten interviewees were women (compared with 12% of all engineers in the unit). The intention was also to oversample for women among technicians, but the low compliance rate in this group made such oversampling impossible; one of the ten technicians

was female (comparable to the 10% of the total technicians in the unit who were female). All of the ten administrative assistants (100% of those in the unit) were female.

The semi-structured interviews were designed to explore issues such as the following: (1) worker perceptions of the positive and negative features of their job; (2) worker attitudes concerning team work, (3) the nature of working relationships among the three groups of workers, and (4) worker perceptions of the corporate communications disseminated by management.

## FINDINGS

### *Positive and Negative Features of the Job*

The majority of the engineers and technicians clearly valued independence and autonomy in their work. Six of the ten engineers mentioned autonomy as *the* most favorable aspect of their work. One male engineer, for instance, expressed this attitude by saying: "There is a fair degree of latitude to do what I need to do; I can figure out what need to get done by myself and I like not being micro-managed." Another engineer said "there is a lot of independence and self-direction," and cited this as the best aspect of his job at SYS.

The technicians also cited autonomy and flexibility as important benefits of their work. One man, for instance, said: "There's autonomy and the ability to do some design work and make decisions. Also, people assume that you know something and they're not always looking over your shoulder." Another said "There are a variety of different projects to work on, and I always have a choice when it's time for me to roll off my current assignment onto a new one."

Both the engineers and the technicians also highlighted the importance of having the opportunity to work with the latest technology and valued the opportunities for learning that they experienced. All of the technicians interviewed mentioned a creative and challenging work environment as one of the primary benefits of their jobs. The engineers as well appreciated the fact that they were "learning new things everyday" and "working with new technology." One female engineer spoke of "getting to work for a lot of different people and learning from the 'brain trust'" as the best aspect of her job. A male engineer cited "good design work" and the "opportunity to do different kinds of engineering" as valuable aspects of his job.

The administrative assistants were more likely to emphasize the social features of the job as positives, highlighting such dimensions of their jobs as working with a wide variety of people, having the opportunity to work on many different tasks, and feeling appreciated by their teammates. One woman, for

instance, said: "Being an administrative assistant is a fast-paced job. There's always something new, and I really feel like I'm a contributing member of my team. Also, I'm never looked down on by anyone on my team. I work with a great group of people." Others echoed similar responses, citing the "versatility and diversity of tasks" and that they "love the people I work with."

Workers in all three groups also discussed several negative features of their jobs. The engineers most frequently cited lack of resources and unrealistic expectations/demands from management. One male engineer said that the entire division is "understaffed because of budgets and the lack of qualified personnel." Another man contended that "there is always too much to do in the time that has been allotted by the engineering development schedule" and that "the engineering development schedules are continually becoming shorter, and yet the technology is becoming more complex and difficult to develop." A female engineer spoke of being "stressed out because of the unrealistic work expectations that are placed on me."

Some of the technicians also mentioned similar feelings of pressure and stress: "being pressured to work overtime, to put in long hours, to work weekends" and "to work under tight schedules." A more frequent complaint from the technicians, however, was lack of opportunity for advancement, which was frequently mentioned as the most discouraging feature of their job. In contrast to the informal learning and growth that they experienced in their work, formally the mobility prospects were seen as limited. One, for instance, said "The work doesn't stagnate, but the position does." Another echoed a similar sentiment: "There are some [technicians] who have been here for 15–18 years and some have just reached the pay of a newly graduated engineer. The opportunities for technicians are very limited and very slow. There isn't a whole lot of room to grow in this job." Some technicians clearly compared their situation with that of engineers, with whom they work closely, and felt relatively disadvantaged.

Several technicians explicitly expressed the desire to become engineers, although obtaining the requisite education was seen as difficult, given their family (and other) responsibilities. One technician expressed dissatisfaction over the fact that the content of his work was similar to that of an engineer, but that his working conditions were very different: "As an engineering technician, you're used in a virtual engineering capacity, but you have no say in your future. Engineers have more luxury in choosing their assignments, whereas almost all of us technicians are told what we will do."

Similar to the technicians, the administrative assistants were most likely to mention concern over their lack of opportunity for advancement as the main negative feature of their job. Typical comments included the following: "I feel like I'm stuck and I can't advance any more as an administrative assistant;"

“the money is low, and there isn’t any room for advancement. In fact, we’re pushing for an additional grade level this year for the administrative assistant job family. If we get this additional grade level, a lot of us will be eligible for a promotion;” “there’s no career path – it’s a dead-end job because I don’t have a degree.”

Moreover, some administrative assistants perceived a status distinction between exempt and non-exempt employees: “I feel like my team appreciated me, but I don’t feel like the division appreciated us [administrative assistants]. Division wide, the leaders do not see us as an asset, and I don’t think they take us seriously. Division leaders favor exempts over non-exempts.” These comments indicate that at least some administrative assistants make a clear distinction between their team and management, and feel valued by the former, devalued by the latter.

#### *Attitudes Regarding Teamwork*

The engineers expressed divergent attitudes about the team structure which was began in 1993. Half of the engineers said that the team environment was important to them and highlighted the positive implications of teams, and three of the five engineers who expressed positive attitudes were women. For instance, one of the three female engineers made the following statement: “I see teaming as a symphony orchestra, which always sends a shiver down my spine. Like an orchestra, a team is better than individual experiences, and it has a more robust output.” Another female engineer agreed: “I enjoy the . . . team environment. There is better visibility as to what is going on, a better understanding of what is going on, and we work closely with the customer. If I worked in the classical functional structure, I would go insane.” The third female engineer also praised the operation of the teams, but for somewhat different reasons: “Yes, I feel like I work in a team environment and it is very important to me. In a team environment, there is no finger pointing and no blaming is allowed, and I think that makes it a good working environment for everyone.”

Two of the male engineers also spoke favorably of the team structure (although one of these had criticisms as well). Interestingly enough, one of the male engineers appeared to primarily value the team collaboration among his fellow engineers; he said that the “communication *between the engineering disciplines* is much better” (emphasis added) in a team structure.

The male engineers were more likely to be critical of the teams, however. Six of the seven male engineers expressed significant reservations about the team structure. One, for instance, called teams “just the latest fad” and went

on to say that the division was still very hierarchical. Another man said that with the team structure, projects take longer and cost more. Yet another man said the following:

I don't think teaming is effective here. We have separate development programs, and I don't think we do an effective job of communicating between the teams. Therefore, each team goes off and does its own thing, with no communication between these groups. Also, I think teaming creates a leadership problem because often no one will step forward and take responsibility for making a decision. One of the pros of teaming is that it makes our customers more satisfied, but this comes with the expense of making the division more segmented and segregated, which is a definite con.

It appears, then, that the engineers' experiences with and attitudes about the team structure are significantly gendered, with the female engineers uniformly expressing positive attitudes and the majority of the male engineers (six of seven) expressing critical attitudes. It may be that the male engineers, who tend to highly value independence and autonomy, find working in a team structure less congenial, whereas the women value more collaborative work. Although the small sample size makes interpretation provisional, this apparent gender difference in attitudes about team work merits further exploration (see also Discussion section below).

The technicians tended to express a combination of positive and negative evaluations of teamwork, with somewhat more emphasis on the positive. On the positive side, the technicians said that "teaming has allowed ideas to flow" and "teaming has improved the communication and overall performance of the division. It brings more of a pride and competitiveness between the various teams," and "teaming cut out a lot of the fat and is the most efficient way to run a project." On the negative side, some said "with the new teaming style, no one made decisions until there was a crisis." Another man called teaming a "fad," and another said "we used to have large pyramids and now we have smaller pyramids."

Because nine of the ten technicians interviewed were men, the question of gender differences in attitudes about teams could not be analyzed among technicians. However, it is noteworthy that the one female technician who was interviewed expressed a critical attitude concerning teams, and one that is surprising in its substance. She said that she "preferred working for a supervisor" because "with a supervisor you always had someone to go to; now, it seems like you're always on your own." She went on to say that "teaming made our jobs a lot more difficult. . . . we had to learn more about a lot of things." Thus, it appears that for this woman, the collaborative potential of team work is not being realized, and she feels "alone" and overwhelmed by the increased task diversity of the team structure.

The administrative assistants were the most uniformly positive in their attitudes about teams, and tended to express highly favorable sentiments. One woman said “the best part of being at SYS is that non-exempts like us can now feel like we are not demeaned; we are treated as an equal part of the team.” Other comments included the following: “Teaming is good because you all work together. I have more interaction with management now;” “teaming gave me empowerment, and it made me happy. I’ll always do 110% and you don’t have to tell me to give it;” “on our team, people are involved in the decision-making process and it gives people a sense of ownership over everything that goes on within the team;” “I like feeling like I’m a contributor to the final product;” and “I feel like my voice is important.” It appears that for most administrative assistants, the positive characteristics of the team structure are highly salient, and compensate for the lack of mobility prospects and the exempt/non-exempt status distinctions.

Two of the eight administrative assistants expressed indifference to the team structure, saying that it had not made a significant difference over the previous way of organizing the work. Few critical comments about teams were made, although one woman admitted: “It can be stressful at times dealing with difficult people and weirdo engineers.” In general, however, the administrative assistants were enthusiastically positive in their evaluation of the team structure and its effects on their working lives.

#### *Working Relationships among the Groups*

All of the engineers expressed positive evaluations of the working relationships among the three groups of workers involved in the teams. In particular, the valuable and close working relationships between engineers and technicians was highlighted. One female engineer, for instance, said: “Engineers and technicians work very closely together, and, in some cases, they are interchangeable.” The administrative assistants were also praised for being “helpful” and for “keeping us organized.” In general, the engineers depicted harmonious interpersonal relationships within the teams.

The technicians as well described generally positive working relationships. One, for instance, said:

When I was in the Navy, the engineers were the officers, and the technicians, like me, were the enlisted men and women. I expected to see this same division here when I was hired a year ago. But here, we work together; while the social time may be separate between engineers and technicians, it is a very positive working relationship – there are no condescending attitudes from the engineers to the technicians.

Another man said: “Engineers and technicians are an essential part of the end product – they work closely together and they have to. I have an absolutely good relationship with the engineers, and I’ve worked with some outstanding engineers who treated their job like a hobby. I also have a great relationship with the administrative assistants. As far as the end product goes, engineers and technicians are the keys.” Although one man alluded to the occasional “personality conflict,” in general the relationships among all three groups were described favorably, as “friendly,” and characterized by “mutual respect.”

It appears then, that despite the structural differences in salary and working conditions, the technicians interact well with the engineers, and that these positive working relationships largely compensate for the structural disadvantage. Clearly, at least some of the technicians were resentful of the fact that they did similar work to the engineers, and yet did not have the same advantages as engineers. One technician, for instance, made this very clear when he said: “As an engineering technician, you’re used in a virtual engineering capacity, but you have no say in your future. Engineers have more luxury in choosing their assignments, whereas almost all of us technicians are told what we will do.” Others, as we have seen, focused on restricted mobility prospects and the fact that although they wanted to be (and felt that they could be) engineers themselves, that obtaining the necessary credential would be very difficult at this stage in their lives. Still others focused on salary differentials. However, considering the balance of “collaboration and competition” (Powell, 1990), it appears that while both are operative, the interpersonal collaboration is more salient in the day-to-day working lives of the technicians.

The administrative assistants, as we have seen, tended to have highly positive perceptions of harmonious working relationships among the various team members. Although one woman said that she felt that administrative assistants were often seen as “a glorified mom” and that “engineers always need help with the littlest things,” in general the administrative assistants expressed sentiments like “I love the people I work with,” and said that they felt respected and valued by their team members. For the administrative assistants, collaboration appears more influential than any tendencies towards competition with their co-workers.

#### *Perceptions of Corporate Communications*

Worker attitudes about the various types of managerial communiques (the weekly newsletter, monthly newspaper, daily email announcements, monthly all-employee forum, internet web page, and “rumor boards” which functioned



like anonymous suggestion boxes) varied significantly among the three groups. The majority of the engineers valued the various forms of communication from the GMT, calling them “informative,” “straightforward,” and helpful in terms of conveying general information about how the division is doing overall. Three of the ten expressed some skepticism, calling the communications “propaganda,” “sugarcoating,” and “rah rah fluff.” In general, however, the engineers stressed the positive implications of these managerial communications and said that they read them and benefitted from them.

In comparison with the engineers, the technicians were far less interested in the division-wide communiques from management. Eight of the ten said that they did not have time to read the various media or to attend the forums. Some went on to say of the disseminated information “a lot of the information doesn’t strike me as being worthwhile or important. Most of it, I delete from my email before I even read it.”

The administrative assistants reacted more critically than the other two groups to the information disseminated by management, in its various forms and forums. Many of the administrative assistants found the information to be at an overly high level, and difficult for them to understand. One woman, for instance, said: “Sometimes I think management communicates at a level that is too high. Not everyone sees information the way they see it. They always explain stuff at the top level.” Another woman expressed similar sentiments: “Management tells us the top-level financial stuff, and that’s about it. That kind of information doesn’t appeal to me all that much, and I have a hard time understanding it.” A majority of the administrative assistants said that they often did not understand the substance of the information being disseminated from management, indicating that the cultural marginalization that Kunda (1992) discussed may still be operative in firms like SYS.

## **DISCUSSION AND CONCLUSIONS**

This research has both confirmed some of the findings of previous research and also opened up some new questions for future research. Certainly, it appears that technocratic polarization and expert/non-expert status distinctions, what one administrative assistant described as a division between exempt and non-exempt employees, exist at SYS and are perceived by at least some of the administrative assistants and technicians. Moreover, the majority of both technicians and administrative assistants expressed dissatisfaction with the lack of mobility prospects and formal growth opportunities. These findings confirm the research of Burris (1993, 1998) and others regarding structural division and credential barriers in high-tech firms.

Cultural polarization and marginalization were revealed by the different reactions to the managerial communications. Although these communications are distributed to all employees, it appears that they are only truly read and understood by the engineers. Most technicians said that they did not really attend to the announcements, and most administrative assistants said that they could not understand the content of most of the communication from management. To the extent that these various communicative media represent a corporate "culture," it appears that this culture is not holistic or generally representative, but rather a managerial/engineering culture, disseminated by management largely for the benefit of the expert sector. This finding confirms Kunda's (1992) research on engineering culture.

However, despite the structural and cultural polarization at SYS, this research found that the team structure appears to mitigate the negative effects and create a generally positive work environment for all three groups of workers. The groups did differ in their experiences with and attitudes about the team structure, however. Engineers appeared the most divided in their opinions about teams. The majority of engineers appeared to value autonomy and independence in their work, and six of the ten were critical of the teams for various reasons. Some engineers appeared to primarily value enhanced communication *among engineers*, and were indifferent or critical of attempts to bring engineers, technicians and administrative assistants together in the same team. One engineer, for instance, praised the team structure for promoting "communication *between the engineering disciplines*." Another said that one of the negative effects of the team environment was that it "made the division more segmented and segregated;" even though the teams clearly bring together engineers, technicians, and administrative assistants, the fact that different teams work on different projects implies a segmentation *among the expert sector* to which this engineer objected. In direct contrast to these predominantly negative attitudes among the male engineers, all of the female engineers expressed positive evaluations of the team structure.

The technicians, like the engineers, were divided in their attitudes about the teams, but were somewhat more positive. They tended to see the team structure as efficient, as promoting better "communication and overall performance of the division." They also generally enjoy having the opportunity to work closely with engineers on projects, although some technicians also complained about the fact that they did work which was comparable to that of an engineer and yet were far below the engineers in occupational status and pay. Clearly, the close collaboration between engineers and technicians did serve to heighten competition and resentment of the structural inequality on the part of some technicians. The main substantive criticism of teamwork came from the one

female technician, who (surprisingly) said that in the team environment “it seems like you’re always on your own;” she preferred having a supervisor to go to with problems.

Of the three groups, the administrative assistants were the most uniformly positive in their attitudes about teams. In fact, they tended to be effusive in their praise of the teams, saying that they felt “valued,” were “treated as equals” and were “empowered.” Even though at least some of these women felt *unappreciated* by management, whom they perceived as favoring exempt employees over non-exempt ones, they also felt appreciated by their team members, and thus their immediate, day-to-day work environment tended to be a favorable one. Even though the administrative assistants were often frustrated by lack of mobility prospects in their jobs, they also felt “involved in the decision-making process” through the operation of their teams, and this appeared to compensate for the blocked mobility. Even though *becoming* an exempt employee was very unlikely, they nonetheless had daily opportunities to *interact* with the expert sector as (perceived) equals, and they very much appreciated this opportunity. This is similar to what Smith (1998) terms “status by association,” whereby more marginal workers (in Smith’s research, temporary workers) receive vicarious, subjective feelings of occupational status and importance through close association with more objectively valued and rewarded employees.

Some workers in each group, and several of the engineers, complained about stress and unrealistic time pressures and deadlines from management, confirming earlier research that team structures tend to be associated with work intensification, production pressures, and “management by stress” (Endo, 1994; Graham, 1995; Parker & Slaughter, 1988, 1994). Whether these workers accept such production pressures due to internalized norms of teamwork or co-worker control is less clear, although some workers clearly differentiate between management, which is seen as the source of unrealistic demands, and their co-workers on the team, whom they tended to praise. It appears that generally positive interpersonal relationships within the teams largely compensate for such problematic features of the job as stress and (among administrative assistants and technicians) lack of mobility prospects and the sense that they are not valued or sufficiently rewarded by management for what they do.

Perhaps the most intriguing finding of this research, however, concerns gender differences in worker attitudes concerning the teams. This difference is most clearly seen among the engineers. The three female engineers expressed highly favorable attitudes about the team structure, whereas six of the seven male engineers were critical. Moreover, the male engineers were also more likely to value autonomy and independence, and to emphasize this as the most positive aspect

of their jobs. Whether these differences are related to gender *per se*, or whether, perhaps, the female engineers perceived themselves to be less integrated into the male-dominated profession of engineering, insecure as a result of being marginal, and more likely to value collaborative team work as a result, is not clear. Perlow and Bailyn (1997) and Hacker (1989, 1990) found clear gender differences among the engineers they studied, and some feminist social scientists have found that women in general tend to be more collaborative than men (Chodorow, 1978; Gilligan, 1982).

Among the technicians, the nine males expressed some cynicism, but generally favorable attitudes about the team structure and its effects. Although some of the technicians mentioned autonomy as one of the positive aspects of their jobs, this was not stressed. Interestingly enough, the one female technician was critical of the teams for being insufficiently collaborative; she felt that the more traditional supervisory structure gave her more support. Thus, although the female technician was critical rather than positive about teams, the nature of her criticism may imply the “exception that proves the rule:” women tend to value collaborative work more than men. However, the fact that the technicians, who were predominantly male, tended towards positive attitudes about teams, also indicates that gender may interact with occupational status in determining differential worker attitudes about teams. Finally, the fact that the administrative assistants were effusively positive in their opinions about teams, is what one would predict, given the fact that they were both female and low in occupational status.

Clearly, given the small sample size of the present study, these findings should be taken as provisional. However, differences according to gender and occupational status in worker experiences and perceptions of teams should be explored in other work environments and with larger samples. This study has indicated that women, at all occupational levels, and non-expert sector workers may tend to benefit disproportionately from, and therefore more highly value, a team structure, whereas higher-status workers in expert positions (here, the male engineers) tend to be more resistant to teaming environments. At SYS, it appears that generally harmonious interpersonal relationships within the team mitigate some of the negative features of the technocratic structure: the polarization into expert and non-expert, the minimal opportunities for mobility from non-expert to expert sector, the cultural hegemony of the expert sector and corresponding cultural marginalization of the non-expert sector.

This paper began by highlighting two divergent conceptions of recent workplace restructuring, the post-Fordist and the technocratic, and asking how they can be reconciled. Our research indicates that both perspectives may have validity in high-tech workplaces such as SYS. The structural polarization

into expert and non-expert sectors and the cultural marginalization of the non-expert sector exist, but overlaying this structure and mitigating its effects is a more democratic and participatory team organization which is clearly valued by most workers, especially women and non-expert sector workers. Given the complexities of contemporary workplace restructuring, theories of workplace change will need to be correspondingly complex, avoiding overly simple conclusions which imply that such restructuring is “good” or “bad” in its effects. Rapidly changing contemporary workplaces are likely to embody contradictions, such as that between the structural and the interactive dimension that we have highlighted in this study. Future research should continue to explore the relative salience of and linkages between these two dimensions of contemporary workplaces for different groups of workers.

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