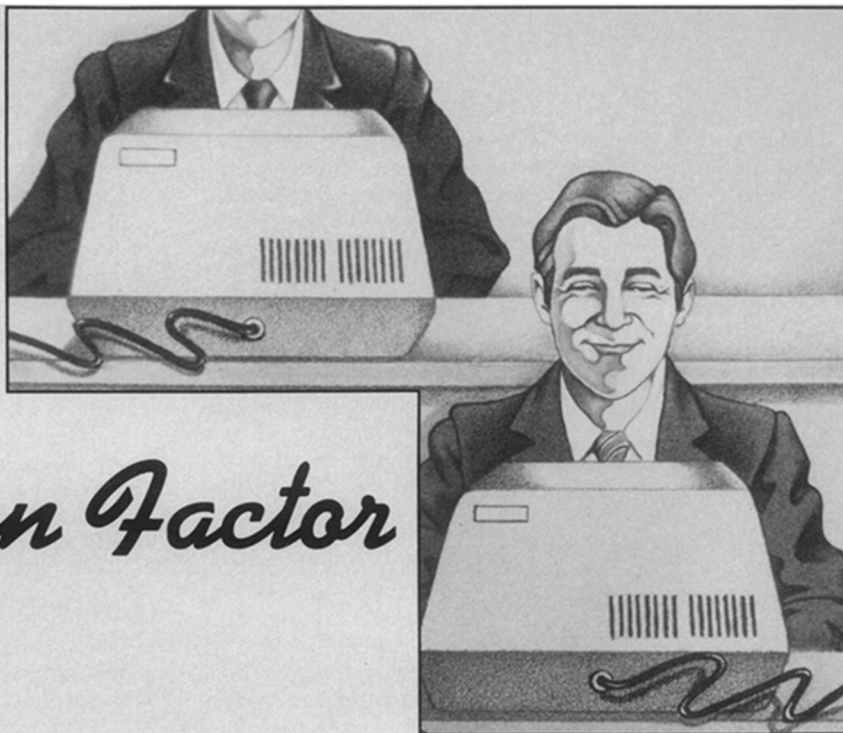# COMPUTERS AT WORK:

The Human Factor

Donna Ward

Computers are entering the business world in a big way, but high-tech effects on social relations and work styles are just beginning to be explored

By BRUCE BOWER

Sometime around April 1981, Lyn Wheeler, then an influential systems programmer at IBM in San Jose, Calif., sent a sheaf of memos to each of IBM's top executives. The memos were surely not what the captains of the successful computer company wanted to read; they included complaints, largely from IBM software developers and technical researchers, charging that employees worked without adequate tools or computing power and with little or no merit incentives or career prospects.

Wheeler culled the catalog of grievances from VNET, IBM's own internal computer message network. From its inception in late 1976, the system quickly evolved into a conduit for sharing data and job information among IBM employees throughout the world. By 1978, however, "GRIPENET" emerged within VNET — complaints against management practices and policies, personal attacks on IBM managers and even announcements of resignations.

Electronic outbursts and "online" tantrums cannot negate the celebrated advantages of computers for work, such as fast and precise information exchange and increased participation in problem-solving and decision-making.

But some social scientists, as well as corporate managers, are now beginning to realize that the pluses of powerful technology can easily become minuses unless computers are integrated carefully into a work environment.

"VNET altered contact patterns for people of different status and expertise in IBM and enabled new social behaviors to occur," says Jane Siegel, a psychologist at Carnegie-Mellon University in Pittsburgh who is familiar with the GRIPENET episode. "Within months, information sharing greatly increased. Employees suddenly became aware of management policies and started to question them."

The initial response of IBM management to GRIPENET was to audit workers' computer disks. Predictably, this resulted in an even greater outpouring of electronic "poison pen letters." But Wheeler's gripe mail sampler may have sparked a change of heart at the top of the corporation. Management has since taken an active role in providing a structure for the system's use and has responded to constructive employee complaints. IBM's computer mail network is now "functioning beautifully," says Siegel.

IBM, of course, is not the only large company with a potential for a GRIPENET.

Firms such as Beneficial Corp. and E.F. Hutton & Co. are investing tens of millions of dollars in computer systems to link up their worldwide offices. Automated-office-equipment sales, which totaled $11.7 billion in 1982, are expected to swell to $40 billion by 1990. In the same year, it is estimated that at least half of all office workers in the United States, or about 50 million employees, will use some type of computer system.

As computer-mediated communication envelops the workplace, will electronic griping and sniping become as commonplace as the floppy disk? No one can say for sure, but uninhibited and openly hostile messages have been noticed for years by observers of computer networks that link together up to several hundred people across the country. Computer aficionados refer to the practice of spouting off over these networks as "flaming."

"There is a terrible gap between the rate of technological improvement and the ability to design organizational interventions that help people to effectively use the new technology," says Siegel.

She and colleagues Sara Kiesler and Timothy W. McGuire have conducted sev-

eral experiments that indicate that small groups attempting to agree upon a solution to a hypothetical problem solely through computer contact differ markedly from groups meeting face-to-face.

They find that three-person groups using computers to "talk" with one another take longer to reach consensus and exchange fewer remarks than do face-to-face groups; although one person tends to dominate in both situations, group participation is more equal when computers are used; people in computer groups are more likely to include swearing, insults or name-calling in their remarks; and more people change their minds and abandon previous positions when using computers.

The researchers have observed these behaviors among college students as well as their elders, experienced and inexperienced computer network users, and groups composed of strangers and friends. In an "electronic mail" experiment, in which there is more time for composing one's thoughts and communicating with only part of a group, the results are similar, with slightly less "flaming."

Why does electronic communication differ from traditional group "interfacing"? It may be more difficult to tell when a point is understood or agreed to if you are staring at text on a computer screen, suggest the investigators; at times this may result in frustration and angry outbursts. Another possibility is that computer communication diminishes the influence of the group leader, giving freer rein and less control to discussions. Also, the lack of nonverbal cues may confuse computer users and cause them to ignore conventional etiquette and social constraints.

Nevertheless, long-distance problem solving via computers has tremendous potential, says Siegel. For example, scientists and business people across the country can now work together on projects without constantly traveling to group meetings. But, she cautions, "In situations where interpersonal exchange is needed, organizations shouldn't madly embrace the use of computers."

The benefits of a computer network are more apparent when a large number of people actively discuss complex problems over a fairly long period of time, says sociologist Starr Roxanne Hiltz of Upsala College in East Orange, N.J.

Last year Hiltz surveyed the members of a "naturally occurring" computer network. It was composed of 182 high-level management, government, labor and academic representatives who were invited to come up with recommendations for the 1983 White House Conference on Productivity. They were divided into seven groups that used computer conferences to address different aspects of the economy, such as increasing worker productivity through training programs or reward systems. About half of the participants re-

mained in the project for its four-month duration.

The majority of this "elite" sample reports favorable opinions about computer conferences, says Hiltz, but there is an almost even split between those who prefer face-to-face meetings and those who find computer sessions more productive. All seven groups did arrive at recommendations and produced a report.

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Several groups with a strong leader who organized the work and encouraged collaboration over the network functioned more effectively. "You need to start out with a designated leader in a computer conference who encourages people to express their feelings and is then able to help smooth things out," she notes.

The conference participants were taught to substitute written cues on the computer for the emotional cues that are ever-present in personal contacts. Such a strategy eliminates the awkward situations that can occur when someone does not realize that your latest transmission is meant as a joke or as a sarcastic aside, says Hiltz.

In a number of other controlled experiments that Hiltz describes in her book *On-line Communities* (1984, Ablex Press: New York), she finds that decisions made in computer conferences are usually as good as or slightly better than face-to-face group decisions. As with the Carnegie-Mellon investigators, she observes more difficulty in reaching consensus and discussion of a greater variety of options in computer groups.

Whether computer conferences become replacements for traditional group meetings, an electronic mail system is used to hook up a string of branch offices or word processors are installed for the first time, "fundamental changes occur in an organization when its internal communication patterns are altered with a new technology," explains Hiltz.

If those changes include a growing cadre of disgruntled employees and unexpectedly low productivity rates, then the fault probably lies not in the machines, but in the organization. In fact, says Tora K. Bikson, a research psychologist at the Rand Corporation in Santa Monica, Calif., many employees who use computers tend to be satisfied with the systems and software but displeased with the office environment and the lack of ongoing user training.

"The computer is often seen as another discrete piece of capital equipment when it is introduced," she notes. "Employees react well to computers, but they need flexible support from a management that can adapt to the new technology."

In a recent survey of 55 offices where advanced computer systems had been in place for at least six months, Bikson and colleague Barbara A. Gutek found that most of the 530 workers, who range from clerical staff to management, use the

"It must be you. The computer, it so happens, is user-friendly."
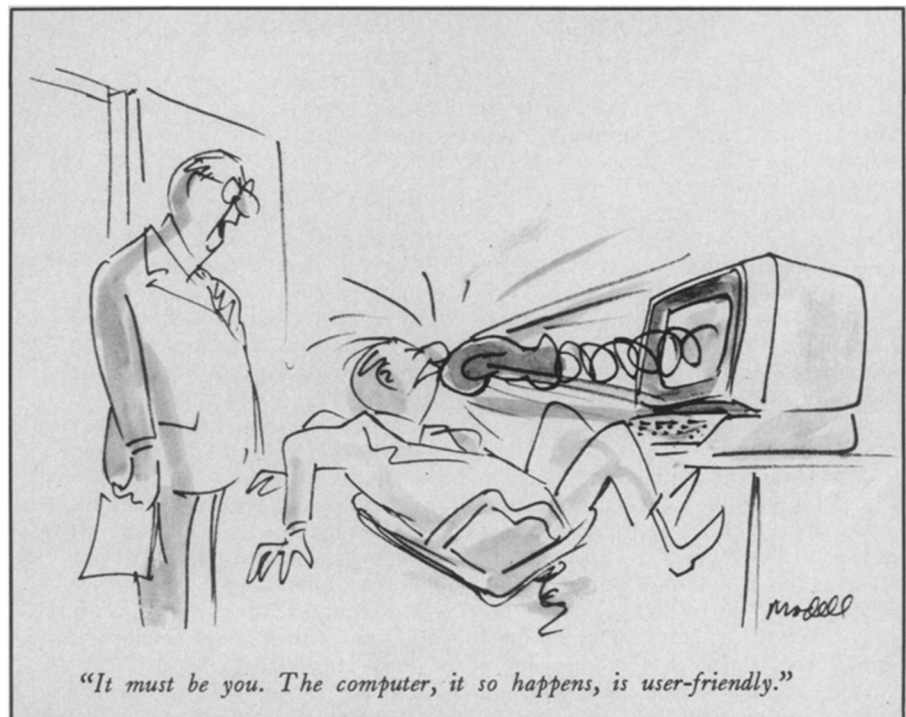
equipment and like it. But in over half of the sites, neither users nor managers believe they are fully exploiting the potential of the technology, and internal measures of productivity did not increase with computerization.

"The main barriers to reaping full benefits from computerized offices are organizational and behavioral, not technical," says Bikson. The survey results indicate that office workers more effectively use a new computer system if they can perform a variety of tasks and modify software programs to conform to their individual work styles, she reports. If computers are used merely to automate routine tasks, employee dissatisfaction rises.

Managers must seek out employee suggestions and criticisms as the organization attempts to adapt to its new "communications infrastructure," adds Bikson. Office workers want a chance to help coordinate computer use; their concerns over the possible loss of privacy and social interaction in an automated office pale in comparison, she says.

"The people responsible for operating [computer] equipment are often the most creative in adapting the technology to the work to be done," explains James C. Taylor, a psychologist at Socio-Technical Design Consultants Inc. in Pacific Palisades, Calif. Unfortunately, their imaginations are rarely tapped, he says.

In a 1982 survey, Taylor and several co-workers found that employees at only 32 of 196 companies reported making innovative and effective use of word processing equipment. Most were using the machines "as more highly mechanized or efficient typewriters," says Taylor. Where innovation did occur, it was usually trivial — in one instance, a machine was programmed to play a few notes of the "Star Spangled Banner" — or isolated among a few clever computer operators.

Is computer 'home work' on the way?

It's Monday morning. An information worker in San Francisco, like millions of others across the country, rolls out of bed, puts on her bathrobe, grabs a cup of coffee and heads over to her home computer terminal for a day of electronic consultation, software programming and report writing. Commute to an office? Other than for a group meeting every week or two, why waste the gas?

While some observers of office automation doubt that commuters have come to the end of the road, others say that this is a plausible scenario of the not-so-distant future. With a mass of information and a widely dispersed group of colleagues at the tips of one's fingers, work need not be confined to a conventional office or a 9-to-5 business day, they reason.

"It may take a generation or two, but work-at-home for those dealing with cognitive tasks is going to become routine and commonplace for at least a significant portion of the work week," contends Murray Turoff, a computer scientist and founder of a worldwide computer communications system at New Jersey Institute of Technology in Newark. Computer systems that encourage the formation of social groups and on-line friendships will go a long way toward breaking down barriers to the "electronic cottage," he says.

In the next few decades, more information employees will be working both at home and at the office, predicts Turoff. Computer-mediated groups can generate many exciting ideas in a short time, but, he warns, "the technology and the work-at-home concept seem ideally suited for those who have a tendency toward workaholism."

There are concerns that portable technology will result in an "electronic sweatshop," adds Turoff. Union groups, especially, fear that clerical employees will become part-time home workers paid by the job with no benefits. Legislation may eventually be needed to protect these workers, he says. Professional or managerial employees who communi-cate intellectually with others as part of their jobs are most likely to request the opportunity to work at home, he continues, and they will protest or resign and go elsewhere if employers try to exploit them.

Yet clerical and professional workers may not abandon central offices, says Robert Kraut, a social psychologist at Bell Communications Research in Murray Hill, N.J. Working at home "threatens to disrupt too many basic facets of organizational life," and employers can effectively use computers without sending people home, he notes.

For example, socializing with others is a major source of satisfaction for office workers, he points out. People who work near each other constantly exchange information about company goals and gossip about other employees that reinforces standards for dress, work and behavior. Furthermore, most employees are used to sleeping, playing and working in different places. Working at home would cause role conflict, says Kraut.

Employers will also discourage home work, he maintains, by using computers to automate office work and spreading conventional offices to areas with more abundant or cheaper labor, such as the Sun Belt.

Even when computers are used to work at home, they usually do not take the place of office work, says Kraut. In a recent electronic mail survey of 327 computer users — primarily software and hardware developers, systems engineers and other professionals at Bell Laboratories and AT&T Information Systems — he found that half of the respondents worked at home an average of 7.3 hours per week. But they also worked full-time at the office.

Management and professional employees may demand more time to work at home, adds Kraut, since their jobs are relatively autonomous and in high demand. Even so, such arrangements will be "on an individual basis without wholesale changes in company policy."
— *B. Bower*

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He points out that in organizations that make effective and innovative use of word processors, managers and operators can describe how the technology is used to further their company's larger mission. In addition, operators are given time to experiment with new ways to use computers. Employees at all job levels feel more competent on the computer systems in these firms.

Taylor's premise is that informed employees committed to an overall organizational purpose are the best computer users. Enlightened leadership, however, is in short supply, he says.

When the chips are down, can the organizational powers-that-be rise above their fascination with fancy technology and invest in the creative energies of the "keyboard crunchers" in their midst? It is not yet a popular strategy, according to Taylor.

Rob Kling, a professor of information and computer science at the University of California at Irvine, agrees. "Internal procedures and social relations in many organizations are being shaken up by new computer technologies," he says, "although the systems are sold because they're supposed to increase efficiency. The first wave of these computers, at least, has been adopted without consulting the staff who must use them." □