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Computer-mediated communication characteristics and job tasks in work groups

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COMPUTER-MEDIATED COMMUNICATION CHARACTERISTICS AND JOB TASKS IN WORK GROUPS

By

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A Dissertation submitted to the Faculty of the Claremont Graduate School in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Graduate Field of Psychology.

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Abstract of the Dissertation

COMPUTER-MEDIATED COMMUNICATION CHARACTERISTICS

AND JOB TASKS IN WORK GROUPS

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The purpose of this study is to investigate why some work groups use computer-mediated communication and some work groups do not. A logical theory to explore these phenomena is information processing theory. Computers have altered many aspects of organizations, including task structure. Information processing theory posits that structural variables like job tasks are related to organizational information technology (Galbraith, 1977).

I predicted that the application of computer-mediated communication in the work group would be correlated with job tasks. A job task is defined as a specific contextual characteristic of work duties, for example task routineness. Computer-mediated communication refers to the exchange of facts or information through a computer-based media (Rice, 1987). The work group level was selected for analysis for conceptual and data collection reasons. The job tasks explored in this study are task analyzability, task routineness, skill variety, task significance, computer-related autonomy, and computer-related feedback. The characteristics of computer-mediated communication investigated in this study include intracompany and extracompany communication, communication network connectivity, whether or not management

receives communication feedback, social-related communication use, work-related communication use, and satisfaction with communication. All 89 work groups included in this research study were located in the Los Angeles, California area and 623 employees from these work groups completed questionnaires.

Major findings from this study are that many work groups do not use computer-mediated communication, but are satisfied with their low level of computer-mediated communication capabilities. Work groups are more likely to communicate for work reasons by computer than for social reasons. Results from this study demonstrate that computer-mediated communication varies with job tasks. Thus, work groups should consider their job tasks when implementing computer-mediated communication systems. This study also indicates the computer-mediated communication is related to organization size, structure, employee characteristics, and other variables.

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CHAPTER I

INTRODUCTION

Purpose of the Study

This dissertation describes how work groups communicate by means of computers. There appear to be significant relationships between the ability to communicate via computer and the way jobs are structured. Thus this study adds to our understanding of computer applications and communication networks in the work place. This study is particularly relevant today since organizations are employing computers for communication more and more (Rice & Shook, 1983).

Cross-organizational study of computer-mediated communication among work groups is rather complicated but fascinating. The purpose of this study is to understand why some work groups use computer-mediated communication and some work groups do not. A logical theory to explore this phenomena is information processing theory. The information processing theory of organization design, formulated as a contingency theory, suggests that an appropriate matching of contextual variables (such as task demands) with organizational arrangements (such as communication structures and media) enhances organizational performance (such as effectiveness and efficiency) according to Rice, Hart, Torobin, Shook, and Tyler (1989). The current study provides an evaluation of information processing theory. Specifically, this study investigated the relationship of specific contextual variables or tasks with

organizational arrangements such as computer-mediated communication.

Galbraith (1977) suggested that tasks are organizational design variables that create structure for work roles. A job task is defined as a specific contextual characteristic of work duties. Job dimensions examined in this study included task analyzability, task routineness, skill variety, task significance, computer-related autonomy, and computer-related feedback. Job tasks may drive work groups to adopt different computer configurations. Hence, the impact of job tasks on computer use may explain some of the variations in computer-mediated communication in the work place.

Research demonstrates that job tasks can affect computer-mediated communication. For example, task environments with more task analyzability were associated with significantly more on-line database usage (Rice et al., 1989). Rice (1987) defined computer-mediated communication as the exchange of facts or information through a computer-based medium. Computer-mediated communication characteristics evaluated in the current study are intracompany and extracompany communication, communication network connectivity, whether or not management receives communication feedback, social-related communication use, work-related communication use, and satisfaction with communication. The current project investigated six hypotheses describing the possible relationships between job tasks and computer-mediated communication needs in a broad sample of work groups.

Significance of the Study

According to Danziger (1985), the computer has been identified as the key technological device producing the third great revolution in human history. The plow was the key device for the agricultural revolution and the machine was the key device for the industrial revolution. The impact of computer technology on society is an extraordinarily important area for social science research (Danziger, 1985; Gutek, Bikson, & Mankin, 1984). For instance, computers make a major difference in the way clients and customers are served and how organizations are designed, and managed (Robey, 1982). Computer technology has revolutionized the job and transformed social patterns in the work place (Kling, 1984). As an example, computerized bank telling allows customers to complete banking transactions without direct personal contact face-to-face with banking personnel. Similarly, computerized inventory control allows salespeople to make retail orders without talking with product distribution personnel. In order for organizations to use their computer systems most efficiently, social work patterns and communication patterns must be considered (Galbraith, 1974).

In general, communication is one of the most important processes in organizations because communication enables workers to coorient and coordinate their activities towards accomplishing the organizations goal (Katz & Kahn, 1978). However, in the past, research examining the relationship between technology and communication was often neglected (Porter & Roberts, 1976).

Despite the rapidly growing body of knowledge in the area of computer application, a review of the current research literature shows that technology and communication still tend to be neglected. Technology does in fact influence communication patterns and processes in important ways (Klauss & Bass, 1982). In complex technological environments special communication roles and needs frequently emerge to compensate for and deal with increasing task uncertainty or lack of predictability of the work (Klauss & Bass, 1982). Yet, little research exists on the relationship between job tasks and computer-mediated communication. In response to this lack of research, several hypotheses on the relationship between job tasks and computer-mediated communication characteristics were developed for the current study. A goal was to suggest policies and guidelines for computer communication strategies that are compatible with the task structure of work groups.

Contingency Organization Theory

According to contingency organization theory, the relationship between organizational structure and effectiveness is contingent on moderating variables both inside the organization and in the outside environment. Lawrence and Lorsch (1967) indicated three basic premises of contingency theory: (1) There is no "one best way" to design an organization; (2) The more successful organization and/or its subsystems "fit" environmental demands; (3) When the organization is properly designed the needs of the organizational members are better satisfied.

The pioneering work of Joan Woodward (1965) was the starting point for contingency theory (Luthans, 1985). In the work place, Woodward (1965) asserted that technology plays a role equal to, if not more important than, the roles of structure and processes. Woodward's (1965) initial study encompassed about 100 British firms which were classified under one of the three following distinct types of productive technological environments: (1) unit or small batch, (2) large batch and mass, and (3) process.

After classifying the firms according to the type of technology employed, Woodward examined the internal variables of structure, human relations, and status. Woodward concluded that among the organizational characteristics showing a direct relationship with technical advance were the length of the line of command, the span of control of the chief executive, the percentage of total turnover allocated to the payment of wages and salaries, and the ratios of managers to total personnel. Furthermore, Woodward (1965) emphasized that technology, although not the only variable affecting organizations, was one that could be isolated for study without too much difficulty.

Burn's and Stalker's study of 20 British firms has also contributed to empirical evidence supporting contingency organization theory. Burns and Stalker (1961) defined mechanistic organizations as highly specialized and centralized firms which encouraged loyalty and obedience, in contrast to organic organizations which were vertically coordinated, had unstructured job definitions, and utilized communication based on advice rather

than commands. Hence, mechanistic organizations were effective in stable environments, while organic organizations were effective in dynamic environments.

Lawrence and Lorsch (1967) analyzed the internal environment of organizations according to the dimensions of differentiation and integration. They defined differentiation as different cognitive and emotional orientations among members of different units and the difference in formal structure among the units like time orientation, goal orientation, formality of structure, and interpersonal orientation. Integration was defined as the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment like reward structure and conflict resolution modes. They found that the internal organization differentiation and integration variables were interrelated with one another and with external environmental variables.

Other contributions to contingency organization theory include Thompson's (1967) work which suggested that the organizations generate various mechanisms to reduce environmental uncertainty. For example, organizations develop slack resources to cope with unexpected emergencies. Perrow's (1970) model of contingency theory relates the problem's analyzability to technological environment. More recently, researchers have been devoted to operationalizing the relationship between structural variables and the environment by way of quantitative modeling techniques, e.g., Sang, Luthans, and Olson, 1982.

However, not all research has been consistently supportive of contingency theory. For example, Hickson, Pugh, and Pheysey (1969) point out that small organizations are more affected by technology than larger organizations. Porter, Lawler, and Hackman (1975) report that it is particularly difficult to estimate how many structural features have been caused by technology, how much technology has been the effect of structure, and especially, how much other features have affected or caused both the nature of technology and the design of organizations. Furthermore, it is difficult to summarize research on contingency organization theory because concepts like technology and fit are not clearly defined and are measured in different ways in various empirical studies (Gutek, 1989).

Information Processing Theory

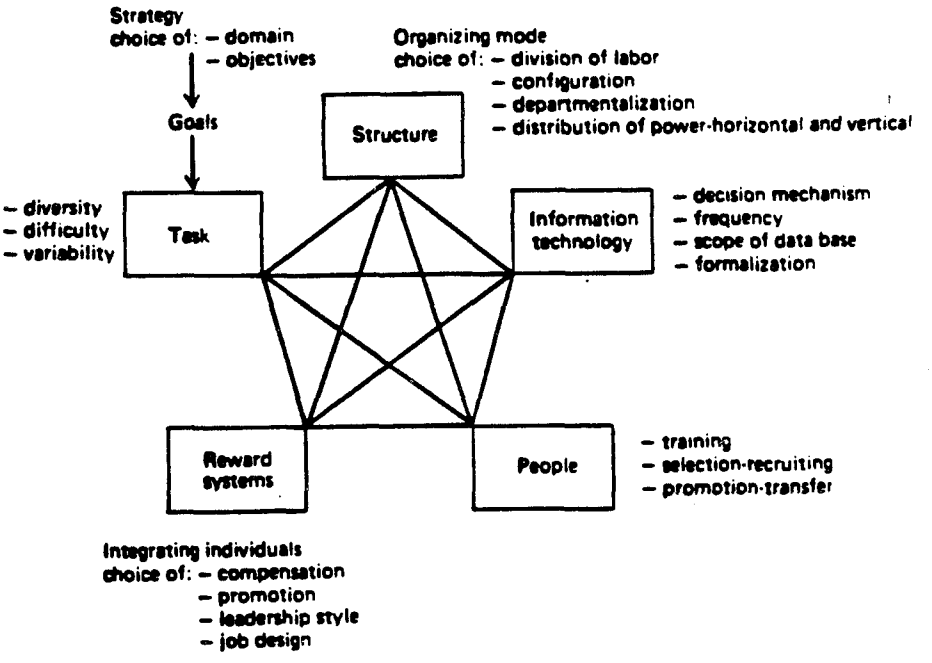
Besides the now classic studies, more recent contributions to contingency organization theory include Galbraith's (1974) development of information processing theory. Galbraith tied Lawrence and Lorsch's (1967) work on differentiation and integration to an information processing perspective. According to Galbraith, an organization needs to balance differentiation with integration. That is, the difference in cognitive and emotional orientation among managers in different functional departments needed to be balanced with integration or the quality of the state of collaboration that exists among departments so that the unity of effort can be achieved to meet the demands of the environment.

For example, Galbraith suggested that as an organization grows and attempts to cope with environmental complexity and uncertainty, it tends to become more differentiated by adding diverse subunits. This increased differentiation will then cause an imbalance with the existing integrating mechanisms and a breakdown in the necessary information processing that is required for successful performance. Hence, a basic proposition is that the greater the uncertainty of the task, the greater the amount of information that has to be processed between decision makers during the execution of the task (Galbraith, 1974).

To create a balance between differentiation and integration, Galbraith suggested that an organization must reduce its need to process information by adding more slack resources or create self-contained tasks. Also, an organization has the option of increasing its capacity to process information systems or creating lateral relationships that cut across lines of authority. Galbraith (1974), consequently, conceptually linked tasks with information technology. Moreover, Galbraith suggested that effective organizations would select information technologies that were appropriate for the organizational task. Effective organizations, hence, create a correct fit between information technology and tasks.

Galbraith (1977) framed information processing theory within the organization design presented in Figure 1. His organizational design includes interrelated choices: task, structure, information technology, people, and reward systems. Galbraith

Figure 1. Galbraith's Organization Design. This model provides a framework for information processing theory.



stresses that the basic proposition of the organizational design theory is choice; that is, the organization's decision makers have the capacity to make choices within each of the five areas. To illustrate, if a task becomes increasingly uncertain, then a greater amount of information has to be processed between organizational decision makers during the execution of the tasks. Therefore, to increase information processing a decision maker can invest in increasing vertical information systems such as increasing computer-mediated communication.

Through information processing theory, Galbraith makes a contribution to contingency organization theory; however, a problem with Galbraith's model of contingency relationships is a lack of empirical support (Luthans, 1985). Recently, research in the area of computer-mediated communication has supported some aspects of information processing theory. Specifically, analyzability has been shown to be related to various types of computer-mediated communication channels (Rice et al., 1989; Rice & Shook, 1989). The current study sought to evaluate the relationship between task and information technology that is hypothesized by information processing theory. This study examined if various job tasks are related to different information technology characteristics, specifically computer-mediated communication characteristics.

Unit of Analysis

Organizations can be studied on several levels such as micro, (the individual level), or macro, (the entire organizational

level) (Huse & Bowditch, 1977). In the current project, the work group was selected for the level of analysis for several reasons: (1) researchers have found the work group level useful when conceptualizing organizational issues (Fry & Slocum, 1984); (2) previous research has explored the impact computers have on work groups (Gutek, Bikson, & Mankin, 1984); (3) it is easier for an individual to speak knowledgeably about specific aspects of the work group of approximately 4 to 20 people than about a whole organization (Gutek, 1987); (4) acquiring information about computers available to a work group is easier than for the whole organization (Gutek, 1987); (5) computers are distributed unevenly throughout the organization and although the same is true of work groups, the variation is probably less (Gutek, 1987), and (6) it is easier and more economical to obtain a large sample of work groups than organizations (Gutek, 1987).

A work group is defined as the smallest formal group of personnel within an organization and represents a relatively permanent arrangement of people and equipment (Fry & Slocum, 1984). In the present study, a work group was operationalized as a group of 4 to 30 people, in at least two levels of organizational hierarchy, engaged in some common tasks or process. By using two levels of hierarchy in data collection, a richer information base is created.

Job Tasks

Galbraith (1977) argues that organizational decision makers have the option of choosing job tasks. Contingency organization

theory, information processing theory, and job design literature were reviewed in order to evaluate job task measures. Traditionally, contingency theory and information processing theory has included task analyzability and task routineness as variables. Task analyzability refers to the way that individuals respond to problems that arise in the process of task completion, and task routineness refers to the frequency of unexpected events that occur in the process of task completion (Rice et al., 1989).

In the area of job design, Hackman and Oldham's (1976) model has dominated job design research (Luthans, 1985). According to this model, certain characteristics contribute to certain psychological states and the strength of employee's need for growth has an important moderating effect. The core job dimensions in Hackman and Oldham's model are:

1. Variety of skill refers to the degree to which the job requires the person to perform different tasks and involves the use of a number of different skills, abilities, and talents.
2. Identity of task involves a complete module of work. That is, the person can do the job from beginning to end with a visible outcome.
3. Significance of task is concerned with the importance of the job. Does the job have a significant impact on others - both internal and external to the organization?

4. Autonomy refers to the amount of freedom, independence, and discretion the person has in areas such as scheduling the work, making decisions, and determining how to do the job.
5. Feedback involves the degree to which the job provides the person with clear and direct information about job outcomes and performance.

A host of researchers (Dunham, 1977; Rousseau, 1977; Rousseau, 1978, Wanous, 1974) have explored the various task characteristics of job design in the work place with factor analysis, correlations, and other statistical methods. Despite research support, Hackman and Oldham's model of task characteristic job design has received much criticism. Roberts and Glick (1981) point out problems with the research on task characteristics job design: theoretical statements of the model are vague and too general, situational effects have been ignored, and adequate types of instruments have not been developed to assess the model's constructs. Often job task measures were designed for blue collar work settings, and do not translate very well to white collar work settings or information technology work environments.

In addition, Roberts and Glick (1981) expressed a major concern about the core task characteristics of Hackman and Oldham's model, variety, autonomy, identity, feedback, and task significance, since these characteristics were based on job classifications from organizational documents having unknown

validity. Hackman and Oldham, moreover, reduced their core task characteristics into a single Motivating Potential Score (MPS) that could be relatively high despite low positive values on one or more of the five job dimensions (Roberts & Glick, 1981). To further complicate the problem, Hackman and Oldham used only the top and bottom third of their data sample for various statistical analysis on all job characteristic measures. The elimination of data is appropriate for exploratory analysis but may reduce the ability to generalize findings and the ability to replicate findings in future studies (Roberts & Glick, 1981).

Because of these criticisms, researchers frequently substitute various job tasks for the core job dimensions used by Hackman and Oldham. For instance, Rousseau (1978) indicates that task identity, task significance, autonomy, dealing with others, skill variety, feedback from agents, feedback from the job, and learning were important job characteristics affecting employees' attitudes and behavior. Majchrzack, Collins, and Mandeville (1987) report that job predictability, job autonomy, and job interdependence were characteristics that affect computer-assisted design implementation in the work place. Some authors have concluded that in most cases some sort of multidimensional factor solution appears to be most appropriate when analyzing a set of job characteristic measures (Dunham, 1976; Green, Armenakis, Marber, & Bedeian, 1979).

After evaluating the contingency theory, and information processing literature as well as various job characteristics

research, four job characteristics or tasks were selected for the current project. Four particular job tasks have been frequently cited in organizational research literature and were selected for study:

1. Task analyzability: the uniformity of operating procedures (Pugh, Hickson, Hinings, & Turner, 1968).
2. Task routineness: the degree to which a job is repetitive (Withey, Daft, & Cooper, 1983).
3. Skill variety: the degree to which the job requires the person to perform different tasks and use a variety of skills, abilities, and talents (Hackman & Oldham, 1976).
4. Task significance: the importance of the job (Hackman & Oldham, 1976). In other words, does the task have a significant impact on others within the organization?

Table 1 compares job characteristics reported in the research literature and used in the current project which shows that various job characteristics converge at the operational level.

Job characteristics design research repeatedly emphasized autonomy and feedback as important aspects of work (Hackman & Oldham, 1976). In addition, many authors submit that when computers are used to control workers in the work setting, there are important ethical ramifications (e.g., Frese, 1987; Rice, 1987). Thus, computer-related autonomy and excessive computer-related feedback measures could be important aspects of job tasks and organization application/control of computers.

Taking into consideration the importance of autonomy, feedback, and computer control issues, two computer-related job characteristics used in this study were:

1. Computer-related autonomy: the amount of self-governing computer interaction an individual has.
2. Computer-related feedback: computerized feedback on transactions and errors the individual makes during computer use.

Job characteristics and various aspects of computer application have been investigated previously. One study showed that specificity of task was increased during computer use; that is, users had less freedom in choosing language, symbols, androutineness because the computer required an inflexible format. However, these same users perceived more task variety in their jobs (Robey, 1979). In another study, very few managers thought that computer-users work at a lower skill level, had less skill variety, or received less feedback than they had before their computer systems were introduced in the office (Gutek, Bikson, & Mankin, 1984). Stasz (1986) reported that skill variety, task feedback, task pace, and job related stress can affect work groups use of computers. Task analyzability's relation to channel selection of computer-mediated communication has been evaluated (Rice et al., 1989).

In the current study, I evaluated six hypotheses which explored the relationship among computer-mediated communication patterns and six job tasks: task analyzability, task routineness,

Table 1

Job Characteristics Reported in the Research Literature

	Hackman & Oldham (1976)	Majchrzack, Collins, & Mandeville (1987)	Perrow (1983)	Pugh, Hickson, Hinings, & Turner (1968)	Rousseau (1978)	Withey, Daft, & Cooper (1983)	Current Project
Variety of Skill	+				+		+
Significance of Task	+				+		+
Autonomy	+	+			+		+
Feedback	+				+		+
Identity of Task	+				+		
Dealing With Others							
Job Predictability		+					
Job Interdependence		+					
Task Analyzability			+	+		+	+
Task Routiness			+			+	+

variety of skill, significance of task, computer-related autonomy, and computer-related feedback. During hypotheses generation, characteristics of both job tasks and computer-mediated characteristics were considered. It is conceivable that work groups with more task analyzability and more task routineness could reflect a work environment more structured and perhaps more defined. In addition, more computer-related transaction feedback and computer-related error feedback could also be hallmarks of a narrowly defined task environment.

On the other hand work groups with more skill variety and more computer-related autonomy could reflect a less confined task structure. Furthermore, it is possible that work groups which have more skill variety and computer-related autonomy are more valued so such work groups report more task significance. Hence, it is possible that similar job tasks, i.e. computer-related transaction feedback and computer-related error feedback, demonstrate similar computer-mediated communication patterns. In summary, considerations of how job task could be related to computer-mediated communication were carefully pondered during hypothesis generation.

Computer-Mediated Communication

The research literature on communication is rich. The term "communication" is freely used and everyone seems to know what communication is but defining communication has been a problem. Most definitions of communication in organizational behavior literature stress the use of symbols to transfer the meaning of

information (Kelly, 1974). Although effective communication is a basic prerequisite for the attainment of organizational goals, it remains one of the largest problems facing organizations today (Katz & Kahn, 1978).

Computer systems have revolutionized functional processes in organizations (Porter & Miller, 1985). For example, companies now have computerized remote terminals to assist their salespeople, automated order processing, telemarketing, and computerized flexible manufacturing (Porter & Millar, 1985). The new communication technologies will likely have a major effect on work and organizations (Galbraith, 1974). Indeed, Galbraith (1977) argues that computer communication can play a significant role in various organizational areas, including task structure. Thus, computer communication is paramount in coordinating organizations (Galbraith, 1974; Porter & Millar, 1985).

As organizations' computer networks proliferate, computer-mediated communication may become a mainstay of organizational communication (Siegel, Dubrovsky, Kiesler, & McGuire, 1986). Thus, it is sensible to study the behavioral and social implications of using computer-mediated communication. According to Siegel, Dubrovsky, Kiesler, and McGuire, research on the behavioral and social effects of computers for communication falls into four categories: technology assessment, technical capabilities studies, social psychological studies, and organizational studies. Technical assessment studies have investigated the potential impact computer networks have on

society and social institutions (Hiltz & Turoff, 1978; Lancaster, 1978). Technical capabilities studies have examined the characteristics of communication as a function of network software variables (Thomas & Carroll, 1981; Turoff, 1982). Social psychological studies investigate such issues as the social context in which people communicate and the effects of computer-mediated communication on interpersonal relationships (Frese, 1987; Williams, 1975). Organizational studies have examined computer-mediated communication on jobs, job performance, and managerial functioning (Christie, 1981; Zuboff, 1982).

The present project, an examination of the characteristics of computer-mediated communication in work groups, falls into the fourth category of organizational studies. Although the virtues of computer-mediated communication for organizations have been touted by many (Culnan & Markus; 1987; Seigal et al., 1986), computer-mediated communication has not reached its full potential within organizations. Organizations often have not integrated their computer systems into effective telecommunication networks (Laudon, 1986). Since little is known as yet about how groups and organizations use computer-mediated communication in the work place, this current study sought to determine if various components of work task structure are related to characteristics of computer-mediated communication in organizations.

The communication characteristics selected for evaluation in this current project were conventional communication themes

observed in organizational literature. However, these communication characteristic have not been adequately explored in the context of computer-mediated communication at the work group level. The computer-mediated communication characteristics addressed in this current study involved intracompany and extracompany communication, communication network connectivity, whether or not management receives communication feedback, social-related communication use, work-related communication use, and satisfaction with communication.

Intracompany and extracompany computer-mediated communication. To understand an organizational communication system, it is important to consider the influence of both internal and external organizational factors (More & Laird, 1985). This is largely because organizations, like individuals, are not isolated entities in social structures (More & Laird, 1985). Open systems theory stresses the importance of external organizational communication (Katz & Kahn, 1978; Kreps, 1986). As Weick (1979) indicates, relevant organizational environments can be conceptualized as information environments in that the relevant environments provide organizational members with important information to process. Indeed, Bacharach and Aiken (1980) suggest boundary spanning does affect communication patterns of managers.

A computer-mediated communication system is a series of circuits formed by computers linked together. Computer-mediated communication systems may include numerous organizations, or

embrace only one organization, be restricted to a major portion of an organization, or involve only a small unit within an organization. According to Rice (1987), at the interorganization level computer-mediated communication systems can increase the capabilities and diversity of organizational functions by extending organizational boundaries. Moreover, at the intraorganizational level, computer-mediated communication systems significantly increase the amount and diversity of communication linkages. Computer-mediated communication systems have complemented not only vertical and redundant communication among organization members but also horizontal communication and coordination. Computer-mediated communication systems have been shown to improve many aspects of organizational information processing (Rice, 1987).

Since computer-mediated communication systems can influence organizational communication, coordination, and information processing, it seems logical that intracompany and extracompany computer-mediated communication is an important factor of information technology. Computerized product ordering systems, which eliminate a sales person verbally placing an order with a warehouse clerk, are examples of how computer-mediated communication influences organization communication, coordination, and information processing. In addition, information processing theory, which implies that tasks are related to information technology, suggests it is possible that the intracompany and extracompany computer-mediated communication system is related to

various job tasks. It is conceivable that task environments with more skill variety need more information in order to produce output. Hence, computer-mediated communication inside and outside the company could enhance task environments high in skill variety. Likewise, task environments with more task significance and computer-related autonomy could require more information to maintain their valued status and autonomy. Thus, computer-mediated communication could be a valuable tool for gathering information.

On the other hand, work groups with more task analyzability, routineness, computer-related transaction feedback, and computer-related error feedback possibly could have job designs so narrowly focused that an increase in information quantity or quality could disrupt the task system. Consequently, computer-mediated communication would not be desired in these types of task environments.

> H1A: At the work group level, more skill variety, task significance, and computer-related autonomy will be each associated with more intracompany computer-mediated communication. More task analyzability, task routineness, computer-related transaction feedback, and computer-related error will be each associated with less intracompany computer-mediated communication.
>
> H1B: At the work group level, more skill variety, task significance, and computer-related autonomy will be each linked to more extracompany use of computer-mediated communication, whereas, more task analyzability, task routineness, computer-related transaction feedback, computer-related error will be each associated with less extracompany computer-mediated communication.

Computer-mediated communication network connectivity. Communication networks are regular patterns or pathways of who

communicates with whom (More & Laird, 1985). Computer networks in organizations are important components of organizational communication because they provide an infrastructure for communication (More & Laird, 1985). In other words, the more linkages in a computer the more possibilities exist for communication. A computer system that links all hardware components in an organization, for example, has more potential for computer-mediated communication than a computer system which can link only a few components. Computer-mediated connectivity is defined as the degree which computer hardware components can be linked together, thus, creating computer networks which make computer-mediated communication possible. The way a group structures its networks will determine the ease and availability with which members can transmit information (Robbins, 1979).

As with all other organizational structures, some forms of networks seem to handle communications more effectively and efficiently than others (Wenburg & Wilmont, 1973). Authors report that all-channel communication networks (everyone interconnected with everyone else, or maximum connectivity), are superior to less well connected communication networks (Huse & Bowditch, 1977; Wenburg & Wilmont, 1973). Thus, computer connectivity, the degree to which computer hardware components can be linked together, is an important factor in creating networks and communication capabilities via computers.

Huse and Bowditch (1977) report that the all-channel communication network which include all members of the group is

superior over an incomplete channel network which does not include all members of the group. Informational speed is fast in the all-channel network because all the members of the group receive information as quickly as possible. Hence, the all-channel network tends to stabilize the organization. However, communication distortion is high in all-channel networks due to multiple inputs (Huse & Bowditch, 1977). Positive aspects contributing to the success of the all-channel communication network is that it tends consistently to produce the best decisions and user satisfaction is extremely high (Wenburg & Wilmont, 1973). According to Wenburg and Wilmont, one reason why the all-channel network may develop in contrast to another network form is because of task; that is, information needs of an individual (or group) center around task requirements. In addition to conventional communication literature, Long (1983) suggested that within a company increases in computer hardware connectivity can increase managers communication with employees. Long points out that network connectivity of computer hardware is related to job task characteristics.

Since communication networks may be related to job tasks like analyzability, and routiness (Wenburg & Wilmont, 1973) and the fact that networks are important in organizational communication (More & Laird, 1985), it is reasonable to assume computer connectivity is an essential component of information technology. Hence, according to information processing theory, computer connectivity could be related to job tasks. It is possible that

work groups with more skill variety, task significance and computer-related autonomy could require more information in order to produce output. Computer-mediated communication could enhance these types of work groups. Computer-mediated communication connectivity could be important in such task environments. Conversely, work groups with more task analyzability, routineness, computer-related transaction feedback, and computer-related error feedback work processes could be so narrowly focused that increased information could disrupt the task system. Computer-mediated communication, therefore, would not be desired in these work groups.

> H2: At the work group level, more skill variety, task significance, and computer-related autonomy will be each related to more computer-mediated communication network connectivity. More task analyzability, task routineness, computer-related transaction feedback, and computer related error will be each associated with less computer-mediated communication network connectivity.

Whether or not management receives computer-mediated communication feedback. Despite wide usage of the feedback concept, there is little consensus on the definition of feedback, either inside or outside of organizational studies (Cusella, 1988). According to Cusella (1988), a general definition of feedback is messages conveyed to receivers about their task performance. Furthermore, communication feedback can vary from immediate fixed response of acknowledgement and acceptance of the initial message to reports of its inadequacy and attempts to alter its character. Feedback is an important feature of communication

because without feedback, communication loses much of its steering capacity (Wiener, 1956).

Feedback is central to our understanding of organizational behavior in general and of organizational communication specifically (Cusella, 1980). As a consequence, it should be of little surprise that feedback is a widely used concept in management decision making, planned organizational change, management control, organizational design, training, performance appraisal, motivation, and organization communication (Cusella, 1988). In addition, computer-mediated communication feedback in organizations is becoming increasingly important (Cusella, 1988).

Considering that communication feedback is paramount for management's decision making process and organizational design and communication process, as well as the growing importance of computer-mediated communication, it is probable that computer-mediated communication feedback to management is a significant component of information technology in organizations. Hence, consistent with information processing theory, it is possible that job tasks are linked with management reception of computer generated feedback. Specifically, task environments with more task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback could be conducive to close regulation by management because the job tasks are narrowly defined. A work group of bank tellers, for example, could have highly analyzable, routine task structure which would demand extremely extensive computer-related transactions and

computer-related error feedback. In such work groups, computer generated feedback used by management could be expected. On the other hand, work groups with more skill variety, task significance and computer-related autonomy could have such varied task structure that extensive management feedback by computer could be difficult or inappropriate.

> H3A: At the work group level, more task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback will be each linked to more use by management of computer-mediated communication feedback on the individual's performance. On the contrary, more skill variety, task significance, and computer-related autonomy will be each related with less use by management of computer-mediated communication feedback on the individual's performance.

> H3B: At the work group level, more task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback will be each related to more use of management's computer-mediated communication feedback on the work group's productivity. More skill variety, task significance, and computer-related autonomy will be each related with less use by management of computer-mediated communication feedback on the work group's productivity.

Social-related and work-related computer-mediated communication. Is computer-mediated communication social-related or only work-related? Social-related computer-mediated communication involves communicating by computer, information whose content is emotional and/or conducive to friendliness, companionship, or pleasant cooperative relations; work-related computer-mediated communication involves communicating by computer information whose content is connected to job activities or duties.

Rice and Love (1987) report that approximately 30 percent of the content of various transcripts of public and organizational computer-mediated communication comprises social and emotional information. Several factors like filtering of nonverbal cues (Kiesler, Siegel, & McGuire, 1984) and increased connectivity (Rice, 1987) may enhance social-related computer-mediated communication.

In addition, some authors would argue that both social-related and work-related computer-mediated communication is associated to job tasks (Daft & Lengel, 1984; Daft & MacIntosh, 1981). For example, Daft and MacIntosh (1981) reported that the amount of computer processing increased with both task analyzability and task variety. Furthermore, Daft and Lengel (1984) would argue that both social-related and work-related computer-mediated communication was dependent on the degree of task analyzability and on task uncertainty. If task analyzability and task variety were related to information processing, it is possible that other job tasks are also related to both social-related and work-related computer-mediated communication.

It is possible that task environments with more skill variety, task significance and computer-related autonomy could have a need for more social and work-related communication because of a more complex task structure. One example of such a complex task environment could be a marketing work group which has to coordinate information from data processing on marketing statistics, information from sales on the current sales status of

products, information from research and development on products possible to produce, etc. Due to the need to coordinate information from different sources, work groups with more skill variety, task significance and computer-related autonomy could be expected to use social and work-related computer-mediated communication.

However, more constrained work environments including more analyzability, routineness, computer-related transaction feedback, and computer-related error feedback could have such specialized computer functions that social or even work-related communication by computer could be impossible. A hotel management office is a good example of a work group with such a constrained task environment. The hotel management office could employ a sophisticated computerized reservation system which could not be used for social or other work-related communication.

> H4A: At the work group level, more skill variety, task significance, and computer-related autonomy will be each related to more social-related computer-mediated communication. More task analyzability, routineness, computer-related transaction feedback, and computer-related error feedback will be each linked to less social-related computer-mediated communication.

> H4B: At the work group level, more skill variety, task significance, and computer-related autonomy will be each related to more work-related computer-mediated communication. On the other hand, more task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback will be each associated with less work-related computer mediated communication.

Satisfaction with computer-mediated communication.

Virtually every field study has found new and increased

communication among individuals who use electronic media (Culnan & Markus, 1987). Does an increase in communication among individuals who use electronic media imply that more and more users are satisfied with computer-mediated communication? Rice (1987) reports numerous factors associated with satisfaction with computer-mediated communication including task routineness, task uncertainty, equivocality, and knowledge of work predictability. Consequently, other job tasks may be related to satisfaction of computer-mediated communication.

Complex work environments including high skill variety, task significance, and computer-related autonomy could need more information. Then work groups with such complex task environments could be more satisfied with computer-mediated communication because computer-mediated communication could supply an additional mode for information gathering. On the other hand, an increase of information could be disruptive to work groups with more task analyzable, routineness, computer-related transaction and computer-related error feedback. Hence, such work groups could reject computer-mediated communication.

> H5: At the work group level, more skill variety, task significance and computer-related autonomy will be each related to more satisfaction with computer-mediated communication. At the work group level, more task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback will be each associated with less satisfaction of computer-mediated communication.

Job Tasks Prediction of Computer-Mediated Communication

In concordance with information processing theory, it is possible that certain job tasks are related to particular computer-mediated communication characteristics. If indeed tasks are related to computer communication, then it is reasonable to believe that job tasks could account for variance in certain computer mediated communication characteristics.

> H6: At the work group level, the set of seven job characteristics (task analyzability, task routiness, skill variety, task significance, computer-related autonomy, computer related transaction feedback and computer-related feedback) can statistically predict each of the separate computer-mediated communication characteristics, intra and extra-company communication, communication network connectivity, whether or not management receives communication feedback, social-related communication use, work-related communication use and satisfaction with communication.

Summary of Hypotheses

It is expected that more skill variety, task significance, and computer-related autonomy will be associated with more intracompany and extracompany communication, communication network connectivity, social-related communication use, work-related communication use, as well as satisfaction with communication. On the contrary, more skill variety, task significance, and computer-related autonomy will be each related with less use by management of communication feedback. In addition, more task analyzability, task routineness, computer-related transaction feedback, and computer-related error will be associated with less intracompany and extracompany communication, communication network

connectivity, social-related communication use, work-related communication use, as well as satisfaction with communication. More task analyzability, task routineness, computer-related transaction feedback and computer-related error will be associated with more use by management of communication feedback. Finally, the set of job tasks will statistically predict each of the computer-mediated communication characteristics. A summary of all six hypotheses and expected results is presented in Table 2.

Table 2

Summary of Hypotheses

Hypotheses	Computer-Mediated Communication Characteristics	Type of Analysis	Job Tasks T1	T2	T3	T4	T5	T6	T7
H1A:	Intracompany	Correlation	-	-	+	+	+	-	-
H1B:	Extracompany	Correlation	-	-	+	+	+	-	-
H2:	Network Connectivity	Correlation	-	-	+	+	+	-	-
H3A:	Does Management Receive Individual's Feedback by Computer	Correlation	+	+	-	-	-	+	+
H3B:	Does Management Receive Group's Feedback by Computer	Correlation	+	+	-	-	-	+	+
H4A:	Social-Related	Correlation	-	-	+	+	+	-	-
H4B:	Work-Related	Correlation	-	-	+	+	+	-	-
H5:	Satisfaction	Correlation	-	-	+	+	+	-	-
H6:	All Communication Variables	Multiple Regression	R	R	R	R	R	R	R

T1 = Task Analyzability
T2 = Task Routiness
T3 = Skill Variety
T4 = Task Significance
T5 = Computer-Related Autonomy
T6 = Computer-Related Transaction Feedback
T7 = Computer-Related Error Feedback

Predicted Relationships

+ = positive relationship ($p < .05$)
- = negative relationship ($p < .05$)
R = multivariate relationship ($p < .05$)

CHAPTER II

METHOD

Data

The data used in this study were collected in the summer of 1988 as part of a study investigating organizational structural contingency theory and computer technology. The study was funded by the National Science Foundation, Information Impact Program, Number IRI-8714768 and the Principal Investigator was Barbara A. Gutek. All 49 organizations included in this research study were located in the Los Angeles, California area and participated on a volunteer basis. Then various work groups within these organizations were contacted and again participated on a volunteer basis. Within the 49 organizations, often more than one work group participated, producing a sample of 89 work groups. From the 89 different work groups, 623 employees completed questionnaires. Furthermore, one manager from each of the 89 work groups was interviewed.

Groups were recruited from personal referrals and soliciting a large number of organizational managers. That is, managers of some work groups were aware of the research and offered to join the project. In other cases, research members of the project simply contacted managers of various types of organizations requesting project participation. The major advantage of this nonprobability sampling plan was economy of time and financial costs. The sample, therefore, was not random, but did include a diverse mixture of white collar work groups.

The majority of the work groups participating in the current study were service oriented. For example, a city police department, a city fire department, a hospital laboratory, hospital pharmacies, accounting offices, city children services, and libraries were included in the work group sample. The work group sample also encompassed car dealership offices, marketing departments and engineering departments as well as research and development work groups. On average there were ten individuals in each work group, of whom only seven returned their questionnaires. By research design, approximately 25 percent of the work group sample fell into each of the following four categories: administrative (20 work groups), technical professional (23 work groups), text professional (22 work groups), and secretarial or clerical or technical support (24 work groups).

The methodology problems associated with secondary analyses like this one are similar to primary analysis problems, but perhaps more acute. In both primary and secondary analyses the researcher must carefully consider data selection validity and reliability problems. In this study, problems of secondary analysis were minimized in several ways. The most important validity problem usually associated with secondary analyses is the misfit between the collector's and user's interpretation of concepts. I became a member of the research team during the data collection stage so conceptualization was not a major concern. Since the data were collected for exploring structural contingency theory, I decreased the misfit of conceptualization by using

information processing theory which is categorized as one form of structural contingency theory. In addition, measures were carefully scrutinized to be certain that they were appropriate and psychometrically sound.

Since reliability is also an important concern with secondary analysis, the data collectors were well trained and conscientious. Furthermore, the data were carefully cleaned and screened for inconsistencies. Since instrument formatting can affect results, both instruments used in this study were examined and are presented in Appendix A and B. Finally, frequency distributions on all variables used in this study are presented in Appendix C in order to exhibit any skew or normal distribution problems.

Measures

Two instruments were used for data collection. The first was a 91-item questionnaire (Appendix A) completed by individual employees in the selected work groups. The second method of collecting data entailed a face-to-face interview with a manager or supervisor of the work group. The interview schedule contained 156 items on various topics related to computers and organizations (Appendix B). Both the questionnaire and interview schedule were developed by a research group at the Claremont Graduate School under the direction of Barbara A. Gutek. In both instruments a variety of questions were incorporated from organizational literature as well as original questions generated by the research group. Before data collection, both instruments were pre-tested and data collectors were trained to use the instruments properly.

Objective and subjective measures were incorporated in the interview questionnaire. In order to offset potential respondent's bias on subjective questions, a supplementary interviewer rating system was employed. For example, it may be difficult for a respondent to evaluate the task significance of their work group since to some degree the respondent must compare their work group to other work groups with which they may not be familiar. While it may be difficult for an interviewee to rate the task significance of their work group, the interviewer has a broader perspective and may be less biased.

Measurement of Independent Variables

The primary independent variables in this study are job tasks. An index of various job tasks were developed from several interview and survey questions relating to task analyzability, task routineness, skill variety, task significance, and computer-related autonomy. An exploratory principal components factor analysis produced a one factor solution having an eigenvalue greater than one for each separate index. The quality of the scales was checked by reviewing the correlations of each item with the other items on the scale. Indices with only two items demonstrate the same inter-item correlation since the two items are correlated only with each other. For example, network connectivity two items (connectivity and interview rating of connectivity) both have inter-item correlations of 0.83. In addition to reviewing the corrected item-total correlation, reliability analyses were conducted for each factor. Table 3

Table 3

Factor Analysis and Reliability Analysis for Job Task and Computer-Mediated Communication Characteristics Scales

Scale	Item #	Items in Scale	Eigen Value % (Variance Explained)	Item-Total Correlation	Unstandardized α	Cronbach's Standardized Item α Reliability	N
1. Task Analyzability	I106	- Known way to do major work	3.00 (74.9)	.73	.89	.89	89
	I107	- Body of knowledge to guide unit		.70			
	I108	- Rely on established procedures		.82			
	I109	- Understandable sequence of steps		.77			
2. Task Routineness	I101	- Same tasks from day to day	3.41 (68.3)	.58	.88	.88	89
	I102	- Work of group is routine		.75			
	I103	- Same job most of the time		.74			
	I104	- Repetitive activities in job		.82			
	I105	- Repetitious duties		.71			
3. Skill Variety	I 97	- Different tasks performed by group	1.74 (58.1)	.41	.63	.64	87
	I100	- Number of different tasks		.52			
	I140	- Number of skills required		.43			
4. Task Significance	I135	- Value of group intracompany	1.66 (83.1)	.66	.80	.80	86
	I136	- Interviewer rating of group value		.66			
5. Computer-Related Autonomy	Q 34	- Number of hours/day on computer known by supervisor	2.68 (67.0)	.69	.83	.84	88
	Q 35	- Number of applications known by supervisor		.63			
	Q 36	- Number of errors on computer known by supervisor		.72			
	Q 37	- Number of transactions on computer known by supervisor		.62			
6. Network Connectivity	I66	- Connectivity	1.83 (91.6)	.83	.91	.91	89
	I66B	- Interviewer rating of connectivity		.83			

presents results of the factor analyses and reliability analyses on job task scales. Questions with response choices used for scale construction and evaluating job tasks are listed in Appendix C.

Based on Perrow's (1970) concept of technology, Withey, Daft, and Cooper (1983) developed an index to measure task analyzability. Withey et al. (1983) reported a Cronbach's Alpha of 0.85 for this measure of task analyzability. Because of the need for a measure of task analyzability and the lack of reliable measures in the literature, Withey et al. (1983) task analyzability measure was included in this study. The task analyzability index was constructed from four interview questions:

I106 - To what extent is there a clearly known way to do the major types of work your work unit normally encounter?

I107 - To what extent is there a clearly defined body of knowledge or subject matter that can guide your unit in doing your work?

I108 - To do your work, to what extent does your unit actually rely on established procedures and practices?

I109 - To what extent is there an understandable sequence of steps that can be followed in carrying out your unit's work?

Results presented in Table 3 show that the item-total correlations were 0.73, 0.70, 0.82 and 0.77. Table 3 shows the Cronbach's Alpha was 0.89 which is in agreement with Withey et al. (1983) results.

Withey et al. (1983) also developed a measure for task routineness with a reported Cronbach's Alpha of 0.81. The task routineness index was constructed from five interview questions.

I101 - How many of these tasks are the same from day to day?

I102 - To what extent would you say the work of your group is routine?

I103 - People in this unit do about the same job in the same way most of the time?

I104 - Basically unit members perform repetitive activities in doing their jobs?

I105 - How repetitious are unit member's duties?

Results presented in Table 3 demonstrate that the item-total correlations were 0.58, 0.75, 0.74, 0.82, and 0.71. For this index, Cronbach's Alpha was 0.88, which is in agreement with Withey, et al. (1983).

Because of the lack of reliable indexes for skill variety, several questions were generated to describe job skill. A scale was constructed from three interview questions:

I97 - Please describe your work group with respect to the number of different tasks performed in the work group.

I100 - How many different tasks are performed by this work group?

I140 - How many different kinds of skills are required to perform the work in this work group?

The item-total correlations for the respective questions were 0.41, 0.52, and 0.43; the Cronbach's Alpha was 0.64.

A task significance index was developed from two interview questions:

I135 - How much is your work group valued in comparison to other work groups in your organization?

I136 - (Interview rating) How much is your work group valued in comparison to other work groups in your organization?

The item-total correlations were 0.66 and 0.66, with a Cronbach's Alpha of 0.80.

A scale for computer-related autonomy was formed from four questionnaire items:

Q34 - Does your immediate superior know how many hours a day you spend working at the computer?

Q35 - Does your immediate superior know how many different applications you use on the computer?

Q36 - Does your immediate superior know how many errors or mistakes you make when you are working on the computer?

Q37 - Does your immediate superior know how many keystrokes or transactions you make per day on the computer?

Table 3 shows the item-total correlations for these respective questions were 0.69, 0.63, 0.72, and 0.62. The Cronbach's Alpha was 0.84 for this index.

Because of low inter-item correlations, an index of computer-related feedback was not constructed. Two separate questionnaire questions used to assess computer feedback were:

Q39 - Does the computer give you feedback (or let you know) how many keystrokes or transactions you make on the computer?

Q38 - Does the computer give you feedback (or let you know) if you make errors or mistakes when you work on the computer?

Measurement of Dependent Variables

The dependent variables in the current study were computer-mediated communication characteristics: intracompany and extracompany communication, communication network connectivity, whether or not management receives individual's feedback by

computer, whether or not management receives group's feedback by computer, degree of social communication by computer, degree of work-related computer-mediated communication, and satisfaction with communication. Table 3 presents results of factor analyses and reliability analyses conducted on the one computer-mediated communication scale, network connectivity. Questions with response choices used for evaluating computer-mediated communication characteristics are listed in Appendix C.

Since in the past, research examining the relationship between technology and communication has been often neglected (Porter & Roberts, 1976), few measures of computer-mediated communication currently exist. Consequently, interview questions on computer-mediated communication were generated. In order to assess intracompany computer-mediated communication, one interview question was used:

I48 - Can members of your work group communicate with workers in other groups in this company via computer?

To assess extracompany computer-mediated communication the following interview question was used.

I49 - Can members of this work group communicate with workers in other companies by computer?

For network connectivity, an index was constructed from two interview questions:

I66 - Please describe the work groups computer system with respect to the extent to which hardware components can be linked together (1-4 scale).

I66B- (Interviewer rating) Please describe the work groups computer system with respect to the extent to which hardware components can be linked together (1-4 scale).

Results in Table 3 demonstrate that the item-total correlation of 0.83 for both of these questions. The Cronbach's Alpha for this index was 0.91.

Due to low inter-item correlation a management feedback index was not constructed. Two interview questions used to assess management feedback were:

I119 - Does management get computer-generated information about each employee's performance or some employees' performance?

I120 - Does management get computer-generated information about the group's productivity?

Again, because of the dearth of indexes and questions pertaining to computer-mediated communication in the technology literature, the research group created direct and straight-forward questions for ascertaining the social-related communication, work-related communication, and communication satisfaction patterns. For example, the interview question used to evaluate the extent of social-related communication was:

I90 - Do people communicate socially via computer?

An interview question used to assess work-related communication was:

I89 - Can workers here use the computer to talk to the people with whom they need to communicate in order to do their work?

In addition, the interview question used to evaluate satisfaction with computer-mediated communication was:

I50 - Overall are you satisfied with your work group's ability to communicate by computer--internally, with other work groups and externally?

In Table 3 Eigen Values were presented to demonstrate the percent variance that was explained by each index one factor solution. Although during factor analysis factor loadings were generated, these loadings were not used in this study. Instead of factor loadings, means of scales and singular items were used in the Pearson Correlation and multiple regression analyses in this project. Specifically, the raw scores from the interview responses were summed and divided by 89 or the appropriate work group number of interviews. The raw scores from the employee questionnaire responses were aggregated to the group level then means were calculated for each work group. These aggregated group means were summed and divided by 89 or the appropriate work group number. During Pearson Correlation and multiple regression analyses, individual questionnaire data were aggregated to the work group level for the three variables constructed from questionnaire data: computer-related autonomy, computer-related transaction feedback, and computer-related error feedback. Due to the nature of these questions, employees probably were in a position to give more accurate answers than managers of the work group. Data aggregated to the work group level are at the same level as the interview data. This provides conceptual and data analysis consistency while testing the hypotheses of the study.

Frequency distributions presented in Appendix C demonstrate that several variables were skewed. Skewed variables were transformed by winsorizing, which allows extreme outliers to be statistically adjusted (Brown, Engleman, Hill & Jennrich, 1988).

During winsorizing, the most extreme data points at both ends of the variable's frequency distribution are moved one standard deviation toward the center of distribution curve. Despite winsorizing skewed variables, no difference in significant results were exhibited during statistical analyses.

Quantitative Analyses

Descriptive statistics were used to describe job tasks and computer-mediated patterns in the work groups. In order to test the relationships between job tasks and computer-mediated communication characteristics in Hypotheses 1 through 5, Pearson correlations were used. Hierarchical linear multiple regression was used to test Hypothesis 6. Drazin and Van de Ven (1985) suggest that for research examining contingency theory, Pearson corelations and linear multiple regression are appropriate statistical methods for exploring relationships among variables. In addition, Fry (1982) indicates that Pearson correlations and linear multiple regression are adequate methods for measuring congruence or the basic notion of fit that contingency theory suggests should exist among variables if the organization is effective.

Qualitative Analyses

To better understand the phenomenon of computer-mediated communication and to explore the hypotheses in this study, I undertook qualitative analyses of two work groups in the sample. The qualitative analyses were based on interview information and observations made during the face-to-face interview with the

manager of the work group. Sometime during the interview process, managers would give a tour of the work group so the interviewee would have a better grasp and appreciation of the work group duties and computer system. The two work groups were selected because they differ in demographic characteristics, job tasks, and computer-mediated communication. One work group reported high task routineness and low use of computer-mediated communication while the other work group reported low task routineness and wide use of computer-mediated communication. In addition, these two work groups were selected because I was familiar with both types of work groups. That is, I had interviewed several auto parts departments as well as had experience with hospital laboratories. All interview questions and responses used for variables in the quantitative as well as qualitative analysis are presented in Appendix C. Some of the measures used in the quantitative analysis were also used in the quantitative analysis. Unless previously designated in this paper, all measures were original and generated by the research group. Due to the extensive variation of computer usage in work groups interviewed in this project, a qualitative analyses could yield insights into how work groups relate task structure to computer-mediated communication.

CHAPTER III

RESULTS

Quantitative Analysis

Statistical frequency distributions on all the variables used in the project are presented in Appendix C. In addition, Appendix C shows the means and standard deviations (when appropriate) for the variables used in this study. Table 4 depicts job tasks and computer-mediated communication characteristics of the entire sample. Interview task findings show that 44% reported workers could use the computer for some of the tasks they perform, 45% reported workers could use the computer for most of the tasks they perform, 11% reported workers could use the computer for all tasks they performed. Furthermore, 39% reported more of their work tasks could be computerized. 72% reported the computer system was a substitute for worker's effort to some extent. These results indicate that the computer is an important tool in the work place.

According to the interview data, most organizations had multiple location sites (70%) and were quite large since the mean number of workers per company site was estimated to be 837 workers. Many organizations in the data sample were large and could probably benefit from increased communication and coordination capabilities that the computer can offer.

43% reported no intracompany computer-mediated communication capabilities. Only 26% reported that the work group could communicate with all other work groups in the company and 31% reported extracompany computer-mediated communication. Moreover,

Table 4

Job Task and Computer-Mediated Communication Characteristics of the Entire Sample

(N = 89)

CHARACTERISTICS	NUMBER OF WORK GROUP	% OF WORK GROUPS
I. Job Tasks		
1. Workers could use the computer for some of their tasks	39	44
2. Workers could use the computer for most of their tasks	40	45
3. Workers could use the computer for all of their tasks	10	11
4. More tasks could be computerized	35	39
5. Computer was a substitute for human effort	64	72
II. Computer-Mediated Communication		
1. Had intracompany communication	47	53
2. Could communicate by computer to all work groups within company	23	26
3. Could communicate by computer outside company	28	31
4. Could communicate by computer to outside companies within the same industry	16	18
5. Could communicate by computer to outside companies in other industries	5	6
6. Could communicate by computer with companies within and outside their own industry	7	8

Table 4 Continued

Job Task and Computer-Mediated Communication Characteristics of the Entire Sample

(N = 89)

CHARACTERISTICS	NUMBER OF WORK GROUP	% OF WORK GROUPS
7. Could communicate by computer with their customer	9	10
8. Could communicate by computer with their suppliers	14	16
9. Could communicate by computer with their computer supply vendor	7	8
10. Did generate by computer feedback on individual's performance	29	33
11. Did generate by computer feedback on group's performance	29	33
12. Did communicate by computer socially	20	22
13. Could communicate by computer for work	36	40
14. Reported somewhat or very satisfied with ability to communicate by computer internally and externally	59	66

18% reported being capable of communicating by computer with companies in the same industry, 6% reported being capable of communicating by computer with companies in another industry, and 8% reported being capable of communicating by computer with companies both in their own industry and outside their industry. 10% reported they could communicate by computer with their customer, 16% reported they could communicate by computer with their suppliers, as well as, 8% could communicate by computer with their computer supply vendor.

The majority of the work groups did not generate management-related computer feedback on employee's performance or the group's productivity. For example, only 33% generated by computer management feedback on individual's performance and 33% reported they generated by computer management feedback on the group's performance. In addition, 22% did use social-related computer-mediated communication and 40% did use work-related computer-mediated communication. If the work group communicated socially by computer, then 90% of the time the work group also communicated for work reasons by computer also. Finally, 66% of the work groups reported being somewhat satisfied or very satisfied with their work groups ability to communicate by computer internally and externally.

A closer examination of work groups satisfaction with computer-mediated communication is summarized in Table 5 which shows that 17% were somewhat or very satisfied having only work-related computer-mediated communication whereas 20% had only

Table 5

Work Group Satisfaction With Computer-Mediated Communication

(N=89)

	SOMEWHAT OR VERY SATISFIED	NOT VERY OR NOT AT ALL SATISFIED	USE THIS TYPE OF COMMUNICATION
Have Only Work-Related Computer-Mediated Communication	17%	3%	20%
Have only Socially-Related Computer-Mediated Communication	2%	0	2%
Have Both Social and Work-Related Computer-Mediated Communication	19%	1%	20%
Have Neither Social or Work-Related Computer-Mediated Communication	29%	28%	57%

work-related computer-mediated communication. Of the 89 work groups, 2% had only social-related computer-mediated communication and both groups were somewhat or very satisfied with only communicating socially via computer. Moreover, 20% had both social and work-related computer-mediated communication, plus, 95% of these work groups were somewhat or very satisfied having both social and work-related communication by computer. In addition, 57% of the work groups had neither social or work-related computer-mediated communication and just 51% of these work groups were somewhat or very satisfied with no social or work-related communication by computer.

The occupational and educational distributions for the interview respondents are shown in Table 6. Most of the interviewees (80%) were managers; approximately one-half of them (52%) had a master's degree or some graduate work. Of the 89 interview respondents, the average tenure with the company was two to five years. The minimum tenure with the company was less than one year and the maximum was over ten years. The wide range of tenure reflects the diversity of work groups studied.

The educational and occupational distributions for the questionnaire respondents are shown in Table 7. Of the 623 survey respondents, 63% were women, 35% were men, and 2% did not indicate sex. In addition, 50% of the sample reported their occupation as technician, secretarial, clerical, or technical-clerical. The average tenure with the company among respondents to the survey was two to five years. The minimum tenure with the company was

Table 6

Educational and Occupational Distributions of the Interview Respondents

Occupational Distribution		
Job Type	n	%
Executive	5	5.6
Managerial	71	79.8
Technical-Professional	2	2.2
Other-Professional	5	5.6
Technician	1	1.1
Secretarial	2	2.2
Technical-Clerical	3	3.4
Total	89	100

Education Distribution		
Education	n	%
H.S.	2	2.2
Vocational School	2	2.2
Some College	19	21.3
B.A. or B.S.	13	14.6
M.A. or some graduate work	46	51.7
Ph.D. or equivalent	7	7.9
Total	89	100

Table 7

Educational and Occupational Distributions of the Questionnaire Respondents

Occupational Distribution		
Job Type	n	%
Executive	9	1.4
Managerial	66	10.6
Technical-Professional	97	15.6
Other Professional	130	20.9
Technician	13	2.1
Secretarial	37	5.9
Clerical	177	28.4
Technical-Clerical	84	13.5
Other	10	1.6
Total	623	100

Education Distribution		
Education	n	%
Less than H.S.	3	.5
H.S. Completion	76	12.2
Vocational School	35	5.6
Some College	231	37.1
B.A. or B.S.	106	17.0
M.A. or some graduate work	135	21.7
Ph.D. or equiv.	22	3.5
(Missing)	15	2.4
Total	623	100

less than six months, while the maximum was more than ten years. Six respondents did not indicate their tenure on the survey.

Hypothesis 1

Hypothesis 1A stated that more skill variety, task significance, and computer-related autonomy at the work group level will each be related to more intracompany computer-mediated communication; more task analyzability, task routineness, computer-related transaction feedback, and computer-related error will be each associated with less intracompany computer-mediated communication. This hypothesis was tested by conducting a series of Pearson correlations between job tasks and intracompany computer-mediated communication index. Table 8 shows the Pearson correlations between each job task and communication variables. Results in Table 8 (row 1) show no significant correlations between any job task and intracompany computer-mediated communication. Hence, Hypothesis 1A was not supported.

According to Hypothesis 1B, more skill variety, task significance, and computer-related autonomy will be each linked to more extracompany use of computer-mediated communication. More task analyzability, task routineness, computer related transaction feedback, computer-related error feedback are each associated with less intracompany computer-mediated communication. As shown in Table 8 (row 2), Hypothesis 1B was partly supported since only task analyzability was significantly related to extracompany computer-mediated communication with a negative correlation of .18, significant at the 0.05 level. These results indicate that

Table 8

Pearson Correlation Matrix Between Job Tasks and Computer-Mediated Communication Characteristics Reported at the Work Group Level

Hypotheses	Computer-Mediated Communication Characteristics	Job Tasks T1	T2	T3	T4	T5	T6	T7
H1A:	Intracompany	-.09	-.06	.10	.02	-.10	-.06	-.05
H1B:	Extracompany	-.18*	.09	.03	.02	.02	.06	-.08
H2:	Network Connectivity	-.07	.01	.12	-.01	-.18*	.10	-.13
H3A:	Does Management Receive Individual's Feedback by Computer	.23*	.12	-.08	.08	-.11	.08	-.15
H3B:	Does Management Receive Group's Feedback by Computer	.23*	.20*	-.11	.02	-.23*	.10	.03
H4A:	Social-Related	-.02	-.02	.18*	.06	.05	-.13	-.14
H4B:	Work-Related	-.09	-.04	.17*	.10	.05	-.11	-.02
H5:	Satisfaction	.05	.17	.01	.11	-.15	-.02	.09
	N	89	89	89	86	88	88	89

T1 = Task Analyzability
T2 = Task Routiness
T3 = Skill Variety
T4 = Task Significance
T5 = Computer-Related Autonomy
T6 = Computer-Related Transaction Feedback
T7 = Computer-Related Error Feedback

* = Significant at the .05 level

as task analyzability, or standardized procedures, decreases the use of computer-mediated communication outside the company increases.

Hypothesis 2

Hypothesis 2 stated that more skill variety, task significance, and computer-related autonomy will be each related to more computer-mediated communication network connectivity. More task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback are each associated with less computer-mediated communication connectivity. This hypothesis was tested by conducting a series of Pearson Correlations between job tasks and computer-mediated communication network connectivity. Table 8 (row 3) shows that the sole job task significantly related to computer-mediated communication network connectivity was computer-related autonomy with a correlation of a negative .18 significant at the .05 level. This result is unexpected since it was hypothesized that more computer-related autonomy be related to more computer network connectivity. So, work groups where supervisors are aware of the subordinate's computer usage have computer systems that are better connected than work groups where supervisors have no information on workers use of the system.

Hypothesis 3

According to Hypothesis 3A, more task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback will be each linked to more use by

management of computer-mediated communication feedback on the individual's performance. On the contrary, more skill variety, task significance, and computer-related autonomy will be each related to less use of management's computer-mediated communication feedback on the individual's performance. A series of Pearson correlations were also used to test this hypothesis. This hypothesis was partially supported; Table 8 (row 4) shows that the only job task significantly related to more use by management of computer generated feedback on the individual's performance was more task analyzability with a positive correlation of .23, significant at the .05 level. These results suggest that managers are more likely to monitor individuals by computers if their work is more standardized than if their work is less standardized.

Hypothesis 3B stated that more task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback are each related to more use by management of computer-mediated communication feedback on the work group's productivity. More skill variety, task significance, and computer-related autonomy are each related to less use of management's computer-mediated communication feedback on the work group's productivity. Table 8 (row 5) demonstrates that more task analyzability and task routineness are associated with more use by management of computer-mediated communication feedback on the work group's productivity ($r = .23, .20$, both at the .05 level of significance). But, more computer-autonomy was associated with

less use by management of computer-mediated communication feedback with a negative correlation of .23, significant at the .05 level. Hypothesis 3B was partly confirmed. Consequently, management's surveillance of the work groups' productivity increases as jobs become more standardized and routine. Furthermore, management's surveillance of work groups productivity increases when supervisors track employees' computer usage.

Hypothesis 4

Hypothesis 4A stated that more skill variety, task significance, and computer-related autonomy will be each related to more social-related computer-mediated communication. More task analyzability, task routineness, computer-related transaction feedback, and computer-related error feedback will be each linked to less social-related computer-mediated communication. To test Hypothesis 4A, a series of Pearson correlations were conducted. Results from Table 8 (row 6) show that this hypothesis was only partially supported because the sole job task associated with more social-related communication was more skill variety, a positive correlation of .18, significant at the .05 level. This suggests that work groups that utilize a wider variety of skills are more likely to use the computer for social communication than work groups that have a more narrow range of skills.

Hypothesis 4B stated that more skill variety, task significance, and computer-related autonomy will be each related to more work-related computer-mediated communication. More task analyzability, task routineness, computer related transaction, and

computer-related error feedback will be each associated with less work-related computer-mediated communication. Again, this hypothesis was only partially supported because Table 8 (row 7) shows that more skill variety was associated with more work-related computer-mediated communication, a positive correlation of .17, significant at the .05 level. Similar to social-related computer communication patterns, workers who use a wider range of skills are more likely to communicate by computer for work-related reasons than workers who have a more narrow range of skills.

Hypothesis 5

As previously stated in Hypothesis 5, more skill variety, task significance, and computer-related autonomy will be each related to more satisfaction with computer-mediated communication. More task analyzability, task routineness, computer-related transaction feedback and computer-related error feedback are each associated with less satisfaction of computer-mediated communication. Pearson correlations were used to test Hypothesis 5. Since results in Table 8 (row 8) show no significant correlations existed between job tasks and satisfaction with computer-mediated communication, Hypothesis 5 was not validated.

To summarize, results show that out of the 56 correlations conducted in this study, eight correlations were significant, and seven of those eight correlations were in the direction predicted by the hypothesis. Moreover, no correlation was above .23. These results are not impressive, but the trend of relationships between

job tasks and computer-mediated communication characteristics should not be ignored.

Hypothesis 6

Hypothesis 6 stated that the set of seven job characteristics (task analyzability, task routineness, skill variety, task significance, computer-related autonomy, computer-related transaction feedback, and computer-related error feedback) could statistically predict each separate computer-mediated communication characteristic: intracompany and extracompany communication, communication network connectivity, whether or not management receives communication feedback on the individual's performance, whether or not management receives communication feedback on the group's productivity, social-related communication use, work-related communication use, and satisfaction with communication. This hypothesis was tested by conducting a series of hierarchical regression analyses using job tasks to predict each separate computer-mediated communication characteristic.

When considering job task structure, it is conceivable that a work duty first becomes standardized, then routinized; at this point skill variety is added or deleted from the job, then the job can be more clearly assessed as being more significant or less significant. In terms of computer-related duties, it is possible that autonomy is built into work duties first, followed by transaction feedback, then logically error feedback. Hence, job tasks were entered into the prediction equation of computer-mediated characteristics in causal order, that is, task

analyzability followed by task routineness, skill variety, task significance, then computer-related autonomy, computer-related transaction feedback, and finally computer-related error feedback. Hypothesis 6 was not supported since results show that no adjusted multiple R squared exceeded 0.02 or was significant. A summary of all six hypotheses and results are presented in Table 9.

Qualitative Analyses

I used qualitative analyses in order to gain additional insights into how work groups relate task structure to computer-mediated communication characteristics. The qualitative analyses were based on information obtained during the face-to-face interview and observations. Two work groups were selected for the qualitative analysis: one was a parts department of an import automobile dealership and the other was a clinical laboratory in a suburban hospital. One of the most salient characteristics observed when visiting these work groups were task structure. That is, the auto parts department tasks appeared routine with low skill variety. In contrast, the hospital laboratory tasks appeared complex, less routine, with high skill variety. Results show that indeed the parts department did report their tasks were more routine and included less skill variety than the hospital laboratory.

Besides task structure, these two work groups were selected because of their computer-mediated communication usage. The auto parts department reported using low levels of computer-mediated

Table 9

Summary of Hypotheses and Results

Hypotheses	Computer-Mediated Communication Characteristics	Type of Analysis	Job Tasks T1	T2	T3	T4	T5	T6	T7
H1A:	Intracompany	Correlation	0	0	0	0	0	0	0
H1B:	Extracompany	Correlation	-	0	0	0	0	0	0
H2:	Network Connectivity	Correlation	0	0	0	0	-	0	0
H3A:	Does Management Receive Individual's Feedback by Computer	Correlation	+	0	0	0	0	0	0
H3B:	Does Management Receive Group's Feedback by Computer	Correlation	+	+	0	0	-	0	0
H4A:	Socially-Related	Correlation	0	0	+	0	0	0	0
H4B:	Work-Related	Correlation	0	0	+	0	0	0	0
H5:	Satisfaction	Correlation	0	0	0	0	0	0	0
H6:	All Communication Variables	Multiple Regression	0	0	0	0	0	0	0

T1 = Task Analyzability
T2 = Task Routiness
T3 = Skill Variety
T4 = Task Significance
T5 = Computer-Related Autonomy
T6 = Computer-Related Transaction Feedback
T7 = Computer-Related Error Feedback

+ = positive relationship ($p < .05$)
- = negative relationship ($p < .05$)
0 = no relationship

communication; the clinical laboratory reported using a wide range of computer-mediated communication. Since these two work groups offer a notable contrast between task and computer-mediated, perhaps other significant differences between the two work groups could be observed which would provide a better understanding of why some work groups use computer-mediated communication and some work groups do not.

I. The Parts Department.

A. Overview. The parts department was located in a modern facility which was about six to ten years old. Basically, the parts department was housed in a large open room with one terminal at the corner of the room. The manager's office was separated from the work floor where the other three employees worked. When polled, the manager of the parts department reported that decision making was distributed to a large extent horizontally between departments but not distributed vertically up and down the organizational hierarchy. During the interview, the parts manager explained that the automobile dealership was owned by one individual. This owner made all the important organizational decisions so power was not distributed vertically in the organization, rather it was concentrated at the top of the organization. To counteract the power of the owner, the departments set up networks among themselves and tried to retain as much decision making as possible. The departments, hence, were about equal in the decision making horizontally. The labor division appeared clear cut and rigid. The overall operating

system of work seemed to be orderly. Although the parts department was courteous, the employees often left customers waiting for ten to fifteen minutes while they socially chatted with each other. Work flow seemed to be sporadic. Economically the dealership as well as the parts department was flourishing.

Two of the employees remarked that the computer was a useful tool. The scope of the computer data base was confined to just tracking inventory levels of several hundred or thousand automobile parts and their specifications. There was definitely potential for more computer use, like billing. Written documentation for operating the computer was limited to a 5 inch by 7 inch booklet of about 60 pages. Employees learned how to use the computer on the job.

The manager and other employees of this work group indicated they were content in their current employment situation and would be happy to continue their job for the remainder of their lives. The manager indicated that the dealership did not encourage continuing education. For example, the manager had taken a couple of computer classes at a local college. Although computers interested him, he said on the job he really didn't use the college course knowledge he had learned. Since college class work wasn't applicable to his work, the manager said he probably would not take any more college courses.

The manager exhibited an autocratic management style by barking orders to his employees. Task design appeared highly

structured. Unless the manager left the work group, no promotion would probably be possible for other members.

Overall, the parts department seemed like a pleasant place to work with some slack resources like time. That is, the work activity level was lethargic or sluggish. The employees appeared to be more non professional than professional.

B. Demographics. The parts department of the import automobile dealership has approximately 60 people working on site but only 4 people worked in the parts department. The parts department was categorized as a clerical or technical support group which produces a service type of a product, in the private business sector. Members of this work group did not belong to a union. All four work group members were men, under 30 years of age, and were Caucasian. Moreover, all members of the group were high school graduates but no member had a bachelor's degree or was technically trained. Finally, this work group controlled one mainframe computer and one microcomputer.

C. Job Tasks. The manager of this work group briefly described the group's tasks as keeping track of automobile parts, selling auto parts and reordering the parts. The parts department reported that the computer system was "quite a bit of substitution" for human work effort. In addition, the manager of the parts department indicated that workers use the computer for all the tasks they perform. So the computer was an integral part of this work groups task structure.

The mean scores for the parts departments tasks: analyzability was 7.00, routineness was 3.20, and skill variety was 2.33. These results suggest that parts department's tasks were highly standardized, very routine, and were below average on skill variety. The parts department manager, in addition, reported that their work group was "valued somewhat more than other work groups" in their organization. Thus, the manager perceives the work group task's significance was higher than for other work groups in the organization.

D. Computer-Mediated Communication. The parts department manager reported that members of the work group could not communicate with each other by computer and could not communicate with workers in other companies. In terms of computer connectivity or the extent to which different computer hardware components can be linked together so that the user can communicate or access information from one computer to another, the manager revealed that the work group's computer system had limited ability to link various hardware components together including some terminal to terminal linking capabilities. The manger did indicate that the work group could communicate by computer "with some other subset of work groups in the company" which was a regional auto dealer headquarters. However, the parts department manager reported that workers could not "use the computer to talk to the people with whom they need to communicate in order to do their work." The parts department computer system did have

capabilities for social communication but employees did not communicate socially by computer.

According to the parts department manager, there was information generated by the computer about the performance of employees in this work group, but the employee did not get computer-generated feedback about their performance. Management did receive computer-generated information about each employee's performance or some employees' performance. In addition, management received computer-generated information about the work group's productivity. The manager indicated that he was overall "somewhat satisfied" with his work group's ability to communicate by computer. No expansion of the computer system had been made within the last two years and future expansion plans were for new software but not hardware. Results here imply that, at the most, the parts department has a very limited use of computer-mediated communication which can be contrasted sharply with the next work group.

II. The Hospital Laboratory

A. Overview. Like the parts department, the laboratory was located in a modern facility which was about six to ten years old. The laboratory was housed in a large open room also. In contrast to the parts department, computer terminals and printers were located all over the laboratory and each member of the work group had her own terminal. Although each member had a desk space or work cubicle, the members were interspersed among other employees' work stations. According to the interviewee of

this laboratory group, the decision making in the organization was well distributed both horizontally between departments and vertically up and down the organizational hierarchy. The division of labor was not clear cut or rigid. That is, managers frequently assisted their employees when the work load was heavy. In addition, all members of this work group were cross-trained and occasionally interchanged or rotated tasks with one another.

The overall operating system of work seemed orderly. The laboratory personnel were courteous and prompt in assisting customers as well as assisting me. Customers (patients, doctors, other hospital personnel) were acknowledged, logged into the computer system, and processed immediately. For the most part, there was a continuous flow of customers and at peak times work load was heavy and hectic. Employees took scheduled breaks so work flow would not be interrupted. The hospital and laboratory operated at a profit. The laboratory was economically stable but slack financial resources were not evident. For example, the interviewee commented that the hospital wanted extensive justification for any purchase because the hospital was constrained by a low profit margin.

The laboratory manager said that computers had made a significant impact on the laboratory. She said that she had seen computers gradually become one of the major components of technology in the clinical laboratory setting. In fact, since she had a fascination for computers, she had been instrumental in assisting implementation of all the computer systems in the

laboratory. The interviewee felt that in the work and hospital the computer was used extensively, but some potential still existed for the system. The scope of the data base was broad since it included the patient's medical history, diagnosis, biographical data, physician name, billing information, and test results from various hospital departments. Furthermore, the data base included hundreds of test procedures, extensive longitudinal quality control records, laboratory employee records, and a variety of other types of records. Indeed, the manager said that adequate memory storage of data was a problem.

Written documentation for operating the computer was extensive. Literally dozens of volumes were available to the work group members, outlining procedures and technical specifications of the system. Employees were formally trained to use the system in the data processing department of the hospital. Computer training consisted of three or four days of work with a terminal in the data processing department. Then more informal computer training was provided in the laboratory.

Although I met almost all of the employees in the work group, I only talked in depth with the interviewee. The manager had taken college night classes to learn programming and more about computers. The laboratory and hospital paid for the employees college classwork. In addition, the hospital required all members of the work group to accrue a certain number of continuing education credits per year. The manager expressed a desire to

take more college classwork in various areas, including the computer field.

Members of the work group exhibited a democratic, participative management style. Task design appeared to be highly structured. However, since all members of the work group were cross-trained and sometimes rotated job tasks, the system did have some flexibility. Promotion and salary increases were limited but not impossible.

Overall, the clinical laboratory looked like a jumbled mess since computers, laboratory equipment, and instruments were everywhere. However, the laboratory appeared to be clean and a well organized work area despite the hodgepodge of equipment. Employees were friendly. The work activity was high. The group members appeared professional; that is, they wore laboratory apparel, exhibited professional diplomas and certificates, and wore their professional registration insignia on their lab coats.

Table 10 shows means of variables depicting a contrast among the parts department work group, the hospital laboratory work group, and the entire data sample. Table 10 gives a quick overview of how the parts department, hospital laboratory differ from each other and from the entire data sample. For example, no members in the parts department had a bachelor's degree, whereas all members in the hospital laboratory had a bachelor's degree. In contrast, in the entire data sample, on the average about four members per work group had bachelor's degrees. Members of the hospital laboratory, therefore, had more college education than

Table 10

Results of Qualitative Analysis: Variable Means of the Parts Department, the Hospital Laboratory, as well as, the Entire Data Sample

VARIABLE	PARTS DEPARTMENT (N = 1)	HOSPITAL LABORATORY (N = 1)	ENTIRE SAMPLE (N = 89)
I. Demographics			
1. Number of Employees On Site	60	600	837.15
2. Number of Members in Work Group	4	7	10.08
3. Number With Bachelor's Degree	0	7	4.44
4. Number Technically Trained	0	7	2.07
5. Number of Mainframes	1	1	1.77
6. Number of Minicomputers	0	1	1.83
7. Number of Microcomputers	1	3	4.94
II. Job Tasks			
1. Computer Substitute for Human Effort 1 = absolutely no substitute 4 = extensive substitute	3	2	2.14
2. Use Computer for All Tasks 1 = no none 4 = yes, all	4	3	2.67
3. Task Analyzability 1 = small extent 7 = large extent	7	7	5.29

Table 10 Continued

Results of Qualitative Analysis: Variable Means of the Parts Department, the Hospital Laboratory, as well as, the Entire Data Sample

VARIABLE	PARTS DEPARTMENT (N = 1)	HOSPITAL LABORATORY (N = 1)	ENTIRE SAMPLE (N = 89)
4. Task Routineness 1 = small extent 4 = great extent	3.20	2.40	2.53
5. Skill Variety 1 = small extent 5 = great extent	2.33	3.67	2.94
6. Task Significance 1 = valued much less 4 = valued much more	3	3	2.73
III. Computer-Mediated Communication Characteristics			
1. Intracompany Communication 1 = only with group 4 = entire company	2	4	1.68
2. Communication Network Connectivity 1 = no linking 4 = extensive linking	3	4	2.70
3. Communicate Socially 1 = no 3 = yes, a lot	1	3	1.29
4. Work-Related Communication 1 = no 3 = yes, very easily	1	3	1.66
5. Satisfaction with Communication 1 = not at all satisfied 4 = very satisfied	3	3	2.90

the members of parts department or many other work groups. Because education could impact on use of computer-mediated communication, it's important to contrast the educational levels of the work groups. Since these two work groups differ on many variables from one another as well as the entire sample, contrasting of these groups may yield insights into variations of computer-mediated communication use.

B. Demographics. The clinical laboratory group was a subunit of a 350 bed, suburban hospital which employed about 600 people. About 40 people worked in the medical laboratory but only seven supervisors comprised this work group. The laboratory was categorized as a technical professional group which produced a service type of a product, in the private business sector. Similar to the parts department mentioned before, members of the clinical laboratory group did not belong to the union. All seven members of the work group were women. In terms of age distribution, one member was under 30 and the other six were between the ages of 30 and 45. All members of the work group were Caucasian. Furthermore, 100 percent of the people working in the work group had bachelors degrees and were technically trained. The laboratory work group had access to one mainframe computer, one minicomputer, and three microcomputers.

C. Job Tasks. According to the manager of this work group, the group's task included collecting blood and biological samples from in-hospital and out-hospital patients. Then, various chemical and biological tests were conducted on the samples. Test

results were sent to other parts of the hospital and/or to the patient's physicians. The manager indicated that the computer system offered "a little substitution" for human effort. It was reported by the manager that workers use the computer for most of the tasks the work group performed.

The mean scores for analyzability was 7.00, routineness was 2.40, and skill variety was 3.67. These means imply that the laboratory unit's tasks were highly standardized, not routine, and a high degree of skill variety. The manager felt that her work group made an important contribution to the company since she stated that the laboratory group was "valued somewhat more than other groups" in the organization. In fact, the manager commented that the laboratory in general was the "biggest revenue generator of the hospital and was a critical component of the health service system of the hospital."

D. Computer-Mediated Communication. Members of the laboratory group could communicate via computer with all work groups in the company. However, members of this work group could not communicate by computer with workers in other companies. The interviewee reported that the work group's computer system components could be linked with almost anything in the system; hence, there was a high degree of computer connectivity.

For the laboratory unit, the manager reported that workers could "very easily" use the computer to talk to the people with whom they need to communicate in order to do their work. The manager said that the computer was very helpful in reducing

billing errors as well as speeding up the billing process. The computer system provided a crucial link between the supervisor and the employee, since the supervisor could more easily communicate to employees on other work shifts. Moreover, the computer system was a critical component in patient care and well being since life saving decisions were based on laboratory test results which could be transferred instantaneously by computer from the laboratory to the emergency room or other areas of the hospital. The manager expressed that computers had dramatically improved instrumentation, thus increasing the accuracy and speed of conducting laboratory tests. Finally, the manager commented that the computer was a vital tool in quality control of testing and employee performance since the computer tracked abnormal test results and who conducted each laboratory test.

Within this work group there was information generated by the computer about the performance of employees but the employees did not receive computer-generated feedback about their performance. According to the interviewee, management did get computer-generated information about each employee's performance or some employee's performance. In addition, management received computer-generated information about the group's productivity.

Members of the work group communicated "a lot" socially via computer. The manager remarked that the employees enjoyed communicating socially by computer. Employees thought it was fun to send a person a joke or a social comment by computer. Therefore, employees used social communication by computer

frequently, perhaps four to five times a day. The manager stated that social communication by computer reduced the monotony of work-related communication by computer. The interviewee disclosed that she was overall "somewhat satisfied" with the work group's ability to communicate by computer internally, with other work groups, and externally. Specifically, the manager stated she would like to communicate by computer with other companies, vendors, and suppliers. Since the manager felt their system had communication and other limitations that needed to be corrected, she was in the process of upgrading the computer system. Even though the computer system had been expanded as much as 30% within the last two years, the interviewee was hoping to expand the system by 100% in the next two years. In summary, the laboratory work group used computer mediated communication to a considerable degree.

CHAPTER IV

DISCUSSION

Communication by computer has been touted as an important technological tool and experts have predicted that it would soon replace conventional modes of communication (Laudon, 1986). Computer technology, after all, has revolutionized the job and transformed social patterns in the work place (Kling, 1984). Then why aren't more work groups using computer-mediated communication? A number of possible reasons could account for the lack of computer-mediated communication in the work place. One reason is that the advantages of computer-mediated communication could be contingent on the job task environment.

Quantitative Insights

Results from this study demonstrate that the computer has impacted the task structure of work groups since in the majority of work groups, workers could use the computer for most or all of the tasks they perform. These results suggest that the computer has indeed had a profound effect on workers' task environment. The hypothesis that task structure relates to computer-mediated communication seemed to be a reasonable notion.

Perhaps the most important finding in this study is that computer-mediated communication is not often used by work groups. That is, 45% of the work groups reported no computer-mediated communication capabilities. Only 26% of the work groups could communicate with all other work groups in the company and only 31% of the work groups could use extracompany computer-mediated

communication. These findings are rather extraordinary considering the significant impact that computers have had on the work place. Moreover, most organizations in this sample had multiple location sites and employed thousands of workers. Many of these organizations were large and could probably benefit from increased communication and coordination capabilities that computer-mediated communication can offer.

One advantage of computer-mediated communication is its utility versatility. Individuals can leap physical boundaries to reach other individuals who have terminals, either within an organization or outside the organization. Since many organizations currently use computers, a work group that employs computer-mediated communication could be "in touch with the world." Imagine the easy and time savings for a work group in manufacturing production to log onto their computer and request an outside organization supplier to ship materials, arrange a joint committee meeting with an inside organization department, report to the computer supply vendor an order for new software, and contact a customer about a product complaint. Besides the normal computer work load, these communication tasks could be completed by computer within one department in minutes.

The parts department examined earlier in this paper probably could benefit from more work-related computer-mediated communication because computer-mediated communication would enable the parts department to overcome physical boundaries. For example, currently the parts department uses a manual billing

system where the customer or the service department must physically take a parts request for payment to the cashiers office. The cashier's office then enters the bill into their computer. The parts department could use computer-mediated communication to transfer billing information into the cashiers computer system, thus, eliminating the time it takes the cashier to enter the parts number and cost into their computer system as well as perhaps eliminating typing errors that could occur during cashier data entry. In addition, the auto dealership's finance department has to enter the parts department data into their computer system weekly. Here, too, computer-mediated communication from the parts department to the finance department could be useful. The auto body department could benefit from computer-mediated communication to the parts department also. The auto body department, for example, could check parts inventory by computer which would be quicker than the current procedure of telephoning or walking to the parts department inquiring about parts inventory.

Work groups which do not communicate socially by computer, like the parts department, may not significantly benefit from social-related computer-mediated communication. However, it is possible to imagine that social communication by computer could facilitate friendly interactions between the parts department and other departments within the auto dealership since the parts department is physically isolated from the other departments. Communicating socially by computer could reduce isolation hence

reduce hostility that can occur from physical departmentalization. Reducing hostility could pave the way for more cooperation among workers. Within the department, social communication by computer could facilitate cooperation. Therefore, the company and the employees could benefit from the cooperation generated by social-related computer-mediated communication.

Even within work groups, computer-mediated communication is not used for management functions like coordinating tasks between subordinates and supervisors or for performance feedback and appraisals. These data show that often work groups do not use work-related computer-mediated communication at all. The majority of the work groups in this sample did not generate management-related computer feedback on employee's performance or the group's productivity. For example, 67% did not generate by computer management feedback on individual's performance or on the group's performance. Plus, 78% of the work groups did not communicate socially by computer.

Work groups are simply not using their computers for the maximum communication possibilities both inside or outside the company. For example, in this study only a tiny minority of the work groups reported they could communicate by computer with their customers, could communicate by computer for supplies, and could communicate by computer with their computer supply vendor. It is possible that organizations could be more efficient and conserve resources by using computer-mediated communication to coordinate tasks, transfer information, etc. Many companies probably could

benefit from computer-mediated communication but in some cases the cost of linking computers together may outweigh the benefits of computer-mediated communication.

Finally, in this study 66% of the work groups reported being somewhat satisfied or very satisfied with their work group's ability to communicate by computer internally and externally. Despite the low capability of computer-mediated communication, the majority of work groups are satisfied. It is fascinating to note the work groups indicate that the computer plays an important role in their work but do not often use the computer for communication and are satisfied not to use the computer for communication. Apparently, computer-mediated communication is not as important as other computer task functions, like word processing, so many workers and managers are satisfied to do without computer-mediated communication. Indeed, sometimes managers interpret computer-mediated communication as a tool for gossiping; thus, computer-mediated communication is a waste of the employees valuable work time.

From these data it appears that about one third of the work groups were content not to have computer-mediated communication. Almost one fifth of the work groups, on the other hand, were content with having both social and work-related communication by computer. Although satisfaction with computer-mediated communication spans across a range of communication possibilities, often work groups are satisfied without social or work-related communication by computer. At this point one begins to wonder if

computer-mediated communication has made an important contribution in the work place since so few work groups are using communication by computers and yet the work groups are satisfied not using communication by computers.

Job Tasks and Intracompany and Extracompany Communication

Despite the impact computers have made on task structure, potential relationships between each job task and computer-mediated communication within the company were not observed in the data. Apparently, within companies computer-mediated communication augments other forms of communication. Computer-mediated communication is only one mode of communication alternatives within a company, since employees of the work group have the option to communicate by telephone, written memo, face-to-face, etc. Thus, other communication alternatives may dominate information exchange so that computer-mediated communication has a less important role in communication within the company.

It is possible that intracompany computer-mediated communication is significantly related to job tasks not explored in this study. However, the results of this study suggest that task structure is not significantly related to intracompany computer-mediated communication. Only task analyzability was related to extracompany computer-mediated communication. The more analyzable the task, the less likely the work group would use computer-mediated communication with other companies. Or in other words, these results indicate that the work groups which do not

have standard operating procedures are more likely than other types of work groups to use the computer for communicating to other organizations outside their company. A good example of such a work group could be a think-tank research laboratory which uses computer-mediated communication to link to various companies collaborating on the same research project.

Job Tasks and Computer Network Connectivity

Computer connectivity, the degree to which computer hardware components can be linked together, provides an infrastructure for computer-mediated communication. Computer-related autonomy, the amount of self-governing computer interaction an individual has, was the sole job task significantly related to computer-mediated communication connectivity. The less computer-related autonomy the work group members reported, the greater the amount of computer connectivity. Or in other words, the less self direction allowed in work groups, the more likely hardware components will be linked together in the computer system.

Computer connectivity communication offers several positive advantages (More & Laird, 1985). For example, Long (1983) suggests that one managerial advantage that computer-mediated connectivity allows is that managers can use the computer to make their own ad hoc inquiries about employees' work, thereby saving expense and hassle of going through corporate channels to find such information. Thus, Long suggested that computer network connectivity for communication should be related to task structure. Only computer-related autonomy was related to

computer-mediated communication connectivity. Therefore, it is conceivable that managers are using computer-mediated communication as a mechanism of employee work surveillance which could have important organizational and ethical ramifications.

Job Tasks and Whether or Not Management Receives Computer-Mediated Communication Feedback

Hypothesis 3A was incompletely supported since only task analyzability was related to managerial feedback on the individuals' performance. Hence, as the task becomes more standardized, the more likely management will use computer-mediated communication to track employees' performance. Managers may only track employees in highly standardized task jobs because the process becomes too cumbersome and complex to track employees in more complicated job task situations. For instance, it is easy to imagine an accounting manager tracking a subordinate accountant's work. In this situation computer-generated feedback by computer could be an exceptionally advantageous tool for management. In contrast, it could be more difficult to track a research engineer whose job duties may be extremely varied which makes objective measures of work output difficult to computerize.

Hypothesis 3B results show that more task analyzability, task routineness, and less computer-related autonomy were the only job tasks related to more managerial use of computer-mediated feedback on the work group's productivity. These data imply that computer-mediated communication feedback to managers is important, as reported by Cusella (1988). Similar to the conclusion drawn

from Hypothesis 2, these results also support the notion that computer-mediated communication is used for managerial surveillance purposes. In other words, managerial use of computer-mediated feedback is significantly related to more job tasks than any other computer-mediated characteristic examined in this study. Therefore, does that mean in terms of task structure, the most important computer-mediated communication function is managerial feedback? The data from this study suggests that is possible, at least in some work groups.

Job Tasks Associated with Social-Related and Work-Related Computer-Mediated Communication

Results show that the more skill variety in a job, the more likely work groups will use their computers for social communication. During data collection, one interview respondent who reported low skill variety scoffed at the notion that management would ever let employees use the computer for social communication since it was still extremely difficult to even use the computer for work-related communication. In addition, during data collection, it was noted that a few work groups with low skill variety had never thought about using the computer to communicate socially.

Skill variety is the only job task significantly associated with computer-mediated communication that is work-related. These results demonstrate that as skill variety increases so does the work-related communication by computer. It is understandable that a job environment with more skill variety could demand higher

quantity and quality of information. To illustrate, an aerospace engineering group with a high skill variety environment would require extensive information inputs from many sources for which computer-mediated communication would be a useful tool. A bookkeeping work group which just manually enters data into the computer, in contrast, has limited skill variety as well as perhaps limited need to use the computer for work-related communication.

This study suggests that computer-mediated communication could be an important mode of communication for job situations with more skill variety. It is possible that social-related computer-mediated communication is partially a by-product of work-related computer-mediated communication. Or in other words, as individuals are communicating by computer for work reasons, social communication by computer arises. Indeed the trend in this study's data suggest that could be possible since 40% of the work groups report using the computer for work-related communication, 22% of the work groups report using the computer for social-related communication, and 20% of the work groups used both work-related and social-related communication by computer. Only 2% of the work groups which used social-related communication did not use work-related communication. These results indicate that social and work-related communication by computer is intertwined. Chances are, 90% of the time, if you communicate socially by computer you communicate for work reasons by computer also.

Job Tasks and Satisfaction with Computer-Mediated Communication

No particular job tasks were found to be significantly associated with computer-mediated communication satisfaction. The majority of work groups reported being satisfied with their work group's ability to communicate by computer internally and externally. It was noted during data collection that some interviewers had never considered using the computer for communication. Conceivably, if you did not know about computer-mediated communication you were satisfied not having it. Another possibility is other modes of communication, like memos and telephone calls, are widely used and computer-mediated communication is not important.

Job Tasks Statistical Prediction of Computer-Mediated Communication

In the multiple regression analysis, no adjusted R squared was significant. This indicates that all job tasks taken together as a set did not statistically predict any specific computer-mediated characteristic. If task characteristics had predicted computer-mediated communication, then the regression analysis could have supported the correlation results between job tasks and computer-mediated communication patterns.

Quantitative Overview

Intracompany computer-mediated communication and satisfaction with computer-mediated communication were the only communication characteristics not associated with job tasks. In contrast, other

computer-mediated communication characteristics, extracompany communication, network connectivity, management's feedback, socially-related and work-related communication, were associated with at least one job task. In addition, not all job tasks were related to computer-mediated communication patterns. Task significance, computer-related transaction feedback, and computer-related error feedback were not related to any computer-mediated communication patterns. These job tasks were apparently less important task structures when considering information technology within organizational design.

The quantitative analysis of this current project shows that many work groups do not use computer-mediated communication and yet are satisfied with their low level of computer-mediated communication capabilities. Work groups are more likely to communicate for work reasons by computer than for social reasons by computer. Some weak links were found between computer-mediated communication and to task structure.

Qualitative Insights

A review of the auto parts department and the hospital laboratory group case studies shows that on the surface it appears that job tasks could be related to computer-mediated communication practices. After all the parts department reported high routineness, high standardization, with low skill variety and was a low user of computer-mediated communication. In contrast, the hospital laboratory group indicated low routineness with high

skill variety and used computer-mediated communication extensively.

However, a closer inspection of these case studies reveal that demographically the two work groups were dissimilar in many respects besides just job tasks and computer-mediated communication. One noticeable difference between the two case studies is the size of the organizations that the work groups are embedded in. The parts department reported about 60 employees on site; the hospital laboratory group reported about 600 employees on site. The difference in size could have a dramatic impact on organizational structure like division of labor, departmentalization, configuration as well as distribution of power horizontally and vertically. Indeed, the hospital laboratory group did report decision making power well distributed horizontally and vertically whereas the manager of the parts department reported that the decision making was not vertically distributed.

Various characteristics of information technology could be interrelated with organization structure and other variables. Since the hospital laboratory had a much larger and more sophisticated data base than the parts department, this could have encouraged the members of the laboratory work group to become more familiar with the computer system because they needed more information from the computer to do their job. Such a broad computer application use in the work setting could have forced the employees to learn a variety of computer skills. Plus, the

hospital laboratory computer system had more applications and more terminals so was more conducive to work-related and perhaps social-related computer interaction.

Galbraith (1974) indicated that the training and personnel characteristics of employees may affect job task, information technology, etc. Personnel factors may play an important role in computer-mediated communication usage in the work place. There was an extreme contrast in personnel characteristics between the hospital laboratory group and the parts department group. Members of the hospital laboratory work group, for example, had more education and technical training than the members of the parts department group. Consequently, the hospital laboratory members may have worked with computers in educational settings where they had been exposed to the process of social communication by computer.

Another noticeable difference is that the hospital laboratory members had much more formalized computer training, as well as, computer documentation and references. The hospital fostered continuing education in the computer area, whereas the dealership did not encourage continuing education. The hospital laboratory members appeared to be more professional than the parts department members. The desire to be seen as a professional may have driven the laboratory members to learn more about computers so they could keep up with rapid technological changes in their work environment and other work related information.

Therefore, the qualitative insights suggest that computer-mediated communication in the work place could be influenced by organizational structural features like distribution of power, employee characteristics like training, education, and professionalism, and rewards like promotion and compensation. Many factors besides just job tasks could possibly affect computer-mediated communication patterns. Although Galbraith (1974) stated that tasks did drive information technology, other organizational features like structure, people, and reward systems were interrelated. Historically, in the early 1970's task uncertainty and environmental turbulence was a relatively unexpected phenomena. Then, it was logical for Galbraith to hypothesize that job task drove organizational systems. It could be debated whether the environments organizations face today are more or less turbulent than in the early 1970's; however, today organizations expect uncertainty and problems, perhaps more so than in the more economically halcyon days of the 1950's and 1960's. The qualitative data support the notion that in the work place today organizational structure, people, and other factors could play a more critical role in computer-mediated communication. Therefore, the process of computer-mediated communication may be intertwined in a complex web of interrelated variables.

Research Limitations

There are several reasons why there were so few significant results in this study: 1) problems with the data, 2) the

relationships between job task and information technology are not as salient as information processing theory suggests, and 3) measures selected for this study may be inadequate.

1. Data. Good statistical analyses depend on quality data that do not violate basic distributional assumptions. Although the sample was not random, the sample size was relatively large and included a wide variety of work groups. After examining the distribution of each variable, it was noted that several variables were somewhat skewed with moderate outliers. Pearson correlations and multiple regression are robust and somewhat insensitive to moderate skew and departures from normality. In addition, winsorized transformations were made on skewed variables. However, the transformations did not alter significant results in the study. Therefore, moderate problems with the data should not have severely affected the statistical analysis.

2. Theory. It is possible that variable relationships presented in information processing theory are not as salient as originally suggested by Galbraith (1977). However, results from this study do support to some extent information processing theory. It is possible, in addition, that the task and computer-mediated communication variables selected for this study are not as strongly related as other job task and computer-mediated communication variables not included in the study. Furthermore, unknown variables could be moderating the relationship between task and computer-mediated communication variables, such as the amount of economic resources available in

the organization. This could explain the weak and erratic correlations and regression results.

The qualitative data suggest that a complex network of interrelated variables could affect computer-mediated communication. Consequently, the scope of this project may have been just too narrow in focus. That is, just one fraction of the information processing model, job task relationship with computer-mediated communication, was evaluated in the study. A broader perspective of organizations may be necessary to better understand computer-mediated communication. Instead of examining only one section, therefore, researchers should consider investigating all the relationships hypothesized in the information processing model. Thus, variables like organizational structure, employee characteristics, reward structure, as well as, task structure should be explored since all these variables may affect computer-mediated communication patterns in the work place.

In addition to further evaluating information processing theory, other theories may be useful in examining the complex phenomena of computer-mediated communication. For example, social learning theory, which extends learning to the problems of personal and social behavior (Atkinson, Atkinson & Hilgard, 1983), may be used as a framework for describing how individuals learn to use computer-mediated communication. That is, does vicarious learning and self regulation play important roles for why individuals learn computer-mediated communication? Chaos theory also may be useful in explaining the dynamic systems nature of

computer mediated communication. Chaos theory suggests that peculiar behavior that appears random in the long run is predictable or seeming random behavior actually has order (Gleick, 1988). Chaos theory states that the critical initial conditions in a system are paramount in the long run behavior of systems. For example, the initial conditions that exist in the work group when computer-mediated communication is implemented may have a dramatic impact on computer-mediated communication patterns for years in the work group. Future research, therefore, should use various theories to explore the phenomena of computer-mediated communication.

3. Measures. Measures selected for this study may be weak. As previously noted, standardized measures did not exist in the current literature so questions and indexes were generated for this study. The measures used may have been inadequate for data collection. Specifically, the measures used may not have accurately assessed the concepts studied. These measures may have only partly extracted information relating to notions of job tasks and computer-mediated communication. For example, the skill variety index used in this study could have included a question asking the level of skill need for work group tasks, hence extracting more information on skill variety. Plus, construct validity could be a problem with the measures used in this study. That is, without testing these measures there is no way to be certain they measure the appropriate concept.

In addition to weak measures, it seems reasonable to conclude that more measures assessing job tasks may be useful. In this study, only seven job task characteristics were used. It's possible that these seven task characteristics did not capture the differences of job task structure among the work groups. One task characteristic that may be helpful is uncertainty of task. Computer-mediated communication may be useful in immobilizing and coordinating resources to cope with ambiguous or unexpected tasks. For instance, a fire department may benefit from computer-mediated communication. Another job task that may be important is speed of task. The computer is a useful tool for making mathematical computation quickly. Work groups, therefore, which must calculate large amounts of data in a short period of time may rely on computer-mediated communication to shift large data bases. For example, a city accounting department which must track monthly expenditures may be facilitated by computer-mediated communication for gathering expenditures from other departments in a timely fashion.

The range of critical error in the task may be important. Computer-mediated communication can transfer data accurately, thus reducing human error. If a hotel accountant makes a calculation error in a customer's bill, then the customer may become angry. The hotel management can correct the bill and give the customer a small perk like a cup of coffee thus likely reversing the anger of the customer. On the other hand, if a hospital laboratory technician gives a doctor a blood gas report that is miscalculated

and off by one tenth of a milliliter, and the doctor acts according to the blood gas report, then the patient may die or suffer brain damage. So the range of critical error is much smaller in the hospital laboratory tasks than in some accounting office tasks. Consequently, the transmission of accurate data by computer is more important in the hospital laboratory because of the narrow tolerance range of error.

Besides job task measures, computer-mediated communication measures could be improved also. Type of information transferred during computer-mediated communication may be important. An accounting work group, for instance, may only transfer numbers. In contrast, a graphic design work group may transfer three dimensional designs as well as color and construction instructions during computer-mediated communication.

The level of information detail may be a primary characteristic of computer-mediated communication. For example, one auto parts department may need to transfer information only on auto part number and price. In contrast, another auto parts department may need to transfer specific parts specification as well as parts number and price. The level of detail needed, therefore, is much different for the two auto parts department.

Another important characteristic of computer-mediated communication is length of communication. For example, a secretarial work group which needs to communicate a two sentence message may choose another mode of communication rather than computer-mediated communication. However, a research laboratory

which needs to communicate a lengthy amount of information like an entire report, may choose computer-mediated communication because it is fast and maybe more cost efficient than overnight mail or a long distance telephone call. Other characteristics of job tasks and computer-mediated communication may be notable and could be examined in the work place.

Information processing theory proposes that task structure is related to information technology (Galbraith, 1977) because information technology provides a vehicle for communication which can be used for coordinating job tasks. Examining all facets of such a complex phenomenon as computer-mediated communication was beyond the scope of this project. Hence, this study investigated the relationship between seven job tasks and six computer-mediated communication. Since this study only assessed one small facet of information processing theory, a future research study broader in scope that evaluates many parameters of information processing theory besides just job tasks could be one strategy in researching computer-mediated communication. For example, the broader study could evaluate the relationships among task structure (diversity, difficulty, variability), organizational structure (division of labor, configuration, departmentalization, power distributions), information technology (decision mechanism, frequency, formalization, computer-mediated communication), people (training, selection, promotion), as well as reward systems (compensation, leadership style).

Another strategy for future research could be the use of other theories like social learning theory and chaos theory which could be used as a framework for exploring computer-mediated communication. Furthermore, broad issues of computer-mediated communication need to be addressed like how does computer-mediated communication relate to other forms of communication in organization. Also, why work groups are unable to use computer-mediated communication needs to be assessed. It is possible that work groups cannot communicate by computer because of hardware, software, and/or humanware problems. In future research studies, more and better quality measures for job task and computer-mediated communication characteristics need to be used.

Summary

This study demonstrates that sometimes certain components of job task structure are linked with specific characteristics of computer-mediated communication which are within the domain of information technology. Since regression analysis of job task could not statistically predict computer-mediated communication and correlations between job tasks and computer-mediated communication were small, results of this project only marginally support assumptions of information processing theory. Results show that certain tasks are tenuously associated with characteristics of computer-mediated communication. Some Pearson correlations are significant but small. Similar correlations have been reported in the job task and computer-mediated communication literature (Rice et al., 1989). However, even though the trend is

inconsistent and weak, the trend should not be dismissed. Since computer hardware and software for computer-mediated communication can be costly, before purchasing linking capabilities, additional terminals, or other resources for computer-mediated communication, work groups should consider their task characteristics. Furthermore, it is possible that in the future computer-mediated communication may play a larger role in the work place. The research presented in this study shows only a trend towards supporting information processing theory.

The purpose of this study was to investigate why some work groups use computer-mediated communication and some work groups do not. This study, therefore, offers insights into how computers are used for communication in the work place. For example, this project demonstrated that computer-mediated communication is often not used in the work place. Second, for the most part work groups are satisfied not using computer-mediated communication. Third, work groups are more likely to communicate for work reasons by computer than for social reasons by computer. Fourth, job tasks are only sporadically and weakly related to computer-mediated communication. Fifth, qualitative analysis suggests that computer-mediated communication could be dependent on other variables besides just job tasks like organizational structure and employee characteristics. Finally, this study modestly increases our understanding of how technology and communication interface since an extraordinary small amount of research in the past has explored computer-mediated communication in the work place.

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APPENDIX A

Employee Survey Questionnaire

Claremont Graduate School
Study of Computers and Work Group Effectiveness

INSTRUCTIONS

1. In this questionnaire, the terms "computer" and "terminal" refer to any video display unit with, or connected to, processing power. This includes:

   A COMPUTER TERMINAL
   (such as a DEC VT100 or IBM 3270)

   A MICROCOMPUTER
   (such as an IBM-PC or Apple Macintosh)

   A GENERAL PURPOSE WORKSTATION
   (such as an Apollo Domain or DEC Micro-Vax)

   A DEDICATED WORD PROCESSOR
   (such as an IBM Displaywriter or Wang Word Processor)

2. When you see the term "work group" in this questionnaire, it refers to the group or department mentioned in the cover letter. Please think of that unit when you answer questions about your work group.

3. For many of the questions in the survey, you will be asked to circle a number that reflects your answer. For these questions, PLEASE CIRCLE ONLY ONE number unless the question specifically requests that you circle all answers that apply.

1. What is your current job title?_____

2. What is the name of your department?_____

3. What is the name of your company?_____

4. Which of the following best describes your job classification?

Executive.....1	Secretarial.....6
Manager.....2	Clerical.....7
Technical-professional...3	Technical-clerical.....8
Other professional.....4	Other, specify:_____
Technician.....5	_____.....9

5. On average how many hours a week do you spend working on this job?

less than 5.....1
5-9.....2
10-19.....3
20-29.....4
30-39.....5
40.....6
more than 40.....7

6. Are you (CIRCLE ONE):

a temporary employee.....1
a permanent employee.....2

7. In your job, do you supervise other employees?

no.....1
yes.....1

8. How long have you worked for this company?

less than 6 months.....1
6 months to 1 year.....2
1-2 years.....3
2-5 years.....4
5-10 years.....5
more than 10 years.....6

9. How long have you worked in your current job?

less than 6 months.....1
6 months to 1 year.....2
1-2 years.....3
2-5 years.....4
5-10 years.....5
more than 10 years.....6

10. Do you interact with a computer in your current job?

No.....1
Yes.....2

11. TODAY MOST EMPLOYEES DO A NUMBER OF THINGS THAT COULD GENERALLY BE DESCRIBED AS INVOLVING "INFORMATION". PLEASE INDICATE WHETHER YOU DO ANY OF THE ACTIVITIES ON THE LIST BELOW--WHETHER FREQUENTLY, SOMETIMES, RARELY, OR NEVER AS A PART OF YOUR WORK. ALSO INDICATE WHETHER YOU DO THIS ACTIVITY WITH OR WITHOUT A COMPUTER. FOR EACH ACTIVITY PLEASE CIRCLE ONE NUMBER TO THE LEFT AND ONE NUMBER TO THE RIGHT.

HOW OFTEN I DO THIS:				WHAT I USE TO DO THIS:			
Rarely or Never	Some-times	Frequently		without a computer	sometimes with a computer	most of the time with a computer	I don't do this
1	2	3	a) Write original material	1	2	3	9
1	2	3	b) Type or keyboard text or data (supplied by someone else	1	2	3	9
1	2	3	c) Edit or rewrite	1	2	3	9
1	2	3	d) Proofread and correct	1	2	3	9
1	2	3	e) Develop forms	1	2	3	9
1	2	3	f) Fill in forms	1	2	3	9
1	2	3	g) Create and maintain databases.	1	2	3	9
1	2	3	h) Process or maintain records	1	2	3	9
1	2	3	i) Keep activity logs	1	2	3	9
1	2	3	j) Administrative support (scheduling, calendar, meeting arrangements)	1	2	3	9
1	2	3	k) Data analysis (e.g., budget analysis; projections; modeling).	1	2	3	9

HOW OFTEN I DO THIS:				WHAT I USE TO DO THIS:			
Rarely or Never	Some-times	Frequently		without a computer	sometimes with a computer	most of the time with a computer	I don't do this
1	2	3	l) Statistical computation	1	2	3	9
1	2	3	m) Programming	1	2	3	9
1	2	3	n) Distribute information	1	2	3	9
1	2	3	o) Handle messages (telephone, written etc.)	1	2	3	9
1	2	3	p) Locate or retrieve information (e.g., look up a personnel record, locate a published report)	1	2	3	9
1	2	3	q) Create graphs, charts, diagrams	1	2	3	9
1	2	3	r) Prepare documents, reports	1	2	3	9
1	2	3	s) Bookkeeping	1	2	3	9
1	2	3	t) Billing	1	2	3	9
1	2	3	u) Gather information from sources outside the company	1	2	3	9

12. Which of the following computer skills do you have? (CIRCLE ALL THAT APPLY)

data entry.....1
applications package(s) for word processing, spreadsheet, graphics, data analysis, CAD or other functions.....2
programming language(s) such as BASIC, COBOL, PASCAL, C.....3
machine or assembly language.....4
other: (please specify)_____5

13. Do you use a computer at home? (CIRCLE ALL THAT APPLY).

do not use a computer at home.....1
use own computer for personal use.....2
use own computer for work.....3
use company computer for personal use....4
use company computer for work.....5

14. How many years of experience do you have working with computers?

Never worked with computers.....1
Less than 1 year experience.....2
Between 1 and 5 years.....3
Between 5 and 10 years.....4
More than 10 years.....5

IF YOU INTERACT DIRECTLY WITH A COMPUTER IN YOUR CURRENT WORK, PLEASE ANSWER THE NEXT QUESTIONS. OTHERWISE SKIP TO QUESTION 43 ON PAGE 7.

15. Are you the only user of your terminal or do you share terminals with other workers?

share a terminal with more than 1 person...1
share a terminal with one other person.....2
have one terminal of my own.....3
have more than one terminal of my own.....4

A. If you share a terminal are you able to get use of it when you need it?

seldom or never.....1
sometimes.....2
usually or always.....3
do not share.....0

16. On average how many hours a week do you spend working on a computer for your job?

less than 5.....1
5 - 10 2
10-20 3
20-30 4
30-40 5
more than 40.....6

17. Do you use the computer about the same number of hours each day or do the number of hours vary from day to day?

same number each day.....1
varies from day to day.....2

18. If you could choose, in doing your work would you:

avoid the computer at all possible costs.....1
don't care whether you use the computer or some other means available.....2
prefer to use the computer.....3

19. If it were possible in your work, would you:
prefer to delegate computer tasks to someone else...1
computerize more of your tasks.....2

IT IS POSSIBLE TO DESCRIBE THE RELATIONSHIP BETWEEN A WORKER AND THE COMPUTER IN SEVERAL WAYS. BELOW ARE A SET OF COMPARISONS. PLEASE CIRCLE THE NUMBER THAT BEST DESCRIBES THE WAY YOU AND THE COMPUTER WORK TOGETHER.

THE COMPUTER AND ME WORKING TOGETHER:

20. Inefficient	1	2	3	4	5	Efficient
21. Smooth	1	2	3	4	5	Rough
22. Unproductive	1	2	3	4	5	Productive
23. Useful	1	2	3	4	5	Useless
24. Slow	1	2	3	4	5	Fast

THERE ARE OTHER WAYS TO DESCRIBE THE RELATIONSHIP BETWEEN A WORKER AND THE COMPUTER. BELOW ARE A SET OF COMPARISONS. PLEASE CIRCLE THE NUMBER THAT BEST DESCRIBES YOUR RELATIONSHIP TO THE COMPUTER YOU USE AT WORK.

25. I use the computer	1	2	3	4	5	The computer uses me
26. My job is to use the computer to do my work	1	2	3	4	5	The computer is a tool to be used at my convenience
27. I can choose when to use the the computer	1	2	3	4	5	I cannot choose when to use computer
28. The computer controls me	1	2	3	4	5	I control the computer
29. The computer is here to assist me	1	2	3	4	5	I am here to use the computer

HERE ARE SOME MORE QUESTIONS ABOUT YOUR WORK WITH COMPUTERS.

30. The computer allows me to be creative in my solving problems at work.
not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

31. The computer thinks for me.

not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

32. My productivity is defined by the amount of work completed on the computer such as number of keystrokes, lines of code, or computerized transactions.

not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

33. The work I do on a computer is an important part of my productivity.

not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

IN SOME ORGANIZATIONS, SUPERVISORS/MANAGERS KNOW A LOT ABOUT EACH PERSON'S COMPUTER USE AND IN OTHER ORGANIZATIONS THEY DON'T KNOW VERY MUCH.

34. Does your immediate superior know how many hours a day you spend working at the computer?

No.....1
Don't know 2
Yes.....3

35. Does your immediate superior know how many different applications you use on the computer?

No.....1
Don't know.....2
Yes.....3

36. Does your immediate superior know how many errors or mistakes you make when you are working on the computer?

No.....1
Don't know.....2
Yes.....3

37. Does your immediate superior know how many keystrokes or transactions you make per day on the computer?

No.....1
Don't know.....2
Yes.....3

38. Does the computer give you feedback (or let you know) if you make errors or mistakes when you work on the computer?

No.....1
Yes, sometimes.....2
Yes, all of the time.....3
Not sure.....4

39. Does the computer give you feedback (or let you know) how many keystrokes or transactions you make on the computer?

No.....1
Yes, sometimes.....2
Yes, all of the time.....3
Not sure.....4

40. If there is an error in the program you are using can you override it or fix it yourself or ask whomever you want for help OR do you have to go to your supervisor or someone in charge for help?

Have to go to supervisor or someone in charge.....1
Can fix it myself or ask whomever I want 2

41. If there is a problem with the computer so that you cannot do your work the way you usually do it, what do you usually do? (CHECK ALL THAT APPLY)

Stop working until someone fixes the computer.....1
Work on some other task until the computer is fixed....2
Work on the same task some other way without computer..3
Do things manually and enter in computer later.....4
Use another computer.....5

42. All in all, how satisfied are you with the computer system available to you?

Not at all satisfied.....1
Not too satisfied.....2
Somewhat satisfied.....3
Very satisfied.....4

IF YOU DO NOT USE A COMPUTER AT WORK, PLEASE START ANSWERING QUESTIONS AGAIN HERE.

43. When you are dealing with other people at work, how frequently are these interactions with:

a. Other people in your work group
Never.....1
Rarely.....2
Sometimes.....3
Frequently.....4

b. Other people at your site or facility but not in your work group
Never.....1
Rarely.....2
Sometimes.....3
Frequently.....4

How frequently are these interactions with:

c. Other people in the company but not in your work group

Never.....1
Rarely.....2
Sometimes.....3
Frequently.....4

d. Other people outside the company

Never.....1
Rarely.....2
Sometimes.....3
Frequently.....4

DIFFERENT PEOPLE AND DIFFERENT ORGANIZATIONS PLACE DIFFERENT VALUES ON TIME AND HOW TO USE IT. IN THIS SECTION, WE WOULD LIKE TO KNOW WHAT PEOPLE IN YOUR ORGANIZATION THINK ABOUT TIME IN THE WORKPLACE. PLEASE ANSWER THE FOLLOWING INDICATING WHAT YOU THINK MOST PEOPLE IN YOUR WORK BELIEVE ABOUT EACH OF THE FOLLOWING. PLEASE CIRCLE THE NUMBER UNDER THE APPROPRIATE COLUMN ALONGSIDE EACH STATEMENT.

	disagree	somewhat disagree	not sure	agree somewhat	agree
44. People here feel that deadlines don't really matter	1	2	3	4	5
45. Staying on schedule is important here	1	2	3	4	5
46. All of our work is tightly scheduled	1	2	3	4	5
47. People get upset when you are late for work	1	2	3	4	5
48. No one cares if you are late returning from a meal break	1	2	3	4	5
49. We never seem to have enough time to get everything done	1	2	3	4	5
50. People usually expect to take their work home with them	1	2	3	4	5
51. People expect to leave at the end of the day without worrying about their work	1	2	3	4	5

	disagree	somewhat disagree	not sure	agree somewhat	agree
52. People rarely get work-related calls during "off" hours (like nights and weekends)	1	2	3	4	5
53. When people go on vacation, they are expected to tell their boss how to reach them	1	2	3	4	5
54. People here worry about using their time well	1	2	3	4	5
55. Working fast is not important here	1	2	3	4	5
56. Most people can work at their own pace	1	2	3	4	5
57. Most people can take breaks when they want to	1	2	3	4	5
58. People here do NOT have the freedom to use their time the way they choose	1	2	3	4	5
59. Most people here cannot set their own work schedules	1	2	3	4	5
60. People just expect to "kill time" on the job	1	2	3	4	5
61. To get the job done, it is important for each person to coordinate his/her work with others	1	2	3	4	5
62. People have to work together to get the job done	1	2	3	4	5
63. Some departments work longer hours than others	1	2	3	4	5
64. People can perform their tasks in any order and still get the job done	1	2	3	4	5
65. People are expected to manage their time efficiently	1	2	3	4	5

	disagree	somewhat disagree	not sure	agree somewhat	agree
66. Most people are expected to find new ways to save time	1	2	3	4	5
67. Most people don't like co-workers who work late	1	2	3	4	5
68. Around here, the rule is "hurry up and wait"	1	2	3	4	5

HERE ARE SOME QUESTIONS ABOUT YOUR WORK AND YOUR WORK GROUP.

69. In our work group, people are expected to put forth a lot of effort
not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

70. In our work group, people are held responsible for results rather than effort
not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

71. Our work group cannot do its work without materials or information from another department
not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

72. Our work group doesn't really need anything from other departments
not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

73. I do my work but nothing gets done with it
not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

THE FOLLOWING QUESTIONS PERTAIN TO THE NORMAL, USUAL, DAY-TO-DAY PATTERN OF WORK CARRIED OUT BY YOU AND THE PEOPLE IN YOUR WORK UNIT.

74. How many of the tasks you do at work are the same from day to day?

Very few of them.....1
Some of them.....2
Most of them.....3
Almost all of them.....4

75. To what extent would you say your work is routine?

To a small extent.....1
To some extent.....2
To a great extent.....3
To a very great extent.....4

76. People in this unit do about the same job in the same way most of the time?

not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

77. Basically, people in the work group perform repetitive activities in doing their job.

not at all true.....1
not very true.....2
somewhat true.....3
very true.....4

78. How repetitious are your duties at work?

Not at all.....1
Somewhat.....2
Very 3

79. All in all, how satisfied would you say you are with your job?

Not at all satisfied.....1
Not too satisfied.....2
Somewhat satisfied.....3
Very satisfied.....4

80. Knowing what you know now, if you had to decide all over again whether to take the job you now have, what would you decide?

Would you decide definitely not to take the same job..1
Would you have some second thoughts.....2
Would you decide without any hesitation to take the same job.....3

81. Think about the job you had exactly two years ago. Even if the job was not at the same company, please think about how satisfied you were two years ago with your job. All in all, how satisfied would you say you were with the job you held exactly two years ago?

Didn't have a job two years ago.....0
Not at all satisfied.....1
Not too satisfied.....2
Somewhat satisfied.....3
Very satisfied.....4

WE ARE INTERESTED IN SOME OF THE NORMS OR ATTITUDES OF PEOPLE IN YOUR WORK GROUP. HERE ARE FIVE STATEMENTS ABOUT MEN, WOMEN AND WORK. PLEASE CIRCLE THE STATEMENT THAT BEST DESCRIBES YOUR OPINION.

82. Women have as much ability as men to make major decisions about computers.

Strongly disagree.....1
Disagree.....2
Neutral or undecided.....3
Agree.....4
Strongly agree.....5

83. The entry of women into traditionally male jobs should be discouraged.

Strongly disagree.....1
Disagree.....2
Neutral or undecided.....3
Agree.....4
Strongly agree.....5

84. It is wrong for a man to enter a traditionally female career

Strongly disagree.....1
Disagree.....2
Neutral or undecided.....3
Agree.....4
Strongly agree.....5

85. Women are just as capable as men to operate a computer.

Strongly disagree.....1
Disagree.....2
Neutral or undecided.....3
Agree.....4
Strongly agree.....5

86. Equal opportunity for all jobs regardless of sex is an ideal we should all uphold.

Strongly disagree.....1
Disagree.....2
Neutral or undecided.....3
Agree.....4
Strongly agree.....5

LAST ARE SOME BASIC DEMOGRAPHIC ITEMS TO HELP US COMPARE YOUR ANSWERS TO THOSE OF OTHER PEOPLE. REMEMBER, NO ONE IN YOUR COMPANY WILL SEE ANY OF YOUR ANSWERS TO THIS QUESTIONNAIRE.

87. Are you:

male.....1
female.....2

88. Your age is:

under 25 years.....1
26-35.....2
36-45.....3
46-55.....4
over 55.....5

89. Which of the following best describes your formal education?

less than high school completion.....1
completed high school.....2
vocational school/certificate.....3
some college or two-year college degree....4
baccalaureate (bachelor's) degree.....5
some graduate work or master's degree.....6
doctoral degree or equivalent.....7

90. Are you:

married.....1
unmarried.....2

91. Which of the following categories describes your own individual income?

under $10,000.....1
$10,000 - $25,000.....2
$25,001 - $50,000.....3
$50,001 - $75,000.....4
over $75,000.....5

THANK YOU!

APPENDIX B

Interview Schedule

I.D. Number ___ I ___ Group type _____

Initials of respondent: _____ Interviewer_____

1. What is your job title:_____

2. Which of the following best describes your job classification?
(ask only if it seems unclear, otherwise just code it)
EXECUTIVE = 1 MANAGER = 2
TECH-PROF = 3 OTHER PROFESSIONAL = 4
TECHNICIAN= 5 SECRETARIAL = 6
TECH-CLER = 7 CLERICAL = 8
OTHER = 9

3. Name of company:_____

_____

4. Name of work group:_____

Most of the questions will be about this work group.

5. Name of department (if different):_____

6. Company site:_____

7. Is there more than one facility or site?
NO = 1; YES = 2;

8. How many people work at this site?
[PEOPLE = BODY COUNT]

9. How many people work in this company?
[PEOPLE = BODY COUNT]

10. How many people work in this work group?
[PEOPLE = BODY COUNT]

11. How many people in the company are under your direct supervision (i.e. report to you)?
[PEOPLE = BODY COUNT]

12. In a few words, please describe what the company (not work group) produces or does.
MANUFACTURING = 1; SERVICE = 2

[CENTRALIZATION]
13. In your company, to what extent is decision-making distributed:
A. vertically up and down the hierarchy
SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

B. horizontally between various departments or divisions at the same hierarchical level
SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

14. Is it public or private?
PUBLIC = 1; PRIVATE = 2

15. In a few words, please describe what this work group produces or does.

16. Briefly, how is it accomplished (in terms of the steps or functions involved)?

17. Could you describe how this work group fits into this whole organization?

I'd like to ask you a few questions about the people who work in this work group.

18. Do people in this work group belong to a union?
YES, EVERYONE (EXCLUDING SUPERVISOR) = 3, YES, SOME = 2;
NO, NONE = 1

19. Of the people who work in this work group, how many are men?
WRITE NUMBER
How many are women?
WRITE NUMBER
CODE PROPORTION WOMEN: _____

A. Is this proportion typical of the whole company?

PROPORTION MEN IS HIGHER IN GROUP THAN COMPANY = 3
PROPORTION MEN IS AVERAGE FOR COMPANY = 2
PROPORTION MEN IS LOWER IN GROUP THAN COMPANY = 1

20. What is the general distribution by age in this work group?
WRITE NUMBER UNDER 30, 30-45, OVER 45

CODE PERCENTAGE UNDER 30, 30-45, OVER 45

A. Is this proportion typical of the whole company?

GROUP IS OLD RELATIVE TO COMPANY = 3
GROUP IS AVERAGE FOR COMPANY = 2
GROUP IS YOUNG RELATIVE TO COMPANY = 1

21. How many ethnic minorities work in this work group?
[ETHNIC MINORITIES ARE NON-CAUCASIANS]
NUMBER MINORITY:_____

PERCENT MINORITY:_____

A. Is this proportion typical of the whole company?

GROUP HAS HIGHER MINORITY THAN COMPANY = 3
GROUP IS AVERAGE FOR COMPANY = 2
GROUP HAS FEWER MINORITY THAN COMPANY = 1

22. What is the average educational level of people in this work group? What proportion have bachelor's degrees?

NUMBER WITH BACHELOR'S DEGREES:_____

PERCENT WITH BACHELOR'S DEGREES:_____

A. Is this proportion typical of the whole company?

GROUP HAS HIGHER EDUCATION THAN COMPANY = 3
GROUP IS AVERAGE FOR COMPANY = 2
GROUP HAS LESS EDUCATION THAN COMPANY = 1

23. What proportion of people in this work group are technical workers or are technically trained? By technical workers I mean those who are performing applied science or engineering jobs.

NUMBER TECHNICALLY TRAINED:_____

PERCENTAGE TECHNICALLY TRAINED:_____

A. Is this proportion typical of the whole company?

GROUP HAS MORE TECHNICALLY TRAINED THAN COMPANY = 3
GROUP IS AVERAGE FOR COMPANY = 2
GROUP IS LESS TECHNICALLY TRAINED THAN COMPANY = 1

24. What proportion of people in this work group are exempt? (Employees are exempt if they are not paid for overtime.)

NUMBER EXEMPT:_____

PERCENTAGE EXEMPT:_____

A. Is this proportion typical of the whole company?

GROUP HAS MORE EXEMPT THAN COMPANY = 3
GROUP IS AVERAGE FOR COMPANY = 2
GROUP HAS LESS EXEMPT THAN COMPANY = 1

25. Are all the people in this work group in the same physical location or are they dispersed across several locations? If they are dispersed, please describe where they are [CONTIGUITY RELATES TO THE DEGREE OF DIFFICULTY IN GETTING EMPLOYEES TOGETHER; DO THEY FEEL TOGETHER OR DO THEY FEEL SEPARATED]
    ALL IN SAME LOCATION (CONTIGUOUS) = 1
    PHYSICALLY DISPERSED (NOT CONTIGUOUS) = 2

26. Do people in this work group have the option of working in different places, such as at home?

    YES, AT HOME = 3; YES, SOMEPLACE ELSE = 2; NO = 1
    [ASK FOR ELABORATION]

[CONTEXT/BACKGROUND - HISTORY OF INFORMATION SYSTEM]

27. I'd like to get a little background about the history of computer systems in your company. Do you know in which department computers were first introduced?

IF ANSWER IS DATA PROCESSING (A GROUP WHICH PROVIDES COMPUTER HELP GENERALLY COMPOSED OF SYSTEMS ANALYSTS/COMPUTER PROFESSIONALS), ASK:]

28. In which department after DP were computers first introduced?

    CODE PROFESSIONAL DEPT =1, MANAGERIAL = 2; CLERICAL DEPT =3

29. Is your work group a comparatively early user of computer systems, relative to other work groups in the company, or was it a comparatively late user?

    EARLY = 1; MIDDLE =2; LATE=3

30. In what year did your work group first start using computers for the work of the work group?
    CODE TWO DIGIT YEAR

31. How easy is it for your work group to order updates or additional computer equipment?

HARDWARE:	SOFTWARE:
VERY EASY = 4	VERY EASY = 4
SOMEWHAT EASY = 3	SOMEWHAT EASY = 3
DIFFICULT = 2	DIFFICULT = 2
IMPOSSIBLE = 1	IMPOSSIBLE = 1

[ASK FOR ELABORATION]

32. When you are ordering computer equipment (hardware) do you have to coordinate your choice with other work groups?

YES = 3; PROBABLY SHOULD = 2; NO = 1
[ASK FOR ELABORATION]

33. When you are ordering computer software do you have to coordinate your choice with other work groups?

YES = 3; PROBABLY SHOULD = 2; NO = 1
[ASK FOR ELABORATION]

34. Do you have to justify new computer equipment or software? Do you have to justify either the money or the choice of a particular product?

a. YES, JUSTIFY MONEY = 2; NO JUSTIFICATION NECESSARY = 1
b. YES, JUSTIFY PRODUCT = 2; NO JUSTIFICATION NECESSARY = 1

c. To whom do you have to justify it?
[ASK FOR ELABORATION]

35. Is the acquisition of computer equipment or software centralized or formalized?
A. YES, FORMALIZED = 2; NO, NOT FORMALIZED = 1
B. YES, CENTRALIZED =2; NO, NOT CENTRALIZED=1

[EXPLAIN CENTRALIZATION AND FORMALIZATION IF PERSON NEEDS IT: [CENTRALIZATION = ONE CENTRAL POINT FOR DECISIONS ABOUT COMPUTER ACQUISITION AND USE; FORMALIZATION = STANDARD PROCEDURES FOR ACQUIRING AND USING COMPUTERS, MOST FORMALIZED IS WRITTEN]

36. How would you describe top management's view of the role of computers in this company?
We want to be on the leading edge of computer use no matter what it takes.....1
We don't want to fall too far behind other companies in computer use.....2
Computers aren't that important to our company.....3
Computers aren't worth the trouble and expense.....4

[TECHNOLOGY - OBJECTIVE MEASURES]

Next, I would like to get some information about the computer system or systems available to workers in the work group. I am interested in all information technology used by the people in the work group for the work of the group, regardless of its physical location. For example, if people in this work group use a printer located in another work group, it should be included.

I would like to start by asking you about computing power available to this work group; I'm going to ask about mainframe computers (e.g. VAX, CYBER, CRAY, IBM), minicomputers (e.g. VAX), or microcomputers (e.g. VAX, IBM, VECTOR, MACINTOSH) including PCs.

37. Is there a mainframe computer that is used by workers in this work group? YES = 2; NO = 1

    A. If yes, how many? CODE NUMBER
    WRITE NAME(S)

    B. Can you access the computer through terminals in this work group? YES = 1; NO = 2
    If no, where do you go? WRITE IN

    C. How is access to terminals determined across work groups? STATUS =1; EGALITARIAN = 2; SENIORITY = 3; JOB/OCC = 4; NEED 5; BUDGET/MONEY/COST = 6; OTHER = 7

    D. How is access to terminals determined within work groups? STATUS =1; EGALITARIAN = 2; SENIORITY = 3; JOB/OCC = 4; NEED 5; BUDGET/MONEY/COST = 6; OTHER = 7

38. Is there a minicomputer(s) that is used by workers in this work group? YES =2; NO =1

    A. If yes, how many? CODE NUMBER
    WRITE NAME(S)

    B. Who controls access, this work group or another?
    THIS WORK GROUP = 1; DP =2; OTHER WORK GROUP =3
    IF OTHER,_____

    C. How is access to terminals determined across work groups?
    STATUS =1; EGALITARIAN = 2; SENIORITY = 3; JOB/OCC = 4; NEED 5; BUDGET/MONEY/COST = 6; OTHER = 7

    D. How is access to terminals determined within this work group?
    STATUS =1; EGALITARIAN = 2; SENIORITY = 3; JOB/OCC = 4; NEED 5; BUDGET/MONEY/COST = 6; OTHER = 7

    E. Where is each minicomputer located?
    THIS WORK GROUP = 1; DP =2; OTHER WORK GROUP =3
    IF OTHER,_____
    REPEAT FOR EACH MINI

    F. If computer is not in your work group can you access it through terminals in your work group?
    YES = 1; NO = 2

    G. If no, where do you go?

39. Are there microcomputers that are used by workers in this work group? YES = 2; NO = 1

    A. If yes, how many? CODE NUMBER
    WRITE NAME

    B. Who controls them? NUMBER BY THIS WORK GROUP_____
    NUMBER BY OTHER WORK GROUP_____

    C. Where are they located?
    HOW MANY ARE ON OR NEAR INDIVIDUAL'S DESKS_____
    CODE PERCENTAGE_____

    HOW MANY ARE IN THIS WORK GROUP_____
    CODE PERCENTAGE_____

    D. How is access determined? STATUS = 1; EGALITARIAN = 2; SENIORITY = 3; JOB/OCC =4; NEED = 5; BUDGET/MONEY = 6; OTHER = 7
    [ELABORATE]

40. Do you have any other kind of computing power besides those we've talked about? By computing power I mean a keyboard and screen attached to computing power. YES = 2; NO = 1
[IF YES, ELABORATE]

41. How many different computer vendors supply the information system(s) used by this group? (Either provide number or list vendors). WRITE BOTH; CODE NUMBER

42. Overall, how many full time equivalent (FTE) workers per terminal (of any kind) are there in this work group?
CODE NUMBER OR FRACTION

43. Overall are you satisfied with your work group's access to terminals and allocated computer time?
    VERY SATISFIED =4
    SOMEWHAT SATISFIED =3
    NOT VERY SATISFIED = 2
    NOT AT ALL SATISFIED = 1

44. How many printers are physically located here in your area?
WRITE TOTAL NUMBER:

45. How many printers outside your work area are used by members of your work group? CODE NUMBER

46. If printers are outside your work area, how far away are they?
WRITE ANSWER; CODE ON SAME FLOOR = 1; ON ANOTHER FLOOR = 2; IN ANOTHER BUILDING = 3
CODE FOR EACH PRINTER

47. Can members of your work group communicate with each other via computer? YES = 2; NO = 1

48. Can members of your work group communicate with workers in other work groups in this company via computer?
    WITH ALL WORK GROUPS IN THE COMPANY = 4
    WITH SOME OR ALL WORK GROUPS AT THIS SITE = 3
    WITH SOME OTHER SUBSET OF WORK GROUPS IN THE COMPANY = 2
    ONLY WITH OTHER MEMBERS OF THE WORK GROUP = 1

49. Can members of this work group communicate with workers in other COMPANIES by computer? YES = 2; NO =1

    A. If yes, how many other companies (approximately)?
       CODE NUMBER

    B. Which companies?
       IF SAME INDUSTRY = 1; OTHER INDUSTRY = 2; BOTH = 3

    C. IF WITH CUSTOMERS = 2; NOT WITH CUSTOMER = 1
    D. IF WITH SUPPLIERS = 2; NOT WITH SUPPLIERS = 1

50. Overall are you satisfied with your work group's ability to communicate by computer--internally, with other work groups and externally?
    VERY SATISFIED =4
    SOMEWHAT SATISFIED =3
    NOT VERY SATISFIED = 2
    NOT AT ALL SATISFIED = 1

Which of the following computer functions are available to members of your work group?

51. Word processing/text editing.....YES = 2; NO = 1
52. Electronic filing system.....YES = 2; NO = 1
53. Calendaring.....YES = 2; NO = 1
54. Data base management.....YES = 2; NO = 1
55. DDS (decision support system).....YES = 2; NO = 1
    [PROGRAM TO HELP PEOPLE MAKE DECISIONS]
56. Information retrieval.....YES = 2; NO = 1
    [FROM AN EXTERNAL OR EXTENSIVE DATABASE]
57. Graphics.....YES = 2; NO = 1
58. Spreadsheet.....YES = 2; NO = 1
59. Statistical computation (e.g., SPSS, SAS).YES = 2; NO = 1
60. What specialized/customized functions are available to your work group (e.g., payroll processing, reservations system)?
    CODE NUMBER OF SPECIALIZED FUNCTIONS
    WRITE DOWN ALL FUNCTIONS FOR FUTURE CODING

[TECHNOLOGY - SUBJECTIVE]
Now I want to discuss some of the more abstract features of computer systems. In particular, I am interested in end-user computing, the extent to which the following features describe the computer system as it is used by workers in your work group. In answering these questions, please consider all the hardware and software available to this work group, not any single unit. Also, in answering these questions, I'd like you to implicitly compare your work group to other white collar work groups in general.

INTENSIVENESS
First I am interested in the ratio of hardware, software, and applications to people in the work group. [THE MORE EQUIPMENT, SOFTWARE AND CAPABILITIES PER PERSON IN THE WORK GROUP, THE GREATER THE INTENSIVENESS. IN A COMPUTER INTENSIVE WORK GROUP, EACH EMPLOYEE MAY HAVE SEVERAL TERMINALS AT HIS/HER WORKSTATION AND ACCESS TO MULTIPLE SYSTEMS.]

61. How would you rate the ratio of hardware, software and applications to people in the work group?
    LOTS OF COMPUTER CAPABILITY RELATIVE TO THE NUMBER OF PEOPLE = 3
    QUITE A BIT OF COMPUTER CAPABILITY RELATIVE TO PEOPLE=2
    LOW RATIO OF COMPUTER CAPABILITY TO PEOPLE =1

    INTERVIEWER RATING_____

62. A similar idea is to contrast labor vs. capital intensiveness or the distribution of costs between wages and all equipment used to do the work of the group. How would you describe your work group on a continuum from spending most money on wages to spending most money on equipment?
    VERY LABOR INTENSIVE = 4
    SOMEWHAT LABOR INTENSIVE = 3
    NOT VERY LABOR INTENSIVE = 2
    NOT AT ALL LABOR INTENSIVE = 1

    INTERVIEWER RATING_____

COMPLEXITY
Second I am interested in the number of types of components (e.g., micro + mainframe) and number of different components (e.g., 1 PC vs. 20 PCs). A COMPLEX SYSTEM IS ONE WITH LOTS OF DIFFERENT COMPONENTS AND USUALLY SEVERAL MACHINES OF ONE TYPE

63. How would you describe the computer equipment here with respect to the number of types and components?
    A LOT OF DIFFERENT TYPES AND NUMBER OF COMPONENTS = 3
    MORE THAN 1 TYPE OR MANY COMPONENTS = 2
    ONLY ONE TYPE OR FEW COMPONENTS = 1

    INTERVIEWER RATING_____

SPECIALIZATION
Third I am interested in the number of different tasks or functions for which the computer system can easily be used by workers in your group. HOW SPECIALIZED IS THE COMPUTER SYSTEM(S) AVAILABLE TO YOUR WORK GROUP.

64. How would you rate the number of different tasks or functions for which the computer system is actually used by workers in your group?
ONLY ONE FUNCTION OR TASK = 1
SEVERAL FUNCTIONS OR TASKS = 2
MANY FUNCTIONS OR TASKS = 3
UNLIMITED NUMBER OF FUNCTIONS/TASKS= 4

INTERVIEWER RATING_____

65. How would you rate the number of different tasks or functions for which the computer system could easily be used by workers in your group?
ONLY ONE FUNCTION OR TASK = 1
SEVERAL FUNCTIONS OR TASKS = 2
MANY FUNCTIONS OR TASKS = 3
UNLIMITED NUMBER OF FUNCTIONS/TASKS= 4

INTERVIEWER RATING_____

INTEGRATABILITY/ CONNECTIVITY
Fourth, I am interested in the extent to which different hardware components that you have can be linked together so that they can communicate or the user can access one from another.

66. Please describe the work group's computer system with respect to the extent to which hardware components can be linked together.
CAN LINK ALMOST ANYTHING WITH THIS SYSTEM = 4
LIMITED ABILITY TO LINK INCLUDING SOME TERMINAL TO TERMINAL = 3
LIMITED ABILITY TO LINK COMPONENTS BUT NO TERMINAL TO TERMINAL ABILITY = 2
NO LINKING CAPABILITY = 1

INTERVIEWER RATING_____

COMPATIBILITY
Fifth, I am interested in the extent to which a function can be performed interchangeably on different hardware components (e.g., the same WP program can be used on two different systems).

67. Please describe your system's interchangeability.
DOESN'T EXIST OR WE ONLY HAVE ONE SYSTEM =1
LIMITED INTERCHANGEABILITY =2
EXTENSIVE INTERCHANGEABILITY =3

INTERVIEWER RATING_____

DECENTRALIZABILITY
Sixth, I am interested in the extent to which the components of your system can be detached and used in distant settings such as in another site or at home.

68. Please describe your system on this dimension.
CAN'T BE SEPARATED; DOESN'T APPLY = 1
LIMITED DECENTRALIZABILITY = 2
VERY DECENTRALIZABLE = 3

INTERVIEWER RATING_____
Please give an example. WRITE ANSWER

PORTABILITY
A similar notion is the extent to which components can be easily moved back and forth to be used in other settings such as home or while traveling.

69. Please describe your system on this dimension.
CAN'T BE MOVED = 1
LIMITED MOBILITY = 2
WHOLE SYSTEM IS VERY PORTABLE = 3

INTERVIEWER RATING _____

EXPANDABILITY
Seventh I am interested in the extent to which the computer system can easily be extended such as adding memory, terminals, functions, and users. [NOT JUST DUPLICATION OF INDEPENDENT FUNCTIONS BY ADDING MORE MACHINES OR ADDING SHIFTS OF WORKERS]

70. How expandable is your work group's computer system?
VERY EXPANDABLE = 3
SOMEWHAT EXPANDABLE = 2
NOT AT ALL EXPANDABLE = 1

INTERVIEWER RATING_____

71. How much has it already been expanded within the last 2 years? WRITE ANSWER

72. Are there plans to further expand the system in the next 2 years? YES = 2; NO =1
ELABORATE

PROGRAMMABILITY
Eighth I am interested in the extent to which end-users, i.e., workers in your group, can develop and store standardized procedures on the computer. [NOT PROGRAMMERS' ABILITY TO DO THIS]

73. Please rate your system's programmability.
VERY PROGRAMMABLE = 3
SOMEWHAT PROGRAMMABLE = 2
NOT AT ALL PROGRAMMABLE = 1

INTERVIEWER RATING_____
A. If it is programmable, could you give an example.
WRITE ANSWER

HABITABILITY/USER FRIENDLINESS
Ninth is user friendliness or the computer's ability to help the workers use it or make its requirements known to the user.

74. Please describe your system's friendliness.
VERY FRIENDLY = 4
SOMEWHAT FRIENDLY = 3
NOT VERY FRIENDLY = 2
NOT AT ALL FRIENDLY=1

INTERVIEWER RATING_____

SUBSTITUTABILITY
Tenth, I am interested in the extent to which the computer system is a substitute for workers, or the extent to which the system now performs functions formerly provided by workers, or makes decisions formerly made by workers.

75. To what extent is the computer system a substitute for human effort and decisions?
EXTENSIVE SUBSTITUTION FOR HUMAN EFFORT = 4
QUITE A BIT OF SUBSTITUTION = 3
A LITTLE SUBSTITUTION = 2
ABSOLUTELY NO SUBSTITUTION = 1

INTERVIEWER RATING_____

A. IF YES, In general what type of work has been replaced?
TEDIOUS CLERICAL WORK YES = 2 NO = 1
SKILLED DECISION MAKING YES = 2 NO = 1
COMPUTATION YES = 2 NO = 1

B. IF YES, Could you give an example. WRITE ANSWER

76. Eleventh, and last, when people work at a terminal, how fast is the system on average?
    TOO FAST TO KEEP UP = 3
    USUALLY JUST ABOUT RIGHT = 2
    TOO SLOW FOR MOST OF OUR WORKERS = 1

    INTERVIEWER RATING_____

[SECTION ON FIT ASSESSED AS AN INDEPENDENT CONCEPT]

I'd like you to think about the goals you have for your work group's computer system.

77. How well does the computer system(s) available to your work group meet your goals for the system?
    EXTREMELY WELL = 4
    VERY WELL = 3
    SOMEWHAT WELL = 2
    NOT AT ALL WELL = 1

78. How well does the computer system meet the goals of the work group?
    EXTREMELY WELL = 4
    VERY WELL = 3
    SOMEWHAT WELL = 2
    NOT AT ALL WELL = 1

79. How well does it contribute to accomplishing the tasks of the work group?
    EXTREMELY WELL = 4
    VERY WELL = 3
    SOMEWHAT WELL = 2
    NOT AT ALL WELL = 1

80. Are there any problem areas with your computer system?
    [IF IT IS A PROBLEM FOR ANY OF THEIR COMPONENTS, THEN CODE IT AS A PROBLEM]
    IF HARDWARE/SOFTWARE = 1 OTHERWISE =0
    IF POLITICAL PROBLEM = 1 OTHERWISE =0
    IF FINANCIAL PROBLEM = 1 OTHERWISE =0
    IF VENDOR PROBLEM = 1 OTHERWISE =0
    ELABORATE

81. What changes would improve the system's ability to meet your work group's needs and goals?
    IF MENTION HARDWARE = 2; IF NO MENTION = 1
    IF MENTION SOFTWARE = 2; IF NO MENTION = 1
    IF MENTION MORE HARDWARE/SOFTWARE = 2; IF NO MENTION = 1
    IF MENTION CHANGE IN WORK = 2; IF NO MENTION = 1
    IF MENTION POLITICS = 2; IF NO MENTION = 1
    WRITE DOWN GIST OF ANSWER

82. How far does the system depart from your ideal system?
VERY FAR = 1
SOMEWHAT FAR = 2
VERY LITTLE = 3
PERFECT FIT = 4

83. To what extent have you had to make adjustments in the way work is done in order to accommodate the computer system?
SUBSTANTIAL CHANGES = 4
SOME CHANGES = 3
VERY FEW CHANGES = 2
NO CHANGES = 1

A. Could you give a couple of examples. WRITE ANSWER

84. To what extent have you had to make adjustments or changes in the computer system in order to accommodate the way work is done in this work group?
SUBSTANTIAL CHANGES = 4
SOME CHANGES = 3
VERY FEW CHANGES = 2
NO CHANGES = 1

A. Could you give a couple of examples. WRITE ANSWER

In order to make the most use of a computer system, users may need some support, for example, programming help, training, maintenance, and the like. These support characteristics have been called the computing infrastructure.

85. What kind of support is available to this work group?
SYSTEM MAINTENANCE YES = 2; NO = 1
PROGRAMMER TO WRITE YES = 2; NO = 1
PROGRAMMER TO HELP USER YES = 2; NO = 1
NEW USER TRAINING YES = 2; NO = 1
CONTINUING TRAINING YES = 2; NO = 1
WRITE ANSWER IF NECESSARY

86. Is there an information center (place, department, or group of computer consultants) in your company?
YES = 2; NO = 1

87. Are there computer consultants available to your work group (either inside or outside of the company)?
YES = 2; NO = 1

88. Where would people in your group usually go for help with your computer?

A. EXPERT IN WORK GROUP	YES = 2; NO = 1
B. EXPERT OUTSIDE WORK GROUP BUT IN COMPANY	YES = 2; NO = 1
C. EXPERT OUTSIDE THE COMPANY	YES = 2; NO = 1
D. WOULDN'T NEED HELP	YES = 2; NO = 1
E. DON'T KNOW	YES = 2; NO = 0

Some experts contend that a computer system should reflect formal and informal patterns of work in order to be most effective.

89. Can workers here use the computer to talk to the people with whom they need to communicate in order to do their work?
YES, VERY EASILY = 3
YES, BUT NOT VERY EASILY = 2
NO, NOT AT ALL = 1

90. Do people communicate socially via computer?
YES, A LOT = 3; YES, A LITTLE = 2; NO = 1

91. Can workers here use the computer for most of the tasks they perform?
YES, ALL = 4
YES, MOST = 3
YES, SOME = 2
NO, NONE = 1

A. IF SOME OR NONE, are there tasks that should be computerized?
YES, MOST = 4
YES, MANY = 3
YES, SOME = 2
NO, NONE = 1

B. How many of these tasks would your current system allow to be computerized?
MOST = 4
MANY = 3
SOME = 2
NONE = 1

In some work groups, people work on their own at individual tasks; in other work groups, people's work is interdependent, e.g., one person's output is another person's input, people with different skills have to work together to accomplish a task.

92. Right now, to what extent does your computer system reflect the interdependence of tasks and workers both within your work group and between your work group and other work groups?

SYSTEM MATCHES WORK GROUP INTERDEPENDENCE WELL -3
SOME MISMATCH -2
TOTAL MISMATCH -1

93. Right now, to what extent does your computer system reflect the amount of discretion usually accorded to various workers in the work group? Are those workers who generally have more discretion in their work also given more discretion by the computer and have more discretion in their use of the computer? (By discretion I mean individual choice or judgment.)
DISCRETION MATCHES VERY WELL - 3
SOME MISMATCH - 2
TOTAL MISMATCH - 1

[SATISFACTION WITH SYSTEM]
94. All in all, how satisfied are you with the computer system available to you?
Not at all satisfied.....1
Not too satisfied.....2
Somewhat satisfied.....3
Very satisfied.....4

95. Knowing what you now know (INCLUDING THE TECHNOLOGY NOW AVAILABLE AND WHAT WAS AVAILABLE WHEN YOU MADE YOUR ORIGINAL CHOICE), if you had to decide all over again whether to adopt the computer system(s) you now have, what would you decide?
Would you decide definitely not to adopt the same system?..1
Would you have some second thoughts?.....2
Would you decide without any hesitation to take the same system(s)?.....3

[SECTION ON OB MEASURES OF UNCERTAINTY - TECHNOLOGY]
Now I want to ask you some questions about the work of the department. In some work groups, all workers perform the same tasks whereas in other departments, each worker tends to perform different tasks.

96. Please describe your work group with respect to the uniformity or diversity of tasks performed by different workers. (THIS CAN ALSO BE CONSIDERED SPECIALIZATION.)
ALL WORKERS PERFORM SAME TASK -1
NOT ALL WORKERS PERFORM SAME TASK - 2
ALMOST EVERY WORKER PERFORMS A DIFFERENT TASK(S) -3
EVERY WORKER PERFORMS A DIFFERENT TASK(S) -4
ELABORATE IF NECESSARY

In some work groups, each worker performs the same tasks all the time whereas in other work groups, people perform many different tasks.

97. Please describe your work group with respect to the number of different tasks performed in the work group.
PERFORM SAME TASK(S) ALL THE TIME = 1
DON'T PERFORM SAME TASK(S) ALL THE TIME =2
RARELY PERFORM THE SAME TASK MORE THAN ONCE = 3
NEVER PERFORM THE SAME TASK MORE THAN ONCE = 4
ELABORATE IF NECESSARY

In some work groups, workload is predictable and uniform whereas in other work groups, workload varies and may not be predictable.

98. Please describe your work group with respect to the uniformity of the workload.
WORKLOAD VERY UNIFORM = 1
WORKLOAD SOMEWHAT UNIFORM = 2
WORKLOAD NOT VERY UNIFORM = 3
WORKLOAD NOT AT ALL UNIFORM = 4

99. And the predictability of the workload.
WORKLOAD VERY PREDICTABLE = 1
WORKLOAD SOMEWHAT PREDICTABLE = 2
WORKLOAD NOT VERY PREDICTABLE = 3
WORKLOAD NOT AT ALL PREDICTABLE = 4
ELABORATE IF NECESSARY

100. How many different tasks are performed by this work group? If it is a very large number, an approximation is fine. (THIS CAN BE CONSIDERED A MEASURE OF SPECIALIZATION.)
1 TASK = 1
2-5 TASKS = 2
6-10 TASKS = 3
11-20 TASKS = 4
MORE THAN 20 TASKS = 5
ALSO WRITE NUMBER

(WITHEY, DAFT & COOPER, 1983. TWO FACTOR MEASURE OF ROUTINIZATION. ALPHA.= .81).

The following questions pertain to the normal usual day-to-day pattern of work carried out by yourself and the people in your work unit.

101. How many of these tasks are the same from day to day?
VERY FEW OF THEM =1
SOME OF THEM =2
MOST OF THEM = 3
ALMOST ALL OF THEM = 4

102. To what extent would you say the work of your group is routine?
TO A SMALL EXTENT = 1
TO SOME EXTENT = 2
TO A GREAT EXTENT = 3
TO A VERY GREAT EXTENT = 4

103. People in this unit do about the same job in the same way most of the time.
NOT AT ALL TRUE = 1
NOT VERY TRUE = 2
SOMEWHAT TRUE = 3
VERY TRUE = 4

104. Basically unit members perform repetitive activities in doing their jobs.
NOT AT ALL TRUE = 1
NOT VERY TRUE = 2
SOMEWHAT TRUE = 3
VERY TRUE = 4

105. How repetitious are unit members' duties?
NOT AT ALL = 1
SOMEWHAT = 2
VERY = 3

(WITHEY, DAFT & COOPER, 1983 MEASURE OF ANALYZABILITY. THEY VIEW THIS AS TECHNOLOGY. IN PRICE & MUELLER, IT IS UNDER STANDARDIZATION. ALPHA = .85).

106. To what extent is there a clearly known way to do the major types of work your work unit normally encounter?
SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

107. To what extent is there a clearly defined body of knowledge or subject matter that can guide your unit in doing your work?
SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

108. To do your work, to what extent does your unit actually rely on established procedures and practices?
SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

109. To what extent is there an understandable sequence of steps that can be followed in carrying out your unit's work?
SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

KANTER AND BRINKERHOFF, 1981 [EFFECTIVENESS]

[READ ALL 3 AND THEN ASK RESPONDENT TO RATE EACH ON SCALE]
When your work group is unable to perform a task, solve a problem, or accomplish a goal, how often is this because:
the information is not available [THEORETICAL BOTTLENECK]
the resources that are required are not available within your company [RESOURCE BOTTLENECK]
the resources exist, but you are unable to put them together [ORGANIZATIONAL BOTTLENECK]

110. THEORETICAL BOTTLENECK
VERY FREQUENTLY = 4
SOMEWHAT FREQUENTLY = 3
NOT VERY FREQUENTLY = 2
NEVER = 1

111. RESOURCE BOTTLENECK
VERY FREQUENTLY = 4
SOMEWHAT FREQUENTLY = 3
NOT VERY FREQUENTLY = 2
NEVER = 1

112. ORGANIZATIONAL BOTTLENECK
VERY FREQUENTLY = 4
SOMEWHAT FREQUENTLY = 3
NOT VERY FREQUENTLY = 2
NEVER = 1

[PRODUCTIVITY - UNIQUE INDICATOR]
113. Do you have a formal indicator or set of indicators for your work group's productivity?
YES = 2 NO = 1

114. Please describe the indicator(s) that you use. WRITE ANSWER

115. [According to this indicator,] what is the productivity level of your organization (over the last month, quarter, year)? WRITE ANSWER.
[IF MORE THAN ONE INDICATOR, WRITE ANSWER FOR EACH.]

116. How do you regard this level of productivity?
Very high = 4
Quite high = 3
Not too high = 2
Not at all high = 1

IF PRODUCTIVITY IS NOT TOO HIGH OR NOT AT ALL HIGH, ASK:
A. What are the causes or reasons for low productivity?

[PRODUCTIVITY - FEEDBACK BY COMPUTER] ZUBOFF

117. Is there any information generated by the computer about the performance of employees in this work group?
YES = 2; NO = 1
WRITE ANSWER

118. If yes, does the employee get computer-generated feedback about his/her performance?
YES = 2; NO = 1
ELABORATE IF NECESSARY

119. If yes, does management get computer-generated information about each employee's performance or some employees' performance?
YES = 2; NO = 1
ELABORATE IF NECESSARY

120. Does management get computer-generated information about group productivity? YES = 2; NO = 1

[DEPENDENCE ON SYSTEM]

121. If there is a problem with the computer so that employees cannot do their work the way they usually do it, what do they do? [CIRCLE ALL THAT APPLY]
Stop working until someone fixes the computer.....1
Work on some other task until the computer is fixed.....2
Work on the same task some other way without the computer3
Use another computer.....4
Do things manually and enter in computer later.....5

[PRODUCTIVITY]

122. In my view, our work group is:
very productive =4
somewhat productive = 3
somewhat unproductive = 2
very unproductive = 1

123. In comparison to other work groups or departments in this company, I think our work group is:
very productive =4
somewhat productive = 3
somewhat unproductive = 2
very unproductive = 1

124. On average, during the last six months, our work group's productivity has:
   Decreased markedly = 1
   Decreased somewhat = 2
   Stayed the same = 3
   Increased somewhat = 4
   Increased markedly = 5

125. Are there normal cyclical patterns that would account for changes in productivity in the past 6 months?
   YES = 2; NO = 1

126. In my view, the quality of our work is:
   very unsatisfactory = 1
   somewhat unsatisfactory = 2
   somewhat satisfactory = 3
   very satisfactory = 4

   A. If it is unsatisfactory, please describe the reasons for the low quality.

127. In comparison to other work groups or departments in this company, I think our work is:
   very unsatisfactory = 1
   somewhat unsatisfactory = 2
   somewhat satisfactory = 3
   very satisfactory = 4

128. On average, during the last six months, the quality of our work has:
   decreased markedly = 1
   decreased somewhat = 2
   stayed the same = 3
   increased somewhat = 4
   increased markedly = 5

[PRODUCTIVITY - CUSTOMERS]
Recently many companies have adopted a customer-service perspective, that is, every work group is viewed as providing a service to or a product for a customer or customers. The customers may be other groups within the same organization, or they may be outside the organization. I would like you to take this perspective and think about the product or service you provide.

129. Who are your customers?

130. Are they inside or outside the company?
   INSIDE = 1
   BOTH INSIDE AND OUTSIDE = 2
   OUTSIDE = 3

131. How would you describe your work group's reputation for the product or service? Please describe the reputation within your company?
EXCELLENT REPUTATION = 4
GOOD REPUTATION = 3
OK REPUTATION = 2
POOR REPUTATION = 1

132. If you have customers outside your company, how would you describe your work group's reputation for product or service --reputation outside your company?
EXCELLENT REPUTATION = 4
GOOD REPUTATION = 3
OK REPUTATION = 2
POOR REPUTATION = 1
NO OUTSIDE CUSTOMERS = 0

133. What is the reputation of your work group in comparison to other work groups of the same type in other companies?
MUCH BETTER = 5
SOMEWHAT BETTER = 4
ABOUT AVERAGE = 3
SOMEWHAT BELOW AVERAGE = 2
MUCH BELOW AVERAGE = 1

134. How would you describe your work group's reputation for timeliness of your product or service?
EXCELLENT REPUTATION = 4
GOOD REPUTATION = 3
OK REPUTATION = 2
POOR REPUTATION = 1

135. How much is your work group valued in comparison to other work groups in your organization?
VALUED MUCH MORE THAN OTHER GROUPS = 4
VALUED SOMEWHAT MORE THAN OTHER GROUPS = 3
VALUED SOMEWHAT LESS THAN OTHER GROUPS = 2
VALUED MUCH LESS THAN OTHER GROUPS = 1

136. How is your value demonstrated by the company?

[STRUCTURE (STANDARDIZATION. IN PRICE & MUELLER, P. 241-242.) ZEITZ, 1983]

137. Whatever situation rises, our work group has procedures to deal with it.
AGREE 1 2 3 4 5 DISAGREE

138. To what extent did your work group follow standard operating procedures or practices to do your major tasks the past three months?
TO NO EXTENT 1 2 3 4 5 VERY GREAT EXTENT

139. Do members of your work group have to punch a time clock or are they expected to be at work during certain hours or are their hours very flexible?
HAVE TO PUNCH A TIME CLOCK/PAY DOCKED IF LATE = 1
EXPECTED TO BE HERE DURING CERTAIN HOURS = 2
QUITE FLEXIBLE = 3
EXTRAORDINARILY FLEXIBLE = 4

140. How many different kinds of skills are required to perform the work in this work group?
ONLY ONE = 1
A FEW DIFFERENT SKILLS = 2
QUITE A FEW DIFFERENT SKILLS = 3
MANY DIFFERENT SKILLS = 4

141. How about the level of skill?
LOW LEVEL ONLY = 1
MODERATE LEVEL = 2
HIGH LEVEL = 3
EXTRAORDINARILY HIGH LEVEL = 4

[DECISION-MAKING/DISCRETION]
142. Are you the person who hires people for this work group, or does someone else do the hiring and you have to accept whom they pick?
RESPONDENT DOES HIRING = 4
RESPONDENT CAN APPROVE OR DISAPPROVE OF HIRE = 3
RESPONDENT MAKES RECOMMENDATION BUT SOMEONE ELSE HAS FINAL SAY = 2
SOMEONE ELSE HIRES/RESPONDENT HAS NO SAY = 1

143. Are you the person who fires or lays off people in this work group, or does someone else make those decisions?
RESPONDENT DOES FIRING/LAYOFFS = 4
RESPONDENT CAN APPROVE OR DISAPPROVE OF FIRING/LAYOFF = 3
RESPONDENT MAKES RECOMMENDATION BUT SOMEONE ELSE HAS FINAL SAY = 2
SOMEONE ELSE FIRES/RESPONDENT HAS NO SAY = 1

[INTERDEPENDENCE]
144. To what extent is your work group dependent on other work groups for supplies? [PAPER, MATERIALS]
VERY DEPENDENT =4
SOMEWHAT DEPENDENT = 3
NOT VERY DEPENDENT = 2
NOT AT ALL DEPENDENT = 1

A. [IF DEPENDENT] On whom are you dependent for your supplies?
OTHER GROUPS WITHIN COMPANY = 1
GROUPS OUTSIDE THE COMPANY = 2
NOT DEPENDENT = 0

145. To what extent is your work group dependent on other work groups for information? [HOW TO DO SOMETHING, PHONE NUMBERS, ETC.]
VERY DEPENDENT =4
SOMEWHAT DEPENDENT = 3
NOT VERY DEPENDENT = 2
NOT AT ALL DEPENDENT = 1

A. [IF DEPENDENT] On whom are you dependent for your information?
OTHER GROUPS WITHIN COMPANY = 1
GROUPS OUTSIDE THE COMPANY = 2
NOT DEPENDENT = 0

146. To what extent is your work group dependent on other work groups for personnel?
VERY DEPENDENT =4
SOMEWHAT DEPENDENT = 3
NOT VERY DEPENDENT = 2
NOT AT ALL DEPENDENT = 1

A. [IF DEPENDENT] On whom are you dependent for your personnel?
OTHER GROUPS WITHIN COMPANY = 1
GROUPS OUTSIDE THE COMPANY = 2
NOT DEPENDENT = 0

ELABORATE ON DEPENDENCE IF NECESSARY

Finally, I'd like to get a little more information about you.

147. How long have you been in your present position?
LESS THAN 1 YEAR = 1
1-2 YEARS = 2
2+ -5 YEARS = 3
OVER 5 YEARS = 4

148. How long have you been with the company?
LESS THAN 1 YEAR = 1
1-2 YEARS = 2
2+ -5 YEARS = 3
5+-10 YEARS = 4
OVER 10 YEARS = 5

149. How much formal education have you had?
LESS THAN HIGH SCHOOL = 1
COMPLETED HIGH SCHOOL = 2
VOCATIONAL SCHOOL/CERTIFICATE = 3
SOME COLLEGE/2-YEAR DEGREE = 4
BA OR BS = 5
SOME GRAD WORK/ MA OR MS = 6
PHD, MD ETC. = 7

150. Do you interact with a computer in your current job?
NO = 1 YES = 2

151. If yes, approximately how many hours a week do you spend working on a computer?
LESS THAN 5 = 1
5 - 10 = 2
10-20 = 3
20-30 = 4
30-40 = 5
MORE THAN 40 = 6

152. The last question: In this work group, is the work that is done now require more or less skill of the workers than the work that was done here before computers were used?
MUCH MORE SKILLED =5
MORE SKILLED = 4
SAME LEVEL OF SKILL = 3
LESS SKILL = 2
MUCH LESS SKILL = 1
DON'T KNOW = 9

Thanks very much for your help. We are all done, unless you have anything you would like to add, except for the organizational chart and annual report.

153. Do you have a copy of an organization chart that I could take with me?
NO = 1 YES = 2

A. If yes, have there been any major changes I should know about?

154. Do you have a copy of the most recent annual report that I could take with me?
NO = 1; YES = 2

155. CLASSIFY WORK GROUP TECHNOLOGY ACCORDING TO WOODWARD'S TYPOLOGY:

1 = SMALL BATCH AND UNIT [CUSTOMIZED INDIVIDUAL OR SMALL GROUP ACCORDING TO CUSTOMERS' ORDERS]
2 = MASS PRODUCTION OF LARGE BATCHES
3 = PROCESS [AUTOMATED PROCESS SIMILAR TO ASSEMBLY LINE]

156. CLASSIFY WORK GROUP TECHNOLOGY ACCORDING TO THOMPSON'S TYPOLOGY:

1 = INTENSIVE [CUSTOMIZED, INDIVIDUAL]
2 = MEDIATING
3 = LONG-LINKED [INTERDEPENDENT, NEED EVERYTHING TOGETHER TO PERFORM JOB]

APPENDIX C

Questions and Response Choices Used for Scales and Singular Items in Quantitative and Qualitative Analyses, Statistical Frequency Distributions, Means, and Standard Deviations

QUESTIONS AND RESPONSE CHOICES USED

FOR QUALITATIVE ANALYSIS

I. Demographics.

Interview Question #4

Name of work group: _____

1. Job Classification.

Interview Question #ii

INTERVIEWER RATING

Group Type

Value	Frequency	Valid Percent
1 Administrative	20	22.5
2 Technical-Professional	23	25.8
3 Text-Professional	22	24.7
4 Clerical or Technical Support	24	27.0
Total	89	100.0

2. Interview Respondents Classification.

Interview Question #2

Which of the following best describes your job classification? (Ask only if it seems unclear, otherwise just code it).

Value	Frequency	Valid Percent
1 Executive	5	5.6
2 Manager	71	79.8
3 Tech-professional	2	2.2
4 Other professional	5	5.6
5 Technician	1	1.1
6 Secretarial	2	2.2
7 Tech-clerical	0	0.0
8 Clerical	3	3.4
9 Other	0	0.0
Total	89	100.0

3. Interview Respondents Educational Level.

Interview Question #149

How much formal education have you had?

Value	Frequency	Valid Percent
1 Less than high school	0	0.0
2 Completed high school	2	2.2
3 Vocational school/cert.	2	2.2
4 Some college/2-yr Degree	19	21.3
5 BA or BS	13	14.6
6 Some grad work/MA or MS	46	51.7
7 PHD, MD, etc.	7	7.9
Total	89	100.0

4. Interview Respondents Organizational Tenure.

Interview Question #148

How long have you been with the company?

Value	Frequency	Valid Percent
1 Less than one year	4	4.5
2 One to two years	7	7.9
3 Two to five years	17	19.1
4 Over five years	28	31.5
5 Over ten years	33	37.1
Total	89	100.0

5. Questionnaire Respondents Gender.

Questionnaire Question #87

Are you male or female?

Value	Frequency	Valid Percent
1 Male	218	35.9
2 Female	390	64.1
9 Missing	15	Missing
Total	623	100.0

6. Questionnaire Respondents Classification.

Questionnaire Question #4

Which of the following best describes your job classification?

Value	Frequency	Valid Percent
1 Executive	9	1.4
2 Manager	66	10.6
3 Technical Professional	97	15.6
4 Other Professional	130	20.9
5 Technician	13	2.1
6 Secretarial	37	5.9
7 Clerical	177	28.4
8 Technical-Clerical	84	13.5
9 Other	10	1.6
Total	623	100.0

7. Questionnaire Respondents Educational Level.

Questionnaire Question #89

Which of the following best describes your formal education?

Value	Frequency	Valid Percent
1 Less than High School	3	0.5
2 High School	76	12.5
3 Vocational School	35	5.8
4 Some College	231	38.0
5 Bachelors	106	17.4
6 Masters	135	22.2
7 Doctoral	22	3.6
9 Missing	15	Missing
Total	623	100.0

8. Questionnaire Respondents Organizational Tenure.

Questionnarie Question #8

How long have you worked for this company?

Value	Frequency	Valid Percent
1 Less Than 6 Months	55	8.9
2 Six Months to One Year	48	7.8
3 One or Two Years	75	12.2
4 Two to Five Years	146	23.7
5 Five to Ten Years	151	24.5
6 More Than Ten Years	142	23.0
9 Missing	6	Missing
Total	623	100.0

9. Multiple Company Sites.

Interview Question #7

Is there more than one facility or site?

Value	Frequency	Valid Percent
1 No	27	30.3
2 Yes	62	69.7
Total	89	100.0

10. Site Workers.

Interview Question #8

How many people work at this site?
(PEOPLE - BODY COUNT)

Value	Frequency	Valid Percent
1-100	32	37.2
101-200	11	12.8
201-300	7	8.1
301-400	4	4.6
401-500	5	5.8
501-600	5	5.8
601-700	1	1.2
701-800	1	1.2
1200	3	3.5
1400	1	1.2
1500	1	1.2
1800	2	2.3
2500	3	3.5
2600	1	1.2
3000	5	5.8
3600	1	1.2
4000	1	1.2
7500	1	1.2
9000	1	1.2
9999	3	Missing
Total	89	100.0

Mean = 837.15
Standard Deviation = 1521.40
Median = 250

11. Number of Workers in Group.

Interview Question #10

How many people work in this group?
(PEOPLE - BODY COUNT)

Value	Frequency	Valid Percent
4	7	7.9
5	10	11.2
6	12	13.5
7	6	6.7
8	9	10.1
9	10	11.2
10	4	4.5
11	9	10.1
12	3	3.4
13	3	3.4
14	4	4.5
15	2	2.2
18	1	1.1
19	2	2.2
20	2	2.2
24	1	1.1
25	2	2.2
34	1	1.1
39	1	1.1
Total	89	100.0

Mean = 10.08
Standard Deviation = 6.26
Median = 8

12. Company Product.

Interview Question #12

In a few words, please describe what the company (not work group) produces or does.

Value	Frequency	Valid Percent
1 Manufacturing	23	25.8
2 Service	66	74.2
Total	89	100.0

13. Decision Making.

Interview Question #13

In your company, to what extent is decision-making distributed: (CENTRALIZATION)

A. Vertically up and down the hierarchy

SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

B. Horizontally between various departments or divisions at the same hierarchical level

SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

Decision Making Vertically.

Value	Frequency	Valid Percent
1 Small Extent	7	8.0
2	14	16.1
3	8	9.2
4	22	25.3
5	9	10.3
6	14	16.1
7 Large Extent	13	14.9
9 Missing	2	Missing
Total	89	100.0

Mean = 4.22
Standard Deviation = 1.88

Decision Making Horizontally.

Value	Frequency	Valid Percent
1 Small Extent	4	4.6
2	3	3.4
3	3	3.4
4	29	33.3
5	16	18.4
6	15	17.2
7 Large Extent	17	19.5
9 Missing	2	Missing
Total	89	100.0

Mean = 4.87
Standard Deviation = 1.58

14. Public Company.

Interview Question #14

Is it public or private?

Value	Frequency	Valid Percent
1 Public	40	44.9
2 Private	49	55.1
Total	89	100.0

15. Unionized.

Interview Question #18

Do people in this work group belong to a union?

YES, EVERYONE (EXCLUDING SUPERVISOR) = 3
YES, SOME = 2
NO, NONE = 1

Value	Frequency	Valid Percent
1 No, none	71	79.8
2 Yes, some	8	9.0
3 Yes, everyone	10	11.2
Total	89	100.0

16. Gender.

Interview Question #19

Of the people who work in this work group, how many are men?

WRITE NUMBER

Number of Men in Group

Value	Frequency	Valid Percent
0	7	7.9
1	20	22.5
2	12	13.5
3	9	10.1
4	15	16.9
5	7	7.9
6	6	6.7
7	3	3.4
8	3	3.4
9	3	3.4
11	2	2.2
15	1	1.1
17	1	1.1
Total	89	100.0

Mean = 3.69
Standard Deviation = 3.21

How many are women?

WRITE NUMBER

Number of Women in Group

Value	Frequency	Valid Percent
0	7	7.9
1	1	1.1
2	9	10.1
3	11	12.4
4	13	14.6
5	11	12.4
6	5	5.6
7	8	9.0
8	6	6.7
9	4	4.5
10	3	3.4
11	1	1.1
12	1	1.1
13	1	1.1
14	1	1.1
15	1	1.1
16	1	1.1
17	1	1.1
19	1	1.1
22	1	1.1
27	1	1.1
34	1	1.1
Total	89	100.0

Mean = 6.28
Standard Deviation = 5.66

17. Age Distribution.

Interview Question #20

What is the general distribution by age in this work group? WRITE NUMBER UNDER 30, 30-45, OVER 45

Under 30 Years

Value	Frequency	Valid Percent
0	17	19.1
1	13	14.6
2	16	18.0
3	18	20.2
4	10	11.2
5	6	6.7
6	3	3.4
7	3	3.4
10	1	1.1
20	1	1.1
27	1	1.1
Total	89	100.0

Mean = 2.98
Standard Deviation = 3.76

From 30 to 45 Years

Value	Frequency	Valid Percent
0	2	2.2
1	5	5.6
2	15	16.9
3	19	21.3
4	13	14.6
5	6	6.7
6	4	4.5
7	5	5.6
8	6	6.7
9	6	6.7
10	2	2.2
11	1	1.1
12	1	1.1
13	1	1.1
16	1	1.1
21	1	1.1
25	1	1.1
Total	89	100.0

Mean = 5.09
Standard Deviation = 4.13

Over 45 Years

Value	Frequency	Valid Percent
0	22	24.7
1	24	27.0
2	24	27.0
3	5	5.6
4	2	2.2
5	4	4.5
6	2	2.2
7	3	3.4
8	1	1.1
10	2	2.2
Total	89	100.0

Mean = 1.98
Standard Deviation = 2.22

18. Minorities.

Interview Question #21

How many ethnic minorities work in this work group?

(ETHNIC MINORITIES ARE NON-CAUCASIANS)

NUMBER MINORITY: _____

Value	Frequency	Valid Percent
0	21	23.6
1	21	23.6
2	19	21.3
3	11	12.4
4	5	5.6
5	3	3.4
6	2	2.2
7	2	2.2
9	2	2.2
12	1	1.1
14	1	1.1
31	1	1.1
Total	89	100.0

Mean = 2.56
Standard Deviation = 3.99
Median = 2

19. Education.

Interview Question #22

What is the average educational level of people in this work group? What proportion have bachelor's degrees?

NUMBER WITH BACHELOR'S DEGREES: _____

Number of Bachelor's Degree.

Value	Frequency	Valid Percent
0	9	10.1
1	18	20.2
2	4	4.5
3	11	12.4
4	11	12.4
5	7	7.9
6	4	4.5
7	8	9.0
8	3	3.4
9	5	5.6
10	4	4.5
11	2	2.2
15	2	2.2
16	1	1.1
Total	89	100.0

Mean = 4.44
Standard Deviation = 3.71

20. Technical Training.

Interview Question #23

What proportion of people in this work group are technical workers or are technically trained? By technical workers I mean those who are performing applied science or engineering jobs.

NUMBER TECHNICALLY TRAINED: _____

Number of Technical Trained.

Value	Frequency	Valid Percent
0	58	65.2
1	1	1.1
2	7	7.9
3	2	2.2
4	3	3.4
5	1	1.1
6	4	4.5
7	5	5.6
8	3	3.4
9	1	1.1
11	2	2.2
13	1	1.1
19	1	1.1
Total	89	100.0

Mean = 2.07
Standard Deviation = 3.65

21. Mainframe.

Interview Question #37

I would like to start by asking you about computing power available to this work group; I'm going to ask about mainframe computers (e.g. VAX, CYBER, CRAY, IBM), minicomputers (e.g. VAX), or microcomputers (e.g. VAX, IBM, VECTOR, MACINTOSH) including PCs.

Is there a mainframe computer that is used by workers in this work group? YES = 2; NO = 1

A. If yes, how many? CODE NUMBER
WRITE NAME(S)

Have a Mainframe

Value	Frequency	Valid Percent
1 No	36	40.4
2 Yes	53	59.6
Total	89	100.0

Number of Mainframes

Value	Frequency	Valid Percent
1	35	66.0
2	8	15.1
3	5	9.4
4	1	1.9
5	2	3.8
7 Seven or More	2	3.8
8 No Mainframe	36	Missing
Total	89	100.0

Mean = 1.77
Standard Deviation = 1.45

22. Minicomputer.

Interview Question #38

Is there a minicomputer(s) that is used by workers in this work group? YES = 2; NO = 1

A. If yes, how many? CODE NUMBER
WRITE NAME(S)

Have a Minicomputer

Value	Frequency	Valid Percent
1 No	53	60.2
2 Yes	35	39.8
9 Missing	1	Missing
Total	89	100.0

Number of Minicomputers

Value	Frequency	Valid Percent
1	18	51.4
2	11	31.4
3	2	5.7
4	3	8.6
7	1	2.9
8 No mini	53	Missing
9 Missing	1	Missing
Total	89	100.0

Mean = 1.83
Standard Deviation = 1.27

23. Microcomputer.

Interview Question #39

Are there microcomputer(s) that are used by workers in this work group? YES = 2; NO = 1

A. If yes, how many? CODE NUMBER
WRITE NAME(S)

Have a Microcomputer

Value	Frequency	Valid Percent
1 No	11	12.4
2 Yes	78	87.6
Total	89	100.0

Number of Microcomputers

Value	Frequency	Valid Percent
1	16	20.5
2	11	14.1
3	12	15.4
4	8	10.3
5	6	7.7
6	5	6.4
7	7	9.0
8	2	2.6
9	2	2.6
11	3	3.8
13	2	2.6
15	1	1.3
16	1	1.3
21	1	1.3
25	1	1.3
88 No Micro	11	Missing
Total	89	100.0

Mean = 4.94
Standard Deviation = 4.57

II. Job Tasks.

1. Job Description.

Interview Question #15

In a few words, please describe what this work group produces or does.

Interview Question #16

Briefly, how is it accomplished (in terms of the steps or functions involved)?

2. Substitution.

Interview Question #75

To what extent is the computer system a substitute for human effort and decisions?

Value	Frequency	Valid Percent
1 None	25	28.1
2 A little	36	40.4
3 Quite a bit	19	21.3
4 Extensive	9	10.1
Total	89	100.0

Mean = 2.14
Standard Deviation = 0.94

3. Computer Used For Tasks.

Interview Question #91

Can workers here use the computer for most of the tasks they perform?

Value	Frequency	Valid Percent
1 None	0	00.0
2 Some	39	43.8
3 Most	40	44.9
4 All	10	11.3
Total	89	100.0

Mean = 2.67
Standard Deviation = 0.67

4. Could Computerize More Tasks.

Interview Question #91A

Are there tasks that should be computerized?

Value	Frequency	Valid Percent
1 No, none	7	16.7
2 Yes, some	23	54.8
3 Yes, most	10	23.8
4 Yes, all	2	4.8
9 Missing	47	Missing
Total	89	100.0

Mean = 2.17
Standard Deviation = 0.76

5. Task Analyzability. A task analyzability index was constructed from four interview questions:

Interview Question #106

To what extent is there a clearly known way to do the major types of work your work unit normally encounter?

SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

Interview Question #107

To what extent is there a clearly defined body of knowledge or subject matter that can guide your unit in doing your work?

SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

Interview Question #108

To do your work, to what extent does your unit actually rely on established procedures and practices?

SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

Interview Question #109

To what extent is there an understandable sequence of steps that can be followed in carrying out your unit's work?

SMALL EXTENT 1 2 3 4 5 6 7 LARGE EXTENT

Value	Frequency	Valid Percent
1.00 Small Extent	2	2.2
2.00	4	4.5
2.75	2	2.2
3.00	2	2.2
3.25	2	2.2
3.50	1	1.1
3.75	3	3.4
4.00	2	2.2
4.25	4	4.5
4.50	6	6.7
4.75	5	5.6
5.00	5	5.6
5.25	5	5.6
5.50	3	3.4
5.75	3	3.4
6.00	5	5.6
6.25	5	5.6
6.50	6	6.7
6.75	5	5.6
7.00 Large Extent	19	21.3
Total	89	100.0

Mean = 5.29
Standard Deviation = 1.58

6. Task Routineness. An index of task routiness was constructed from five interview questions:

Interview Question #101

The following questions pertain to the normal usual day-to-day pattern of work carried out by yourself and the people in your work unit.
How many of these tasks are the same from day to day?

VERY FEW OF THEM = 1
SOME OF THEM = 2
MOST OF THEM = 3
ALMOST ALL OF THEM = 4

Interview Question #102

To what extent would you say the work of your group is routine?

TO A SMALL EXTENT = 1
TO SOME EXTENT = 2
TO A GREAT EXTENT = 3
TO A VERY GREAT EXTENT = 4

Interview Question #103

People in this unit do about the same job in the same way most of the time.

NOT AT ALL TRUE = 1
NOT VERY TRUE = 2
SOMEWHAT TRUE = 3
VERY TRUE = 4

Interview Question #104

Basically unit members perform repetitive activities in doing their jobs.

NOT AT ALL TRUE = 1
NOT VERY TRUE = 2
SOMEWHAT TRUE = 3
VERY TRUE = 4

Interview Question #105

How repetitious are unit members' duties?

NOT AT ALL = 1
SOMEWHAT = 2
VERY = 3

Value	Frequency	Valid Percent
1.00 Not routine	2	2.2
1.20	3	3.4
1.40	3	3.4
1.60	5	5.6
1.80	6	6.7
2.00	8	9.0
2.20	5	5.6
2.40	6	6.7
2.60	12	13.5
2.80	11	12.4
3.00	9	10.1
3.20	7	7.9
3.40	3	3.4
3.60	5	5.6
3.80 Very routine	4	4.5
Total	89	100.0

Mean = 2.53
Standard Deviation = 0.71

7. Skill Variety. For skill variety, a scale was constructed from three interview questions:

Interview Question #97

In some work groups, each worker performs the same tasks all the time whereas in other work groups, people perform many different tasks.

Please describe your work group with respect to the number of different tasks performed in the work group.

PERFORM SAME TASK(S) ALL THE TIME = 1
DON'T PERFORM SAME TASK(S) ALL THE TIME = 2
RARELY PERFORM THE SAME TASK MORE THAN ONCE = 3
NEVER PERFORM THE SAME TASK MORE THAN ONCE = 4
ELABORATE IF NECESSARY

Interview Question #100

How many different tasks are performed by this work group? If it is a very large number, an approximation is fine. (THIS CAN BE CONSIDERED A MEASURE OF SPECIALIZATION.)

1 TASK = 1
2-5 TASKS = 2
6-10 TASKS = 3
11-20 TASKS = 4
MORE THAN 20 TASKS = 5
ALSO WRITE NUMBER

Interview Question #140

How many different kinds of skills are required to perform the work in this work group?

ONLY ONE = 1
A FEW DIFFERENT SKILLS = 2
QUITE A FEW DIFFERENT SKILLS = 3
MANY DIFFERENT SKILLS = 4

Value	Frequency	Valid Percent
1.00 No variety	0	0.0
1.33	1	1.1
1.67	3	3.4
2.00	10	11.2
2.33	10	11.2
2.67	17	19.1
3.00	9	10.1
3.33	18	20.2
3.67	14	15.7
4.00 A lot of variety	7	7.9
Total	89	100.0

Mean = 2.94
Standard Deviation = 0.67

8. Task Significance. A task significance index was developed from two interview questions:

Interview Question #135

How much is your work group valued in comparison to other work groups in your organization?

VALUED MUCH MORE THAN OTHER GROUPS = 4
VALUED SOMEWHAT MORE THAN OTHER GROUPS = 3
VALUED SOMEWHAT LESS THAN OTHER GROUPS = 2
VALUED MUCH LESS THAN OTHER GROUPS = 1

Interview Question #136

INTERVIEWER RATING OF INTERVIEW QUESTION #135

How much is your work group valued in comparison to other work groups in your organization?

VALUED MUCH MORE THAN OTHER GROUPS = 4
VALUED SOMEWHAT MORE THAN OTHER GROUPS = 3
VALUED SOMEWHAT LESS THAN OTHER GROUPS = 2
VALUED MUCH LESS THAN OTHER GROUPS = 1

Value	Frequency	Valid Percent
1.00 Valued much less	1	1.2
1.50	6	7.0
2.00	15	17.4
2.50	15	17.4
3.00	35	40.7
3.50	8	9.3
4.00 Valued much more	6	7.0
9 Missing	3	Missing
Total	89	100.0

Mean = 2.73
Standard Deviation = 0.67

9. Computer-Related Autonomy. A scale for computer-related autonomy was formed from four questionnaire items:

Questionnaire Question #34

Does your immediate superior know how many hours a day you spend working at the computer?

YES = 1
DON'T KNOW = 2
NO = 3

Questionnaire Question #35

Does your immediate superior know how many different applications you use on the computer?

YES = 1
DON'T KNOW = 2
NO = 3

Questionnaire Question #36

Does your immediate superior know how many errors or mistakes you make when you are working on the computer?

YES = 1
DON'T KNOW = 2
NO = 3

Questionnaire Question #37

Does your immediate superior know how many keystrokes or transactions you make per day on the computer?

YES = 1
DON'T KNOW = 2
NO = 3

Data aggregated from the individual level to the work group level:

Value	Frequency	Valid Percent
1.00 Yes	1	1.3
1.01-1.19	3	3.4
1.20-1.39	3	3.4
1.40-1.59	17	19.3
1.60-1.79	19	21.6
1.80-1.99	15	17.0
2.00-2.19	15	17.0
2.20-2.39	6	6.8
2.40-2.69	9	10.2
3.00 No	0	00.0
9 Missing	1	Missing
Total	89	100.0

10. Computer-Related Feedback on Transactions.

Questionnaire Question #39

Does the computer give you feedback (or let you know) how many keystrokes or transactions you make on the computer?

NO = 1
NOT SURE = 2
YES, SOMETIMES = 3
YES, ALL THE TIME = 4

Data aggregated from the individual level to the work group level:

Value	Frequency	Valid Percent
1.00 No	0	00.0
1.01-1.49	5	5.7
1.50-1.99	25	28.4
2.00-2.49	27	30.7
2.50-2.99	5	5.5
3.00 Sometimes	25	28.4
4.00 All the time	1	1.1
9 Missing	1	Missing
Total	89	100.0

Mean = 2.37
Standard Deviation = 0.54

11. Computer-Related Feedback on Errors.

Questionnaire Question #38

Does the computer give you feedback (or let you know) if you make errors or mistakes when you work on the computer?

NO = 1
NOT SURE = 2
YES, SOMETIMES = 3
YES, ALL THE TIME = 4

Data aggregated from the individual level to the work group level:

Value	Frequency	Valid Percent
1.00 No	14	15.9
1.01-1.29	13	14.8
1.30-1.59	11	12.5
1.60-1.89	21	23.9
1.90-2.19	2	2.3
2.20-2.49	8	9.1
2.50-2.79	4	4.5
3.00 Sometimes	12	13.6
4.00 All the time	3	3.4
9 Missing	1	Missing
Total	89	100.0

Mean = 1.85
Standard Deviation = 0.79

III. Computer-Mediated Communication Characteristics.

1. Intracompany Communication.

Interview Question #48

Can members of your work group communicate with workers in other work groups in this company via computer?

Value	Frequency	Valid Percent
0 No communication	38	44.7
1 Only work group	4	4.7
2 Some subset of company	13	15.3
3 All groups on-site	7	8.2
4 All work groups in company	23	27.1
9 Missing	4	Missing
Total	89	100.0

Mean = 1.68
Standard Deviation = 1.71

2. Extracompany Communication.

Interview Question #49

Can members of this work group communicate with workers in other COMPANIES by computer? YES = 2; NO = 1

Value	Frequency	Valid Percent
1 No	61	68.5
2 Yes	28	31.5
Total	89	100.0

3. Types of Extracompany Communication.

Interview Question #49B

Which companies can members of this work group communicate with workers in other companies by computer?

SAME INDUSTRY = 1
OTHER INDUSTRY = 2
BOTH = 3

Value	Frequency	Valid Percent
1 Same industry	16	57.1
2 Other industry	5	17.9
3 Both	7	25.0
8 No Extracompany	61	Missing
Total	89	100.0

Communicate With Customer

Interview Question #49C

Which companies can members of this work group communicate with workers in other companies by computer?

CAN NOT COMMUNICATE WITH CUSTOMER = 1
CAN COMMUNICATE WITH CUSTOMER = 2

Value	Frequency	Valid Percent
1 No	19	67.9
2 Yes	9	32.1
8 No Extracompany	61	Missing
Total	89	100.0

Communicate With Suppliers

Interview Question #49D

Which companies can members of this work group communicate with workers in other companies by computer?

CAN NOT COMMUNICATE WITH SUPPLIERS = 1
CAN COMMUNICATE WITH SUPPLIERS = 2

Value	Frequency	Valid Percent
1 No	14	50.0
2 Yes	14	50.0
8 No Extracompany	61	Missing
Total	89	100.0

Communicate With Vendor

Interview Question #49E

Which companies can members of this work group communicate with workers in other companies by computer?

CAN NOT COMMUNICATE WITH COMPUTER VENDOR = 1
CAN COMMUNICATE WITH COMPUTER VENDOR = 2

Value	Frequency	Valid Percent
1 No	21	75.0
2 Yes	7	25.0
8 No Extracompany	61	Missing
Total	89	100.0

4. Communication Network Connectivity. For network connectivity, an index was constructed from two interview questions:

Interview Question #66

INTEGRATABILITY/CONNECTIVITY

Fourth, I am interested in the extent to which different hardware components that you have can be linked together so that they can communicate or the user can access one from another.

Please describe the work group's computer system with respect to the extent to which hardware components can be linked together.

CAN LINK ALMOST ANYTHING WITH THIS SYSTEM = 4
LIMITED ABILITY TO LINK INCLUDING SOME
TERMINAL TO TERMINAL = 3
LIMITED ABILITY TO LINK COMPONENTS BUT
NO TERMINAL TO TERMINAL ABILITY = 2
NO LINKING CAPABILITY = 1

Interview Question #66B

INTERVIEW RATING OF INTERVIEW QUESTION #66

Please describe the work group's computer system with respect to the extent to which hardware components can be linked together.

CAN LINK ALMOST ANYTHING WITH THIS SYSTEM = 4
LIMITED ABILITY TO LINK INCLUDING SOME
TERMINAL TO TERMINAL = 3
LIMITED ABILITY TO LINK COMPONENTS BUT
NO TERMINAL TO TERMINAL ABILITY = 2
NO LINKING CAPABILITY = 1

Value	Frequency	Valid Percent
1.00 No linking	15	16.9
1.50	3	3.4
2.00	14	15.7
2.50	9	10.1
3.00	16	18.0
3.50	11	12.4
4.00 Link almost anything	21	23.6
Total	89	100.0

Mean = 2.70
Standard Deviation = 1.06

5. Work-Related Communication.

Interview Question #89

Some experts contend that a computer system should reflect formal and informal patterns of work in order to be most effective.

Can workers here use the computer to talk to the people with whom they need to communicate in order to do their work?

Value	Frequency	Valid Percent
1 No	53	59.6
2 Not easily	13	14.6
3 Very easily	23	25.8
Total	89	100.0

Mean = 1.66
Standard Deviation = 0.87

6. Communication Feedback.

Interview Question #117

Is there any information generated by the computer about the performance of employees in this work group?

Value	Frequency	Valid Percent
1 No	60	67.4
2 Yes	29	32.6
Total	89	100.0

Interview Question #118

Does the employee get computer-generated feedback about his/her performance?

Value	Frequency	Valid Percent
1 No	11	37.9
2 Yes	18	62.1
9 Missing	60	Missing
Total	89	100.0

Interview Question #119

Does management get computer-generated information about each employee's performance or some employees' performance?

Value	Frequency	Valid Percent
1 No	12	41.4
2 Yes	17	58.6
9 Missing	60	Missing
Total	89	100.0

Interview Question #120

Does management get computer-generated information about group productivity?

Value	Frequency	Valid Percent
1 No	60	67.4
2 Yes	29	32.6
Total	89	100.0

7. Social Communication.

Interview Question #90

Do people communicate socially via computer?

Value	Frequency	Valid Percent
1 No	69	77.5
2 A little	14	15.7
3 A lot	6	6.7
Total	89	100.0

Mean = 1.29
Standard Deviation = 0.59

8. Satisfaction with Communication.

Interview Question #50

Overall, are you satisfied with your work group's ability to communicate by computer--internally, with other work groups and externally?

Value	Frequency	Valid Percent
1 Not satisfied	12	14.0
2 Not very satisfied	15	17.4
3 Somewhat satisfied	29	33.7
4 Very satisfied	30	34.9
9 Missing	3	Missing
Total	89	100.0

Mean = 2.90
Standard Deviation = 1.04