CHAPTER 4

The impact of contemporary communication and information technologies on police organizations

Andrew J. Flanagin
University of California, Santa Barbara, USA

Police in the United States have long embraced the use of communication and information technologies in the conduct of their work. As early as 1877, police organizations employed the telegraph to bridge distances and improve their core communication processes (Manning 1992). Today, computer-assisted dispatching, mobile data computers and terminals, and information-based data repositories are among the tools used to improve enforcement effectiveness, organizational efficiency, and officer safety. Although positive effects are certainly not guaranteed (Brynjolfsson 1993; O'Mahoney & Barley 1999; Sproull & Kiesler 1991), contemporary organizations are experiencing considerable benefits from modern communication and information technologies and are undergoing consequential and fundamental changes in form and function. However, compared to workers in other organizations, police may not be experiencing the same degree of benefit from these tools. The structure of police organizations, the nature of police work, and the demands of effective information processing combine to pose considerable barriers that inhibit police officers' ability to benefit fully from modern communication and information technologies.

These issues are explored first by examining the potential benefits of modern communication and information technologies in contemporary organizations. Communication and information technologies are considered in terms of their intra- and interorganizational impacts, as well as their influence as a basis for organizing. Next, the nature of police organizations and police work is considered by focusing on information, intelligence, and operational strategies.[1] Based on this assessment, the use (and lack of use) of modern communication and information technologies in police organizations is

examined by considering police knowledge, skill, and the nature of successful information processing. Finally, and in spite of the considerable obstacles to the effective use of these tools, strategies are suggested whereby police organizations may make better use of modern communication and information technologies.

Benefits of modern communication and information technologies for contemporary organizations

Technological advances have profoundly increased the capabilities of contemporary organizations. Compared to more traditional means, electronic communication and information technologies can carry more information faster, at a lower cost, to more people while also offering increased data communality, processing, and powerful recombinant capabilities (Beniger 1996; Fulk & DeSanctis 1995). Furthermore, the use of advanced electronic technologies in organizations is widespread and commonplace, due to the development of a dependable technical infrastructure, decreasing technology costs and, in many cases, the achievement of a critical mass of users (Gurbaxani 1990; Markus 1990). The use of these technologies has resulted in substantial changes to intraorganizational relations, interorganizational relationships, and contemporary organizational forms.

Intraorganizational relationships

Research on technologies such as electronic mail (Fulk 1993; Markus 1994; Rice 1992; Schmitz & Fulk 1991), videoconferencing (Finn, Sellen & Wilbur 1997), group support systems (Benbasat & Lim 1993; Seibold, Heller & Contractor 1994), and corporate intranets (Hills 1997), illustrates the capacity of electronic technologies to alter intraorganizational relations and to extend organizational scope and reach. Electronic communication and information technologies have been credited with extending the number and variety of people involved in organizational decisions (Huber 1990; Sproull & Kiesler 1991), diminishing temporal and physical interaction constraints (Eveland & Bikson 1988; Kaye & Byrne 1986), and increasing horizontal and vertical communication in the organization (Hinds & Kiesler 1995). Pinsonneault and Kraemer (1990) reported that technological advancements have affected group processes in organizations by increasing consensus reaching, increasing confidence in group decisions, increasing members' satisfaction with group process and group

decisions, and decreasing decision time. Within organizations, electronic technologies affect the potential for, and the dynamics of, interpersonal relationships. By virtue of increased connectivity and communality among individuals (Fulk, Flanagin, Kalman, Monge & Ryan 1996), electronic technologies alter organizational dynamics that were, a generation ago, based primarily on proximate, hierarchical relations, where both the flow and control of information were relatively predictable. In view of new technologies, communication with others is faster and easier and information is more widely distributed and more readily available to a broad range of organizational members.

Moreover, as these tools become more prevalent, organizations are relying on increasingly dispersed groups of workers in order to accomplish organizational goals (DeSanctis & Poole 1997; Fulk & Collins-Jarvis 2001). Accordingly, the study of electronic communication tools designed to help group members collaborate has become an important area of study in recent years (Dennis, George, Jessup, Nunamaker & Vogel 1988; Huber 1990; Scott 1999) and its continued examination is perhaps more important now than ever before (Jelassi & Beauclair 1987).

Interorganizational relationships

Connectivity *among* organizations has also become increasingly important as economic, technological, and social factors enable and encourage organizational linkages. There are several advantages for organizations that work together in networks to achieve their goals. Network relations aid organizations in gaining knowledge and learning (Powell, Koput & Smith-Doerr 1996), provide a competitive advantage (Jarillo 1988), and buffer organizations from failure (Miner, Amburgey & Stearns 1990). In addition, interorganizational links serve to increase network centrality and influence (Boje & Whetten 1981) and provide firms with greater stability and flexibility than pure market relations by providing access to complementary resources and knowledge (Tödtling 1992).

Organizations, for example, are experiencing economic benefits from closer coordination of their activities. Tools such as "just in time" or electronic data interchange (EDI) technologies enable firms to link together in the value chain, thus reducing coordination costs and increasing profits (Davidow & Malone 1992; Ferioli & Migliarese 1996). In addition, as linkages among organizations become more prevalent, organizational interconnectivity propagates based on competitive advantages (Jarillo 1988; Porter 1985), institutional pressures (Abrahamson & Rosenkopf 1993; DiMaggio & Powell 1983; Flanagin 2000),

and specific organizational benefits (Chesbrough & Teece 1996; Joyce, McGee & Slocum 1997; Mowshowitz 1994). Of course, appropriate organizational structure depends on the tasks being performed (Ahuja & Carley 1999), the type of innovations incorporated or produced (Chesbrough & Teece 1996), and managers' skills (Joyce et al. 1997).

New forms of organizing

Organizational *forms* are also changing as a result of advances in communication and information technologies. By facilitating coordination tasks once performed by middle managers, electronic technologies result in the "flattening" of the organizational hierarchy. New methods of horizontal coordination decrease lag times in the shipment of goods and the need for physical proximity among individuals, while increasing the importance of well-coordinated communication and information flow between organizations. This increased connectivity has prompted a return to market relations among organizations (as opposed to vertical integration), where organizations are tightly coupled in the value chain (Malone & Rockart 1991; Malone, Yates & Benjamin 1987).

So profound are the effects of electronic technologies that researchers posit the emergence of the "virtual" (Davidow & Malone 1992) or "network" forms of organization (Miles & Snow 1986; Nohria & Berkley 1994; Nohria & Eccles 1992; Powell 1990), that exist irrespective of the physical proximity of organizational members. Organizations are increasingly turning to network forms that link multiple organizations to one another and stress complementarity, relational communication, interdependence, and high trust over more contractual or formal relations (Miles & Snow 1984, 1986; Powell 1990). These organizational forms are based on "permeable and continuously changing interfaces between company, supplier, and customers" (Davidow & Malone 1992: 5–6) that rely on advanced technologies for their sustenance.

The nature of police organizations and police work

Although contemporary communication and information technologies deliver substantial intra- and interorganizational benefits, even altering the form of modern organizations in the process, the nature of police organizations and police work mediate these benefits. Police organizations are a form of traditional rational bureaucracy, with a clear system of super- and subordination and

activities that are dictated in fixed ways as duties. Authority is based on the position of the office held and personnel are concentrated at the foundation of a flat hierarchy, as patrol officers and in communication/dispatch centers. In this manner, "the social organization of policing amplifies the asymmetrical nature of information flow in which information...concentrates at the 'bottom' of the organization" (Manning 1992:388).

Rather than controlling their external environments, police organizations largely react to them in the conduct of event-driven tasks (see, however, Chapter 2). Because these environments can be extremely unpredictable, and the consequences of being unprepared can be substantial, police organizations hold considerable slack resources in reserve in the form of personnel and other assets. In the realization of the goals of protecting and serving members of the public, "the core technology of the police is situated decision making with the potential for application of violence (Bittner 1990)" (Manning 1992:354).

Although there are clear rules and regulations that guide police behavior (see Chapter 3), because "police-relevant events are sporadic and uncertain in appearance, duration, extent, and potential" police often rely on the use of "*situational rationality* that takes into account the particular times and places of events, rather than a set of firm rules, regulations, or laws" (Manning 1992:357). Thus, police work takes place in an environment distinguished by decentralized decision-making, problem-oriented management, and the exercise of discretionary powers. Consequently, police knowledge is believed to be highly contextual and is based on officers' implicit understanding of the nature of events and situations.

Types of information

Manning (1992) identifies 3 types of information gathered by police: primary information, secondary information, and tertiary information. Primary information constitutes the vast majority of data encountered by police and consists of the raw information that is processed in the normal conduct of police work. Examples include information that patrol officers might record in a personal log and discuss with other officers. Secondary information is that information that has been processed within policing, such as the same log information already mentioned, once it is recorded in a police report and made available to officers in other divisions (such as detectives). Secondary information thus changes in both location and format. Tertiary information is "managerial" information that is processed more than once; for instance, between

several units. Administrative authority often rests on the exercise of tertiary information.

Although crucial to the information processing and sharing functions of the police organization, primary information is often not widely shared among officers (apart, that is, from round-table discussions in briefings), due to the personalized practices of information storage. Because of this, "most of the information that exists in policing is primary data possessed by aggregated records or files or the information stored mentally by an officer" (Manning 1992:370). Secondary and tertiary information, by contrast, are most often codified and handled in a manner that enables reliable storage, retrieval, and recombination. As a consequence, secondary and tertiary information are best suited to take advantage of the substantial capabilities of advanced communication and information technologies.

Forms of police intelligence

Police intelligence, or the "systematized, classified, and analyzed information that has been encoded in police-relevant categories," can be prospective, applied, or retrospective (Manning 1992:365). Prospective intelligence, such as that used for criminal targeting, is gathered in advance of a crime or problem and is intended to help anticipate and control the phenomenon of interest. By contrast, applied intelligence is used to link known deeds that have already occurred with previously named suspects. Consequently, applied intelligence is often the basis of detective work. Retrospective intelligence, however, is sought out from past records as part of current investigations. Retrospective intelligence occurs in the normal conduct of police work and consists of such activities as checking for outstanding warrants for criminal suspects confronted in connection with events that are in progress. Recent training efforts in crime and intelligence analysis are aimed at further developing prospective and applied intelligence within police organizations. However, retrospective intelligence remains a primary area where advanced communication and information technologies may extend the capability of the police officer.

Operational strategies

Operational strategies describe the ways in which police cope with the various activities that warrant their attention. There are three main operational strategies (Manning 1992; Reiss 1971) that interact with the type of information and

intelligence in order to produce the outcome goals of the police. *Proactive* strategies are used to create the conditions of crime in order to catch criminals. A prime example is a police "sting operation" designed to lure criminals into committing illegal acts in a highly controlled environment in which apprehension is more certain. Proactive policing strategies rely on prospective intelligence in order to predict events. In similar fashion, *preventive* strategies require substantial intelligence on past and potential behaviors and are used to alter, prevent, or intervene in criminal situations. Examples are community crime prevention programs. Although Manning (1992) notes that preventive strategies are not central to the specified aims of policing, which are focused on response and control over prevention, prevention is increasingly emphasized through such initiatives as community-oriented policing (Rosenbaum 1994; see Chapter 2). Finally, the vast majority of police work relies on *reactive* strategies that are invoked in response to specific events. Reactive strategies take advantage of both retrospective and applied intelligence and encourage the officer to act largely autonomously.

Overall, the nature of police work and police organizations, the types of information processed in the conduct of police work, the character of police intelligence, and the various operational strategies invoked by the police combine to form a specific environment to which advanced communication and information technologies may be applied. Although the capabilities of these tools are vast, and their effects on contemporary organizations can be substantial (as documented above), the specific environment of police work holds somewhat idiosyncratic possibilities for the effective and widespread use of these tools. The following section explores this in detail.

The use (and nonuse) of modern communication and information technologies in police organizations

Police in the United States have a long history of employing technologies to aid them in their work. According to Manning (1992), as early as 1877, police and fire departments in Albany, New York used the telegraph to connect remote officers. This was followed by the use of teletype by Pennsylvania State police in 1923, the use of one-way radio in Detroit in 1928, two-way radio in Boston in 1934, and the widespread use of the automobile in the 1930s. More recent innovations include centralized call collection and computer-assisted dispatching (CAD) and information-based data repositories among decentralized

populations of police organizations (Flanagin, Monge & Fulk 2001; Monge, Fulk, Kalman, Flanagin, Parnassa & Rumsey 1998; Monge, Fulk, Parnassa, Flanagin, Rumsey & Kalman 1999). However, although police organizations have adopted a wide variety of technologies, there exist considerable barriers specific to police organizations that may inhibit the wholesale acceptance (and attendant benefits) of advanced communication and information technologies in particular.

Tacit versus explicit officer knowledge

Nonaka (1994) argues that, in order to prosper in uncertain environments, organizations must not only react to environmental forces by processing information efficiently, but must also create new knowledge so that they can solve recurring problems more effectively. In his view, organizational knowledge creation occurs through a continuous dialog between what he terms "tacit" and "explicit" knowledge. Ultimately, knowledge creation occurs as information is transferred between explicit and tacit knowledge across levels of the organization (i.e., individual to group to organizational).

Explicit or codified knowledge is "transmittable in formal, systematic language" whereas *tacit* knowledge "has a personal quality, which makes it hard to formalize and communicate. Tacit knowledge is deeply rooted in action, commitment, and involvement in a specific context" (Nonaka 1994: 16). Thus, although explicit knowledge can be codified and secured in formal records such as archives and databases, tacit knowledge resides in individuals' situational understanding and is accumulated through shared experience.

Knowledge creation, through the transfer between tacit and explicit knowledge, can take many forms. For instance, sharing explicit knowledge in organizations is relatively straightforward: because it can be readily codified and transported without difficulty, explicit knowledge is easily perpetuated in databases of information, procedure manuals, and handbooks. The transfer of explicit organizational knowledge from one person to another is thus a straightforward matter of information processing. By contrast, because the accumulation of tacit knowledge depends on situated individual experiences, its transfer is more complex. Tacit knowledge is acquired only through shared experience. Therefore, passing tacit knowledge from one organizational member to another requires socialization into the organization's culture and the practices of its members, a process that requires learning organizational norms and modifying one's own behavior accordingly (Jablin 1987).

The nature of police officers' skill

Tacit and explicit knowledge are critical in understanding the nature of organizational members' skill and the role this plays in police organizations' use of modern communication and information technologies. Stinchcombe (1990:21) defines skill as the "capacity to routinize most of the activity that comes to a given work role in an uncertain environment." In this view, skill is the knowledge of many routines, or sets of tasks used to solve specific problems, and the ability to select the proper routine under uncertain conditions. Highly skilled workers are adept at choosing from among many routines they have mastered, according to the demands of the situation, by means of "principles of decision" that guide their choice. Thus, skill consists of "the capacity to use the news about what uncertainty has come in, to decide what to do and then to do it ... in a fast and effective way" (Stinchcombe 1990:32). Less skilled workers, by contrast, know fewer skills and/or have less need or ability to choose from among them. With completely *un*skilled work, all decisions are prespecified and the task is entirely routinized.

Highly skilled workers thus rely to a large extent on tacit knowledge whereas explicit knowledge is sufficient to accomplish most low skill work. The principles of decision are learned by situated experience, are accumulated over time, and are guided by fellow organizational members. As such, the principles of decision, and even the routines, of highly skilled workers are difficult to articulate and pass on, absent shared experience. Zuboff (1988) elaborates on the nature of this type of "action-centered" skill, noting that it requires high sentience, dependence on action and context, and high personalism.

Obstacles to the use of advanced communication and information technologies in police organizations

Although the positive influence of advanced communication and information technologies on contemporary organizations can be substantial, police organizations do not seem to benefit to the extent that other types of organizations do. In fact, there exist considerable obstacles in the adoption of these tools that might explain why their use has been limited in scope, as compared to other types of contemporary organizations. According to Manning (1992:350), "information technologies, the most important and influential kinds of technology, have been constrained by the traditional structure of policing and by the traditional role of the officer" and, as a consequence, "the computer

revolution in policing...has yet to take place" (p. 390). Reasons for the relatively low return from these technologies in police organizations include (a) the conditions of information processing for the effective use of these tools and (b) the character of organizational knowledge and the nature of police officers' skill.

Barriers to implementation: Information characteristics for the effective use of technological support

There are several obstacles to obtaining the complete benefits from advanced technologies that stem from the requisite characteristics of information required for their most effective use. The effective use of advanced technologies for wide scale communication and information sharing requires that information be accurate, complete, and readily processable. Accuracy and comprehensiveness are obvious requirements for information used in police work. Whereas up-to-date and precise information may improve decision-making dramatically, inaccurate or incomplete information cannot be trusted and is of little value. Indeed, the largely reactive strategies invoked by patrol officers imply that data on criminal suspects and situations must be current, accurate, and easily accessible.

Furthermore, information must exist in a format that is suitable for efficient processing in order to be useful — more specifically, information that is to be shared widely through electronic means must be readily stored, easily searched, and simply interpreted. In order to accomplish this in view of the rich primary data encountered by officers in the conduct of their work, information is necessarily streamlined, by reducing the amount of raw information to be processed and by increasing the capacity to process information (a process Weber referred to as "rationalization"). Although computer technologies are proficient at increasing the human capability to process large amounts of information (Beniger 1990), data reduction prior to input is unavoidable in order to handle the copious amounts of primary information encountered in the field.[2]

Data reduction occurs by use of set formats (e.g., standard report forms) and standard codes that are invoked to reduce a wide range of potentially diverse information to a manageable number of categories that can be interpreted easily. Each of these methods, however, necessarily neglects information detail. Whereas explicit knowledge meets the conditions of data reduction relatively well, tacit knowledge, which constitutes the basis for the majority of patrol officers' information, does not. Although the goal of effective data reduction, however tenuous, is to maintain information fidelity while also

retaining information richness and depth, often "what is entered into computer records is a severely edited version of the primary reality encountered on the street by officers" (Manning 1992:372). As a consequence, the situated rationality endemic to the patrol officer's work is often lost with the application of electronic communication and information technologies. Furthermore, because primary information is the *basis* for both secondary and tertiary information, the loss of primary information tends to endure as the information is forwarded to others.

Barriers to implementation: Police knowledge and skill

As already discussed, police labor is highly skilled and is formed from tacit knowledge that relies heavily on officers' use of situational rationality. For the most part, police work is reactive, with strategies invoked in response to specific events. Furthermore, reactive strategies take advantage primarily of retrospective intelligence by seeking links between ongoing events and past data. Thus, successful police work hinges on a relatively esoteric situational understanding and the ability to quickly and accurately arrive at an appropriate decision. As Nonaka (1994) points out, the tacit knowledge required to be successful under such conditions is difficult to transfer from person to person, except by active and continued socialization.

Therefore, police work is not conducive to the type of distillation and categorization required of most advanced communication and information technologies (as described in the previous section). In fact, the application of situational rationality in the field is best learned *in the field*, and is only tangentially supported by the use of electronic technologies. In effect, such tools are used most effectively to *augment* officers' decision making and to provide additional data that might inform them, and not to routinize or automate their work (as is the case in most other types of organizations). Thus, widely used technologies, such as the two-way radio and mobile data terminals that are linked to databases of information (e.g., Department of Motor Vehicles information), inform officers' actions but do not determine them.

This highlights the unique nature of police work and the attendant problems of applying technologies to policing in the field. From an information processing standpoint, vast amounts of primary data "in raw and unintegrated form, are organized and stored in chunked and coded units in individual officers' memories. When (or because) data are full and rich, they are not entered into the computer in many cases..." (Manning 1992:371–372). Overall, the use of communication and information technologies effectively in the field,

in any manner that fundamentally alters the nature of highly skilled police work, is a complex issue not easily resolved by the application of technologies to complex human behaviors.

Consequently, the most effective use of technologies for the transfer of tacit knowledge from officer to officer takes place outside of the field, and not in "live" situations. For example, patrol car videotapes of traffic stops have been used not only to document officers' activities (in order to provide evidence to build legal cases against criminal suspects) but also for training new officers. Videotapes of traffic stops can serve as examples of both proper and improper field behaviors. Similarly, situation "simulators" that project fictitious scenarios (based on real events provided by experienced officers) enable junior officers to experience realistic conditions, without the considerable risk involved in the field. In both cases, the goal of these tools is to capture tacit knowledge and make it more explicit (in videotape form or within the scenarios provided by the simulator). In turn, by studying the events and practicing how to approach various situations, this explicit knowledge is again made tacit, and officers' skill levels are raised in a reduced risk, controlled environment.

Strategies for more effective use of modern communication and information technologies in police organizations

In spite of these considerable obstacles, a number of strategies exist that might help police organizations to enjoy greater benefits from the use of modern communication and information technologies. Although many of these strategies are currently in use in contemporary police organizations, their use is uneven, due to differences such as organizational size, the amount of funding available, the perceived need for the functions supported by these technologies, officers' technical training, the acceptance of these tools by administration, and a diversity of interests in using these technologies that can arise from several additional factors. Thus, several opportunities exist whereby police organizations may benefit, or benefit more completely, from the use of contemporary communication and information technologies.

First, one means by which to augment the retrospective intelligence of the patrol officer is to link together a greater number of the core databases of information that are germane to officers' work. For example, the use of Department of Motor Vehicles data, criminal records, and other databases currently available to the patrol officer serves to provide relevant and timely information at the point at which it is needed most. By linking an even *larger* number of nonredundant information sources together, this information base can be

greatly expanded. Initiatives such as the National Crime Information Center (NCIC), a comprehensive information system first established in 1967, provide precisely this type of resource. Furthermore, with the recent introduction of the NCIC 2000, these capabilities have been vastly increased in many police organizations: NCIC 2000 serves 80,000 local, state, and federal law enforcement agencies in the U.S. through 17 databases that provide access to mug shots, stolen vehicles, articles, and guns records, wanted and missing persons information, gang data, and suspected terrorist profiles. In addition, it also provides investigative tools such as fingerprint matching and online ad hoc searches (U.S. Department of Justice 1999). In this manner, "as law enforcement enters the 21st century, NCIC 2000 provides capabilities to fight crime that law enforcement officers lacked" prior to the advent of these tools.

Second, the collection of primary information by the patrol officer is a key element of effective policing that can be enhanced by the use of technologies. With the use of instant or digital photographs and information solicited directly from individuals, officers are able to build databases of known gang members, for example. These databases, in turn, add to the retrospective information that officers rely upon and serve to provide valuable tools for the identification of gang members at subsequent points in time. Electronic tools thus enable officers to record and share primary information more effectively and reduce the substantial reliance on what Manning (1992:366) terms "officer's good memory, shrewd judgment, and patience". It is important to note, however, that the collection and use of personal information must always be tempered by legal and ethical guidelines of appropriate use and privacy protection.

Third, greater reach and contact can be achieved by making advanced communication technologies more readily available to officers. For example, the use of mobile data terminals (MDTs) and mobile data computers in patrol cars serves to put officers in better contact with dispatchers, one another, and directly with data sources. Similarly, cellular phones may serve to augment officer communication, and can be used to verify assignments and to discuss tasks with fellow officers (Manning 1996). The potential of these tools also increases the chances of the formation of advice networks among officers and encourages wider information sharing in the field. Furthermore, this type of direct contact may become more important with the current shift from fewer multiple officer patrol units to a higher number of single officer patrols. However, as is always the case with technological implementation, technologies can be used in ways quite different than intended (Sproull & Kiesler 1991). Such is the case, for example, with the implementation of the cell phone among

patrol officers, used for such diverse and unintended tasks as to order pizza and even for phone sex (see Manning 1996).

Fourth, there are a number of ways in which to facilitate the transfer of tacit knowledge among officers, and to disseminate the type of information that constitutes the situated decision-making that is the core of officers' work. For instance, following the lead of corporate information systems, police organizations might benefit from the establishment of "best practices" or "expert systems" databases. Such data repositories hold information, often in the form of scenarios or descriptive accounts, provided by experienced organizational members. Organizational members draw upon this information when they encounter situations with which they are unfamiliar or that may be atypical. In such cases, the information contained in these systems is often valuable in providing a course of action, based on previous strategies that have proven useful. The establishment of such databases of information might be especially useful in capturing and retaining information from organizational members who are no longer with the organization and for use in officer training. Of course, a key issue with such systems is incentives for encouraging the input of information from officers, as addressed later.

Fifth, and relatedly, computer-mediated communication has successfully been employed to minimize status differences among communication partners. For instance, gender differences have been reduced when users take advantage of *anonymous* computer-mediated communication (e.g., online text-based communication, such as "chat" features and electronic mail). Gopal, Mirana, Robichaux and Bostrom (1997), for example, found that females preferred communicating in computer-mediated environments because of the anonymity afforded by the technology. In addition, Flanagin, Tiyaamornwong, O'Connor and Seibold (2002) found that males and females differed in their experiences using computer-mediated communication (CMC). Their findings suggest that whereas men may have favored face-to-face communication, in order to maintain the advantages they experience in that environment, women may have preferred the anonymous environment of CMC, possibly in order to recapture some of the equality lost in face-to-face encounters. Accordingly, Dubrovsky, Kiesler and Sethna (1991) found that females who were typically uncomfortable with or discouraged from participating in groups were more at ease when participating in CMC environments than in a face-to-face atmosphere. Although these studies explored sex differences in particular, these findings suggest that there is a potential to equalize status more generally with the use of anonymous communication supported by communication technologies.

For police, this suggests that communication and idea sharing via anonymous means might serve to reduce status differentials.[3] Doing so might, in turn, promote a more open exchange of ideas and tacit knowledge that is more readily shared. Practical applications may include such things as the use of anonymous "listservs" or electronic bulletin boards whereby officers would be able to share opinions and experiences without fear of reprimand or appearing ignorant. Especially important might be the benefits of anonymous communication and data seeking among less senior officers, who may have legitimate reasons to "save face" among their colleagues. Furthermore, truly anonymous communication might also serve to make public some of the more private moments that officers encounter in efforts to seek opinions on procedure and advice about how to perform their duties. However, the successful implementation and use of these tools relies on high *trust* — of fellow officers, of the integrity of the technical system, and of the police administration (Bok 1989; Cummings & Bromily 1996; Jarvenpaa & Leidner 1999; Lewis & Weigert 1985; Monge et al. 1998). As Manning (1992:384) points out, "Police in lower-level segments are in danger of losing discretion and autonomy as on-line monitoring of their activities becomes more common and technological devices permit increased review of their actions and choices." Thus, in order to be successful, officers must be certain that communication assumed to be anonymous remains anonymous, under all conditions.

Sixth, and finally, the necessity to encourage *collective action* among several organizational members is at the core of the success of many of these ideas. The creation of some communication and information resources, such as a database of "best practices" information or an effective communication system wherein ideas are openly shared, depends on the collective action or participation among many organizational members. Particularly when each member holds unique information, everyone's contribution is important because "when information resources are *distributed*, participation in the information system by each member is a necessary condition for the success of the communal endeavor" (Fulk et al. 1996:73). This suggests that personal motivations for contributing, and individual perceptions of the resource, are both important in the realization of these communication and information goals.

However, there exist two key obstacles in the successful provision of these "public goods": "free riding", which occurs when participants enjoy benefits without helping to contribute to or maintain the public good (Connolly & Thorn 1990; Hardin 1968; Olson 1965; Sweeney 1973), and disincentives to contribute that occur for some public goods because early contributors must

invest in the absence of contributions by others, and thus receive little in terms of direct, immediate benefits from their contributions. In such cases, each participant is rewarded for waiting until others contribute, thus serving as a disincentive for early contributors.

One means by which to reduce free riding among users, and to motivate the contribution of resources in the absence of a fully provided good, is to implement *incentives* for information sharing among officers. For example, direct incentives for contributing information or communicating about certain aspects of one's job (e.g., monetary or other compensation), disincentives for noncontribution (e.g., punishment or loss of resources), or aid (e.g., secretarial or other support) in the input of ideas are strategies that might help to provide collective goals. However, the key is to maintain a balance between incentives and disincentives in order that the problem does not shift from the nonprovision of valuable information to the overprovision of useless information (Fulk et al. 1996; Monge et al. 1998). Thus, stimulating collective action within police organizations is a crucial, yet difficult, task.

Epilogue

Modern communication and information technologies have fundamentally altered connections between people within and among contemporary organizations. In many instances, this transformation has facilitated dramatic improvements in organizational efficiency and individual effectiveness. However, although police have adopted a wide variety of these tools, there exist considerable barriers specific to police organizations that may inhibit the wholesale acceptance (and attendant benefits) of advanced communication and information technologies.

Although police organizations in the United States continue to take advantage of technologies to improve their operation, structural factors and information processing concerns inhibit the degree to which police officers stand to benefit from modern communication and information tools. Due to the focus and structure of police organizations, where the majority of workers (patrol officers and communication personnel) are located at the bottom of a relatively flat hierarchy, "information is most used in reactive strategies where a suspect is known, a crime is known to have been committed, and a prior record exists on the suspect. The most important information is retrospective intelligence...[and]...computer-based information is most relevant and used

in doing routine 'housekeeping tasks'" (Manning 1992:383). Consequently, the most important application of computer technologies occurs in personnel and organizational administration and in the relatively specific areas of police work where proactive and preventive strategies can take advantage of prospective and applied intelligence. By contrast, patrol officers will rarely take advantage of the majority of these communication, information, and analytical tools. As a result, the greatest potential benefit of modern communication and information technologies, as realized in other types of contemporary organizations, may go untapped within police organizations.

Nonetheless, there exist several possibilities for the more effective use of these tools in street level policing, including strategies to link core information and officers in the field, greater collection of primary information, greater reach and contact among officers, means of facilitating the transfer of tacit knowledge, computer-mediated communication used to minimize status differences, and means by which to encourage collective action among police. Overall, although substantial obstacles exist, it would seem that taking better advantage of modern communication and information technologies in police organizations remains an important, and attainable, goal.

Notes

1. Throughout this chapter, local level police organizations (as opposed to Sheriffs' Departments or other agencies) within the United States are the focus of attention. As a result, the work of the patrol officer is emphasized, due to the high proportion of patrol officers relative to other roles in most local level police organizations (Manning 1996). Furthermore, advanced communication and information technologies are considered, as opposed to other types of technologies, because of the substantial documented benefits of these tools in contemporary organizations.

2. Although the problem of data reduction in order to enable searchability is substantial, there are marked advantages to technologies that are able to record the true richness of officers' experience (e.g., high quality video data recorders that are feasible for use in the field). Consequently, such tools provide important alternatives to relying on officers' fallible memories. For instance, video evidence from a crime scene can be used to review details that may have been overlooked at the time of the initial investigation. Overall, although accuracy and comprehensiveness are potential strengths of these tools, the difficulties in ease of processing suggest that they may be appropriate for only certain types of police work.

3. In fact, anonymous telephone numbers and web sites are in use in many police organizations today.

References

Abrahamson, E. and Rosenkopf, L. 1993. "Institutional and competitive bandwagons: Using mathematical modeling as a tool to explore innovation diffusion". *Academy of Management Review* 18: 487–517.

Ahuja, M. K. and Carley, K. M. 1999. "Network structure in virtual organizations". *Organization Science* 10: 741–757.

Benbasat, I. and Lim, L. 1993. "The effects of group, task, context, and technology variables on the usefulness of group support systems: A meta-analysis of experimental studies". *Small Group Research* 24: 430–462.

Beniger, J. R. 1990. "Conceptualizing information technology as organization, and vice-versa". In *Organizations and Communication Technology*, J. Fulk and C. Steinfeld (eds), 29–43. Newbury Park, CA: Sage.

Beniger, J. R. 1996. "Who shall control cyberspace?" In *Communication and Cyberspace: Social Interaction in an Electronic Environment*, L. Strate, R. Jacobson and S. B. Gibson (eds), 49–58. Cresskill, NJ: Hampton Press.

Bittner, E. 1990. *Aspects of police work.* Boston: Northeastern University Press.

Boje, D. M. and Whetten, D. A. 1981. "Strategies and constraints affecting centrality and attributions of influence in interorganizational networks". *Administrative Science Quarterly* 26: 378–395.

Bok, S. 1989. *Secrets: On Concealment and Revelation.* New York: Vintage.

Brynjolfsson, E. 1993. "The productivity paradox of information technology: Review and assessment". *Communications of the ACM* 36: 67–77.

Chesbrough, H. W. and Teece, D. J. 1996 "When is virtual virtuous? Organizing for innovation". *Harvard Business Review* 74: 65–71.

Connolly, T. and Thorn, B. K. 1990. "Discretionary databases: Theory, data, and implications". In *Organizations and Communication Technology*, J. Fulk and C. Steinfeld (eds), 219–233. Newbury Park, CA: Sage.

Cummings, L. L. and Bromiley, P. 1996. "The organizational trust inventory (OTI)". In *Trust in Organizations: Frontiers of Theory and Research*, R. M. Kramer and T. Tyler (eds), 302–330. Thousand Oaks, CA: Sage.

Davidow, W. H. and Malone, M. S. 1992. *The Virtual Corporation.* New York: Harper Collins.

Dennis, A. R., George, J. F., Jessup, L. M., Nunamaker, J. F. and Vogel, D. R. 1988. "Information technology to support electronic meetings". *MIS Quarterly* 12: 591–624.

DeSanctis, G. and Poole, M. S. 1997. "Transitions in teamwork in new organizational forms". *Advances in Group Processes* 14: 157–176.

DiMaggio, P. J. and Powell, W. W. 1983. "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields". *American Sociological Review* 48: 147–160.

Dubrovsky, V. J., Kiesler, S. and Sethna, B. N. 1991. "The equalization phenomenon: Status effects in computer-mediated and face-to-face decision-making groups". *Human Computer Interaction* 6: 119–146.

Eveland, J. D. and Bikson, T. K. 1988. "Work group structures and computer support: A field experiment". *Transactions on Office Information Systems* 6: 354–379.

Ferioli, C. and Migliarese, P. 1996. "Supporting organizational relations through information technology in innovative organizational forms". *European Journal of Information Systems* 5: 196–207.

Finn, K.E., Sellen, A.J. and Wilbur, S.B. (eds) 1997. *Video-Mediated Communication.* Mahwah, NJ: Lawrence Erlbaum.

Flanagin, A.J. 2000. "Social pressures on organizational website adoption". *Human Communication Research* 26: 618–646.

Flanagin, A.J., Monge, P.R. and Fulk, J. 2001. "The value of formative investment in organizational federations". *Human Communication Research* 27: 69–93.

Flanagin, A.J., Tiyaamornwong, V., O'Connor, J. and Seibold, D. (2002). "Computer-mediated group work: The interaction of member sex and anonymity". *Communication Research* 29, 66–93.

Fulk, J. (1993). "Social construction of communication technology". *Academy of Management Journal* 36: 921–950.

Fulk, J. and Collins-Jarvis, L. 2001. "Wired meetings: Technological mediation of organizational gatherings". In *The New Handbook of Organizational Communication*, F.M. Jablin and L.L. Putnam (eds), 624–663. Thousand Oaks, CA: Sage.

Fulk, J. and DeSanctis, G. 1995. "Electronic communication and changing organizational forms". *Organization Science* 6: 337–349.

Fulk, J., Flanagin, A.J., Kalman, M., Monge, P.R. and Ryan, T. 1996. "Connective and communal public goods in interactive communication systems". *Communication Theory* 6: 60–87.

Gopal, A., Mirana, S.M., Robichaux, B.P. and Bostrom, R.P. 1997. "Leveraging diversity with information technology: Gender, attitude, and intervening influences in the use of group support systems". *Small Group Research* 28: 29–71.

Gurbaxani, V. 1990. "Diffusion in computing networks: The case of BITNET". *Communications of the ACM* 33: 65–75.

Hardin, G. 1968. "The tragedy of the commons". *Science* 162: 1243–1248.

Hills, M. 1997. *Intranet Business Strategies.* New York: John Wiley and Sons.

Hinds, P. & Kiesler, S. 1995. "Communication across boundaries: Work, structure, and use of communication technologies in a large organization". *Organization Science* 6: 373–393.

Huber, G.P. 1990. "A theory of the effects of advanced information technologies on organizational design, intelligence, and decision-making". In *Organizations and Communication Technology*, J. Fulk and C.W. Steinfield (eds), 237–274. Newbury Park, CA: Sage.

Jablin, F.M. 1987. "Organizational entry, assimilation, and exit." In *Handbook of Organizational Communication*, F.M. Jablin, L.L. Putnam, K.H. Roberts and L.W. Porter (eds), 679–740. Newbury Park, CA: Sage.

Jarillo, J.C. 1988. "On strategic networks". *Strategic Management Journal* 9: 31–41.

Jarvenpaa, S.L. and Leidner, D.E. 1999. "Communication and trust in global virtual teams". *Organization Science* 10: 791–815.

Jelassi, M.T. and Beauclair, R.A. 1987. "An integrated framework for group decision support systems design". *Information & Management* 13: 143–153.

Joyce, W.F., McGee, V.E. and Slocum, J.W., Jr. 1997. "Designing lateral organizations: An analysis of the benefits, costs, and enablers of nonhierarchical organizational forms". *Decision Sciences* 28: 1–25.

Kaye, A.R. and Byrne, K.E. 1986. "Insights on the implementation of a computer-based message system". *Information and Management* 10: 277–284.

Lewis, J.D. and Weigert, A. 1985. "Trust as a social reality". *Social Forces* 63: 967–985.

Malone, T.W. and Rockart, J.F. 1991. "Computers, networks, and the corporation". *Scientific American* September: 128–136.

Malone, T.W., Yates, J. and Benjamin, R.I. 1987. "Electronic markets and electronic hierarchies". *Communications of the ACM* 30: 484–496.

Manning, P.K. 1992. "Information technologies and the police". In *Modern Policing 15*, M. Tonry and N. Morris (eds), 349–398, Chicago: The University of Chicago Press.

Manning, P.K. 1996. "Information technology in the police context: The 'sailor' phone". *Information Systems Research* 7: 52–62.

Markus, M.L. 1990. "Toward a critical mass theory of interactive media". In *Organizations and Communication Technology*, J. Fulk and C.W. Steinfield (eds), 194–218. Newbury Park, CA: Sage.

Markus, M.L. 1994. "Electronic mail as the medium of managerial choice". *Organization Science* 5: 502–527.

Miles, R.E. and Snow, C.C. 1984. "Fit, failure, and the hall of fame". *California Management Review* 26: 10–28.

Miles, R.E. and Snow, C.C. 1986. "Organizations: New concepts for new forms". *California Management Review* 28: 62–73.

Miner, A.S., Amburgey, T.L. and Stearns, T.M. 1990. "Interorganizational linkages and population dynamics: Buffering and transformational shields". *Administrative Science Quarterly* 35: 689–713.

Monge, P.R., Fulk, J., Kalman, M., Flanagin, A.J., Parnassa, C. and Rumsey, S. 1998. "Production of collective action in alliance-based interorganizational communication and information systems". *Organization Science* 9: 411–433.

Monge, P.R., Fulk, J., Parnassa, C., Flanagin, A.J., Rumsey, S. and Kalman, M. 1999. "Cooperative interagency approaches to the illegal drug problem". *International Journal of Police Science and Management* 2: 229–241.

Mowshowitz, A. 1994. "Virtual organization: A vision of management in the information age". *Information Society* 10: 267–288.

Nohria, N. and Berkley, J.D. 1994. "The virtual organization: Bureaucracy, technology, and the implosion of control". In *The Post-Bureaucratic Organization: New Perspectives on Organizational Change*, C. Heckscher and A. Donnellon (eds), 108–128. Thousand Oaks, CA: Sage.

Nohria, N. and Eccles, R. (eds) 1992. *Networks and Organizations: Structure, Form and Action*. Boston: Harvard Business School Press.

Nonaka, I. 1994. "A dynamic theory of organizational knowledge creation". *Organization Science* 5: 14–37.

Olson, M. 1965. *The Logic of Collective Action*. Cambridge, MA: Harvard University Press.

O'Mahoney, S. and Barley, S.R. 1999. "Do digital telecommunications affect work and organization? The state of our knowledge". In *Research in Organizational Behavior, Volume 21*, B. Staw and L.L. Cummings (eds), 125–161. Greenwich, CT: JAI Press.

Pinsonneault, A. and Kraemer, K.L. 1990. "The effects of electronic meetings on group processes and outcomes: An assessment of the empirical research". *European Journal of Operational Research* 46: 143–161.

Porter, M. 1985. *Competitive Advantage: Creating and Sustaining Superior Performance.* New York: The Free Press.

Powell, W.W. 1990. "Neither market nor hierarchy: Network forms of organization". *Research in Organizational Behavior* 12: 295–336.

Powell, W.W., Koput, K.W. and Smith-Doerr, L. 1996. "Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology". *Administrative Science Quarterly* 41: 116–145.

Reiss, A.J. Jr. 1971. *The Police and the Public.* New Haven, CT: Yale University Press.

Rice, R.E. 1992. "Task analyzability, use of new media, and effectiveness: A multi-site exploration of media richness". *Organization Science* 3: 475–500.

Rosenbaum, D.P. (ed.). 1994. *The Challenge of Community Policing: Testing the Promises.* Thousand Oaks, CA: Sage.

Schmitz, J. and Fulk, J. 1991. "Organizational colleagues, media richness, and electronic mail: A test of the social influence model of technology use". *Communication Research* 18: 487–523.

Scott, C. 1999. "Communication technology and group communication". In *The Handbook of Group Communication Theory and Research,* L.R. Frey, D.S. Gouran and M.S. Poole (eds), 432–472. Thousand Oaks, CA: Sage.

Seibold, D.R., Heller, M.A. and Contractor, N.S. 1994. "Group decision support systems (GDSS): Review, taxonomy, and research agenda". In *New Approaches to Organizational Communication,* B. Kovacic (ed.), 143–167. Albany, NY: State University of New York Press.

Sproull, L. and Kiesler, S. 1991. *Connections: New ways of Working in the Networked Organization.* Cambridge, MA: The MIT Press.

Stinchcombe, A.L. 1990. *Information and Organizations.* Berkeley, CA: University of California Press.

Sweeney, J.W. 1973. "An experimental investigation of the free-rider problem". *Social Science Research* 2: 277–292.

Tödtling, F. 1992. "Technological change at the regional level: The role of location, firm structure, and strategy". *Environment and Planning* 24: 1565–1584.

U.S. Department of Justice 1999. "U.S. Department of Justice, Federal Bureau of Investigation". Retrieved June 15, 2001, from the World Wide Web http://www.fbi.gov/pressrel/pressrel99/ncic2000.htm

Zuboff, S. 1988. *In the Age of the Smart Machine.* New York: Basic Books.