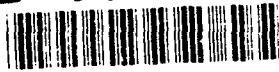


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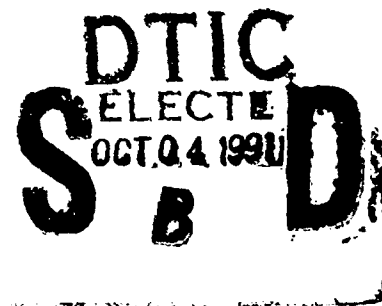


U.S. Army Research Institute
for the Behavioral and Social Sciences

Research Report 1593

Executive Development Through Asynchronous Computer Conferencing

Michael J. Strait
University of Maryland



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U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

**A Field Operating Agency Under the Jurisdiction
of the Deputy Chief of Staff for Personnel**

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Research Report 1593

Executive Development Through Asynchronous Computer Conferencing

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FOREWORD

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) conducts research to develop and implement technology for aiding sequential and progressive leader development. The initial effort consisted of interviews with two-thirds of the three- and four-star general officers incumbent at that time. Content analysis of these interviews identified knowledge and skills uniquely required in the duty positions occupied, and a general understanding of the working frames of reference these generals used for problem solving and decision making.

At the time this work was being done, asynchronous computer conferencing was being advanced as a technology to develop executive thinking skills and frames of reference. The research detailed in this report was undertaken to determine if evidence existed for either the use of this technology in the private sector, or for its effectiveness. At the same time, an experimental net using computer conferencing was initiated with a group of battalion commanders who had completed a developmental leadership assessment. A principal finding from that work was that there was not enough interest in the computer conferencing net; fewer than 30% of the battalion commanders became involved.

That finding, coupled with the findings from the present effort, led to the conclusion that this is, at least for the present, not a good technology for the development of executive thinking and decision making skills, and that further research in this area would not be useful.

This report is one of a series of reports prepared for the Executive Development Project. The sponsor is the Deputy Chief of Staff for Personnel, LOA 17 June 1985, entitled Concept for Executive Leadership. Its primary utility has been in determining useful directions that were taken by subsequent research.

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EDGAR M. JOHNSON
Technical Director

EXECUTIVE DEVELOPMENT THROUGH ASYNCHRONOUS COMPUTER CONFERENCING

EXECUTIVE SUMMARY

Requirement:

To investigate computer-mediated communication, specifically asynchronous computer conferencing (ACC), and its potential for executive development.

Procedure:

The concept of executive development was discussed and re-defined through a review and analysis of recent Army documents and research literature from the fields of social, industrial/organizational, and developmental psychology. A conceptual analysis of some key issues related to the potential use of ACC in executive development was performed, with special emphasis on the relationship between executive development as defined by the Army and concepts of adult cognitive development.

The investigation of ACC's potential as a supporting technology for executive development was performed by reviewing the background literature on the history and use of ACC. In particular, research literature was reviewed concerning applications of ACC with a focus on implications for the use of ACC to support executive development.

Recent published and unpublished surveys, current news periodicals, and proceedings of active computer conferences were reviewed, and several experts were interviewed, to determine the current state of ACC technology and its application that might be relevant to executive development.

Findings:

It was determined that traditional sources of research literature on human development and leadership in organizations do not provide significant help in understanding the nature of executive leadership and executive development as it concerns the U.S. Army. However, more recent research that assumes a situational or contingency approach and a developmental perspective, such as that of Jaques (1976), is promising.

The emergence of a new transactional perspective in developmental psychology that allows for context-specific development across the life span offers some support for the possibility of executive leadership development in the organizational context of the U.S. Army. A possible model for intervention and research was found in recent literature describing efforts to enhance the intellectual and ethical development of college students (Perry, 1970).

There is considerable evidence to attest to the value of ACC as a communications system for geographically dispersed workgroups, and evidence of increasing interest in ACC as an instructional delivery system for distance education. It was determined, however, that past use of ACC and previous research on applications of ACC technology had little to contribute to the main question of the value of ACC as a supporting technology for executive leadership development in the Army. There is little evidence of ACC being used to effect cognitive development and little evidence of ACC being used by executives for any purpose.

The argument is made that the most favorable conceptual framework for executive leadership development suggests that scientifically meaningful development occurs through developmental challenges confronted in a person's real work environment. In order for asynchronous computer conferencing to support executive leadership development activities, ACC technology must be integrated into the work organization environment at all levels, including the executive levels.

Utilization of Findings:

This report provides information on past and current use of ACC and research on ACC applications relevant to executive development application by the Army. The report presents a conceptual analysis of key issues that must be addressed and conditions that must be met to determine the value of ACC as a support technology for executive development in the future.

EXECUTIVE DEVELOPMENT THROUGH ASYNCHRONOUS COMPUTER CONFERENCING

CONTENTS

	Page
INTRODUCTION	1
Objectives	1
Approach	2
Organization of the Report	3
A CONCEPTUAL FRAMEWORK FOR EXECUTIVE DEVELOPMENT	5
Social Psychological Perspectives	5
Developmental Perspectives	6
The Starting Point: A Concept of Executive Leadership	8
Is Developmental Intervention Possible	9
A Model from Higher Education	11
Summary of Executive Development Conceptual Framework	13
BACKGROUND LITERATURE ON ACC AND EXECUTIVE DEVELOPMENT	15
The Origins of ACC	15
The Nature of ACC: A Closer Look	16
Early Research on ACC	18
Summary of Strengths and Weaknesses	21
Recent Reviews of ACC and Computer-Mediated Communication	22
Use of ACC for and by Executives	23
Corporate Computer Conferencing	26
Summary of Findings Related to ACC and Executive Development	30
CURRENT STATUS OF ACC AND EXECUTIVE DEVELOPMENT	33
Interviews with Experts	33
Legal Issues in ACC	34
DISCUSSION AND CONCLUSIONS	35
ACC Technology and Human Values	35
Can ACC Be Used to Enhance Executive Development?	36
REFERENCES	41
APPENDIX A: EXPERT INTERVIEW SUMMARIES	A-1
B. MORE ON LEGAL ISSUES IN ACC	B-1

EXECUTIVE DEVELOPMENT THROUGH ASYNCHRONOUS COMPUTER CONFERENCING

INTRODUCTION

This document is a technical report on research concerning the use of asynchronous computer conferencing (ACC) in executive development. This work was undertaken in support of a long-term effort to identify the requirements of executive leadership and to evaluate and design technology-based enhancements for the development of future executive leaders.

Objectives

The ultimate objective of this line of investigation is to document what we do and do not know about the potential of ACC as a technology to support executive development as defined by the Army. The executive level of leadership is defined by the Army as the two top echelons of the formal Army organization, primarily the positions of three- and four-star general officers. The required executive leadership capabilities are to a large extent determined by the nature, size and structure of the organization, following stratified systems theory (Jacobs & Jaques, 1987; Jaques, 1986). The applicability of this model of executive level leadership to the Army has been tested (Jacobs, Rigby, and Harris, in press), and had been presented in Army documents such as DA-PAM 600-80, Executive Leadership (Department of the Army, 1987). The definition of executive capabilities developed in these documents served as the starting point for this report.

In order to fully explore the potential of ACC as a technology to support executive development, the first objective of the investigation was to discuss the conceptual framework for executive development necessary to facilitate understanding the potential of ACC as a supporting technology. The second objective was to review the history of ACC and research literature on applications of ACC to executive development and related activities.

The first objective of developing a conceptual framework was premised on the known fact that, whatever relevant information might be found in the reviews of past use and research on ACC, there was no significant body of knowledge or on-going program of research directly targeting the overall objective of understanding the potential of ACC as a technology to support Army executive leadership development. Whatever could be deemed relevant from previous use and previous research would eventually have to be confirmed for this expressed purpose.

The most significant limitation placed on the review of technology applications was to strictly limit the review to asynchronous computer conferencing. There are several communications technologies, including but not limited to computer-mediated communications, which are frequently lumped

together as telecommunications or teleconferencing technologies. While these various technologies are easily grouped together in taxonomies of computer and/or communications applications, they cannot be treated as one thing in relation to the important questions of this investigation.

Approach

The investigation of the history of ACC and applications research literature was carried out through computerized literature searches, traditional library research, and a wide-ranging canvass of ACC experts, users, suppliers, and researchers. Results of two recent studies of executive computer use in leading U.S. corporations, conducted independently by the Center for the Study of Future Management, were also included.

Computer-Assisted Searches. Computer searches of three databases and the on-line catalog of the University of Maryland library were performed using keywords such as "computer conferencing," "leadership," "decision making," "executive," "cognition," and "cognitive development." The databases searched were ABI/INFORM, PsychINFO, and NTIS. The University of Maryland library on-line catalog contains a virtually complete record of the holdings of the three main libraries of the College Park campus, and holdings of other University of Maryland campuses as well.

The most productive computer search was of ABI/INFORM, using "computer conferencing" as the keyword phrase. Sixty-one articles or books were listed, of which thirty-seven were earmarked for follow-up, and sixteen were used. The search of the NTIS database with the keyword phrase "computer conferencing" turned up about the same number of citations, but most were unpublished research reports of questionable value to the central concerns of this report. The PsychINFO database was the least productive, resulting in only two citations, one of which was used.

The University of Maryland system produced no results on the "computer conferencing" keyword. Variations such as "computers and communications," "telecommunications," and "teleconferencing" were attempted with limited success. The vast majority of sources netted using these keywords in the library system were of a technical nature, intended for an engineering audience.

A secondary search strategy on the University system was to search on the names of authors of references found in the other bibliographic databases. This proved particularly valuable in conjunction with the NTIS search, helping to identify eleven useful published works.

Library Research. Recent periodical literature indexes were searched manually to supplement the computer searches. The indexes searched included: Computer Contents and Management Contents, publications which merely reprint the table of contents page from leading periodicals; PsycSCAN: Applied Psychology, which publishes abstracts of articles from selected periodicals including computer applications and organizational behavior fields; and the Reader's Guide to Periodical Literature.

Two other types of paper sources used were publication catalogs and weekly trade news publications. The most recent editions of book and periodical catalogs of major commercial publishers were skimmed, as well as catalogs of the U.S. Government Printing Office and the National Technical Information Service. The last twelve months of the following weekly news publications were also searched: Business Week, Computerworld, Government Computer News, Infoworld, Network World, and Washington Technology.

Canvass of Experts, Users, Suppliers, Researchers. Several tactics were used to gather information directly from individuals currently involved with asynchronous computer conferencing in ways relevant to this report. These included phone contacts with related professional association offices, government and private funding agencies, developers and vendors of conferencing software, system operators, and individuals identified as experts or consultants in the use of ACC.

Ten interviews were conducted with individuals with wide-ranging experiences and responsibilities involving ACC. Summaries of those interviewed are included in Appendix A.

Organization of the Report

The report is divided into three parts. The first part proffers a conceptual framework seen as necessary to establish the distinctive value of ACC in future executive development activities. The second part briefly summarizes the background literature on ACC as it relates to the general questions of executive development applications. The third part assays the current status of ACC technology and its applications in settings and for purposes that appear relevant to the subject of this report.

A CONCEPTUAL FRAMEWORK FOR EXECUTIVE DEVELOPMENT

Whereas computers, and the human activity of computer conferencing, may not be fully understood, they are at least tangible: the reader is apt to feel that, given the time and a reason, one could actually observe computers and persons engaging in computer conferencing, and thereby better understand the subject. Unfortunately, the same cannot be said about executive development.

Executive development is a complex concept without the same kind of tangible referents we have for computers and conferencing. An executive might seem tangible enough, seen as a person who has the executive role in an organization. Certainly parts of the executive role are tangible activities, but the part that concerns us here, executive level leadership, is not. The development of executive leadership in large-scale formal organizations such as the U.S. Army would seem to be a topic of study which could draw from the voluminous research literature in human development, and the social psychological study of leadership in organizations. Unfortunately, these domains of study offer little guidance. The limitations of traditional social psychological and developmental perspectives are briefly outlined below.

Social Psychological Perspectives

From a basic disciplinary perspective, leadership has most often been pursued as a social psychological phenomenon: it deals with individual human behavior in a group setting--any group setting. Allport (1968) dated social psychology from the publication of its first two texts in 1908; but relates, as do many others, that it was not until much later that Lewin (1936) and others began to study group dynamics and leadership.

The organizational role of executive belongs, in a similar sense, to the applied field known as industrial and organizational psychology, which for the most part might be described as one subfield of applied experimental social psychology. Using the first publication rule, industrial and organizational I/O psychology began in 1903 with Walter Dill Scott's The Theory of Advertising. Mankin, Ames, and Grodsky (1980) state the general consensus however that the "organizational" part of I/O psychology didn't get under way until after Roethlisberger and Dickson's (1939) publication of the now well-known Hawthorne studies.

Stogdill (1950) made the point that most leadership studies up until 1950 used the terms "group" and "organization" interchangeably, and that at that time, there still was no scientific theory and method for the study of leadership as an aspect of formal organizations. Stogdill's definition of leadership was ". . . a process of influencing the activities of

an organized group in its task of goal setting and goal achievement" For the last thirty years, leadership as an aspect of formal organizations has been better represented in the research literature under the rubric of managerial psychology or managerial leadership (see, e.g., Leavitt, Pondy, & Boje, 1980; Yukl, 1981; and Schein, 1987).

Yukl (1981) has classified most research on leadership as taking one of four approaches: (1) power-influence, in which the most recent emphasis has been on reciprocal influence and exchange relationships between leaders and followers; (2) traits, in which personal characteristics of the leader related to managerial effectiveness are examined, (3) behavior, emphasizing what leaders do to be effective and classification of managerial activities; and (4) situational or contingency, in which aspects of the environment determine what kinds of power, traits, and behavior are most effective. Although the last approach would appear to provide the appropriate perspective for this research, most of the research that has been done has focused on leadership at levels below the executive level of organization (Jacobs & Jaques, 1987).

Developmental Perspectives

Although the term "development" is often used in such expressions as "leadership development," "organizational development," or "human resource development," none of these uses of the term has much to do with the scientific or theoretical meaning of development (Kimberly & Miles, 1980).

To put it most bluntly, what is missing almost entirely from the many years and hundreds if not thousands of studies of leadership in organizations is a truly developmental perspective. It is beyond the scope of this paper to examine all the reasons for this fact, or to elaborate on the few exceptions. The most obvious reason for this omission is the still prevalent belief that human development is "finished" by the end of adolescence. Developmental psychology is still very often equated with child and adolescent psychology. The relatively new area of life-span development is concerned with development in adults, but the bulk of work in this field focuses on processes and effects of aging among older adults (Honzik, 1984). Cognitive developmental psychology (Flavell & Markman, 1983; Loevinger & Knoll, 1983), of particular interest here, has provided new knowledge across the life span and in many areas of human endeavor, but its application to problems of managerial leadership is still very much a future project.

The most prominent methodological feature of developmental perspectives is the concept of stages of development, but behind that similarity are significantly different models of developmental variation used to explain different kinds of development (Loevinger, 1976).

In one model, growth rates differ but the final growth achieved is the same for everyone. The development of walking is an example. A second model involves differential growth rates, but the terminal age for growth is constant. This model is implied in the case of IQ measurement. A third model projects like rates of growth but the terminal age differs. Adult differences then reflect the age that growth stopped. An example of this model would be approximated by the highest grade level achieved in school. A fourth model groups together those cases in which the final adult level of growth is not the maximum value. Some theories of sequenced stages of cognitive development, including Piaget's, may be of this sort: each stage is a kind of reasoning that first increases and then decreases in favor of another kind. A fifth model prescribes a fixed relationship between age and the opportunity for some kind of development to occur: any deviation is a deviation into some kind of abnormality. This model is seen most clearly in embryonic development.

The models above do not exhaust the possibilities; they are enough to demonstrate that adopting a developmental perspective does not constrain one's assumptions in one particular way. The model of development proposed by Jaques (1976), for example, has been characterized as a "sigmoidal progression characteristic of biological growth" (Stamp, 1988).

The most fundamental aspect of a developmental perspective is not a sequence of stages, nor a particular model of growth; it is the aspect of structure. Any specific structure is defined by relations among elements that constitute the unity and wholeness of the structure. When the relations change, the structure changes. Any or all elements may change without a change in structure. Development "consists of the acquisition of a new structure or of the change from an old structure to a new one" (Loevinger, 1976).

The use of the term "development" in studies of leadership and organizations most often means nothing more than a change in degree of skill or efficiency, or the acquisition of a skill or capability: changes which in no way constitute development in a scientifically meaningful sense.

In sum, not only is there little data to inform the use of ACC in executive development, there is little theoretical or scientific infrastructure on which to base research on executive development quite apart from the question of whether ACC can facilitate it.

One of the very few serious, if somewhat controversial, efforts to provide a developmental view of management and executive leadership in organizations is that begun by Elliott Jaques with A General Theory of Bureaucracy in 1976.

The Starting Point: A Concept of Executive Leadership

For the purposes of this study, executive leadership, and the executive levels of work are defined in terms of Jaques' (1986) stratified systems theory. This concept has been further elaborated by Jacobs and Jaques (1987) and in DA PAM 600-80, Executive Leadership (Department of the Army, 1987). The particular value of this scheme is its application of a developmental perspective to organizational structure, calibrated with developmental levels of cognitive functioning. This scheme achieves an integration of psychological and sociological explanatory concepts, at least with respect to relating organizational level and structure to levels of cognitive development, that has generally eluded social psychologists (Doise, 1986).

The Army document entitled "Executive-Level Leadership: Examples of Performance Dimensions" (Lucas and Harris, 1988) introduces the concept in this way:

Jacobs and Jaques suggest that a well-configured large organization will usually have seven discriminative levels that are divided into three broad bands. . . . Each level or layer poses a unique new set of requirements for decision makers and leaders. These new requirements do not replace those of lower levels, but rather add to them, such that conceptual requirements become increasingly complex. The implication is that a part of executive development is constructing a conceptual frame of reference that enables the decision maker to understand the progressively greater complexity encountered at each higher organizational level.

Leaders in the top, or executive, layer are confronted with highly complex requirements. Executive leaders "add value" to their organization in large part by instilling a sense of understanding and purpose to the general activities of the organization. However, gaining this sense of understanding is progressively harder at the higher echelons, particularly in terms of cause and effect relationships that are operational in any given situation. A number of factors make achieving clarity on cause and effect relationships especially difficult at the executive level. The time scale of events is increasingly long. In addition, there are many more factors to consider, among them contingency factors that are probabilistic in nature.

A consistent finding in the literature is that leaders at the executive level deal with resulting uncertainty and ambiguity in at least two ways. The first is by developing a frame of reference that enables comprehension of the direct and indirect effects that combine to produce outcomes which may not be realized for some time into the future. The second is growth in conceptual skills and a resultant change in the approach to decision making. At the executive level,

decision making appears not to be a selection from formulated alternatives, based on advantages/disadvantages comparison, but rather formulation of "workable" solutions to problem situations. The executive approach is to develop a workable course of action and then to manage the outcome over time so that it will be successful.

This document went on to list as cognitive skills required at the executive level: understanding the dynamics of the total system, dealing with extended time horizons and envisioning the future, thinking and acting proactively, purposeful scanning of the environment, formulating problems, creating frames of reference to aid situational understanding, tolerating uncertainty and risk, and rapidly modifying actions based on new information.

Is Developmental Intervention Possible?

The concept of executive leadership referenced above implies capabilities of cognitive complexity, and interpersonal sensitivity that are, in western societies at least, classified among the highest levels of human development. Perhaps the most important capability, harder to encapsulate than those above is the power of originship; to envision and enact a world view that literally makes a comprehensible world out of uncertainty and ambiguity.

The abilities indicated clearly go beyond what would be considered average or typical adult cognitive development. In the terms of Piagetian theory, the required cognitive complexity goes beyond formal operations, to a post-formal operations period emphasizing problem finding rather than simply problem solving, and the ability to perceive second and third order relations (Sternberg & Davidson, 1985).

The attributes listed or implied in the concept of executive leadership are representative of autonomous and integrated stages of ego development (Loevinger & Wessler, 1970). A particular value of ego development theory in this regard is that it recognizes that there is a necessary emotional maturation that goes along with cognitive maturation in developmental growth: a point that is not well acknowledged in the Army's conception of executive development. The following interpretation of the autonomous stage of ego development (Knefelkamp, Parker, & Widick, 1978) strikes several concordant notes with the Army definition of executive leadership capability:

Conceptual complexity is the most salient characteristic of this and the following stage. The individual sees reality as complex and multifaceted and is able to integrate apparently contradictory or incompatible ideas. He has a high tolerance for ambiguity and has a courageous capacity to confront and

cope with the inner conflict that stems from conflicting needs, conflicting duties, and the conflicts between the two. The individual at this stage has an accurate awareness of his multiple roles and responsibilities and is interested in his own development and progress toward self-fulfillment. He allows autonomy in others and acknowledges his interdependence with others. He endorses and acts on broad, abstract social ideals such as fairness and justice.

The highest stage of ego development, the integrated stage, is the least described and of course the rarest to find. The integration implied in the name refers to an integrated sense of identity which only comes by transcending the conflicts of the autonomous stage.

From a developmental perspective, these abilities are elements of relatively stable cognitive developmental structures. They are not simple behavioral skills which can be acquired through training. On the other hand, the extreme perspective that development cannot be effected by training is not the majority view. More theorists and researchers are taking to the middle ground between this extreme and its opposite--the view that there are few limits on what can be learned given appropriate environmental conditions.

Fortunately, for those interested in attempting to improve executive leadership development practices, there is a trend in the research literature toward integration of these perspectives with a concomitant search for a transactional or collaborative perspective that conjoins organism and environment. Of course, interactionist perspectives are not new; but the current trend evidences a qualitative change. The following excerpt from a recent review effectively states the case (Fischer & Silvern, 1985):

These contemporary efforts to introduce a level of analysis that conjoins organismic structure and environmental variation differ from traditional studies of the interaction between two discrete factors. In the conjoint analysis, the factors are not independent; instead, the relevance of each for development involves that of the other (Fischer 1980, Silvern 1984). Characteristics of the individual, such as structures, are said to have meaning only in particular contexts, while variable contexts have meaning for development only in light of the individual's developmental status.

Instead of identifying a closed developmental sequence of structures, the investigator seeks to specify how structures show stabilities and changes in different contexts for people of different ages. Instead of identifying the regularity of environmental impacts, the investigator seeks to specify how environments have similar and differing effects as a function of human structures and motivations.

No cognitive assessment can ever be free of context or free of the effect of age-related changes in cognitive organization. Thus the findings of both the organismic and the mechanistic viewpoints remain relevant, and the prescription for new research is to combine the methods of the two viewpoints.

The question which starts this section cannot be answered simply by observing that a reconceptualization of the problem of human development is occurring among researchers, but this trend does support proceeding with research designed to provide an answer, and it gives some guidance on how to go about it.

The most important implication of the transactional perspective is that no developmental assessment can be free of context. In fact, the stronger claim can be made that development is context-bound, or context specific, to a greater degree than has been acknowledged by mainstream developmental research.

Efforts to study and effect developmental growth must be conducted in the situation where a higher level of development is required. In relation to the objectives of this research, the claim is that the individual must experience the activities from the vantage point of the organizational level requiring new capabilities. The crucial experiences cannot be "handed down" to a person operating only at lower levels of the organization, nor can the crucial experiences be fabricated in the sense that certain kinesthetic experiences are simulated to introduce and exercise psycho-motor or technical skills.

A Model from Higher Education

A related line of research and intervention activity has been going on in higher education for several years (Chickering, 1981; Cross, 1981; Knefelkamp, 1978; Mentkowski, Moeser, & Strait, 1983; Mentkowski & Strait, 1983; Winter, McClelland, & Stewart, 1981). One of the earliest investigators of intellectual growth (earliest in the still youthful domain of cognitive developmental studies grounded on modern behavioral science principles of inquiry) was William Perry. Perry's theoretical formulations of stages of intellectual development (1970) were specifically focused on the intellectual development of what today are called "traditional age" college students over their four years in college. The data were collected in the late 1950s and early 1960s by the Bureau of Study Counsel at Harvard College and document the experience of two cohorts of undergraduates attending Harvard and Radcliffe.

Perry's work is relevant to the present inquiry on several points: It is first and foremost an important precedent for attempting to formulate a developmental scheme that is bound to a particular context and time frame. Perry and his colleagues

were concerned about how college students did or did not develop the ability to perceive the contextual and relativistic nature of all knowledge and values, and the necessity of taking responsibility and making commitments in a pluralistic society.

The scheme posits cognitive and ethical development in terms of structural changes in perspective from dualism to multiplicity to relativism. These three phases encompass nine stage positions, with transitions between each stage. Beginning with absolute cognitive simplicity in which Authorities know the difference between right and wrong, truth and untruth, the first transition is precipitated by recognition that Authorities disagree; there are differences of opinion and uncertainties. The first modification of simple dualism creates two categories of good and bad Authorities. Realization that even "good" Authorities disagree spurs another transition to: even good Authorities don't have all the answers, yet! The acknowledgment that some conflicts and uncertainties may take a very long time to solve, or may never be solved, begins the break toward relativism.

In the liberal arts college environment, and for traditional age students, the moves from dualism to relativism were usefully characterized as shifts in focus of concern from what to learn, to how to learn, to how to think. Beyond acceptance of a contextual and relativistic world of knowledge, the focus of concern turned to the need to bring order to the natural chaos of relativism by making commitments and taking personal responsibility.

In the original investigations by Perry and his colleagues, a developmental perspective was intentionally pursued. The investigators were aware of and acknowledged ways of understanding their data that had been previously conceptualized by Piaget and others, including several of their contemporaries (Harvey, Hunt, & Schroder, 1961; Loevinger, 1959; and Sanford, 1956, 1962). These correspondences suggest careful scrutiny of Perry's methods of investigation and his findings in relation to the present research agenda.

Robert White described the special virtue of Perry's approach in the Foreword of Perry's book cited above:

Perry's method of investigation is so straightforward that its scientific virtue can easily be overlooked. It is based on the principle that if you want to study how people think, you must first get them to think.

To get them to think and to think in ways and about things that are contextually relevant, the developmental environment must be the actual work environment. The fact that executive leadership in the Army is 100% internally developed makes this model especially appealing, since study and intervention may start the first day a soldier puts on a uniform. It should be

noted that the age when this ordinarily occurs is not that different from the age of Perry's college freshmen! Obviously, the span of time for development continues long beyond four years.

Summary of Executive Development Conceptual Framework

The bulk of traditional sources of research literature on human development and leadership in organizations does not provide significant help in understanding the nature of executive leadership and executive development as it concerns the U.S. Army. While recent approaches to the study of management and leadership in organizations do hold promise, particularly situational or contingency approaches, the work done to date has focused on leadership only at lower levels of management.

There are as well emerging trends in developmental psychology which will provide appropriate perspectives and knowledge about context-sensitive cognitive development in adulthood. It is proposed that one of the most promising models for study and intervention in executive development in the Army can be found in recent work in intellectual and ethical development of college students.

The major consequence of this line of thinking with respect to asynchronous computer conferencing is that for ACC to be an effective support technology, ACC must be used by the organization to conduct work, not just to perform training or instructional exercises. For Perry's college students, "going to college" was their "work;" in other kinds of organizations, including the military, instructional activities are clearly auxiliary to the real work of the organization and can not be expected to evoke the same kinds of cognitive structure-changing challenges that occur through engagement in the real work of the organization.

BACKGROUND LITERATURE ON ACC AND EXECUTIVE DEVELOPMENT

A conference, with or without computers, is an exchange of views. Computer conferencing denotes using a computer as the communications medium for exchanging views. Asynchronous computer conferencing describes a computer-based means of communication in which conferees exchange views without having to send and receive messages concurrently or at the same rate. Two or more conferees may send or read messages at the same time without interrupting each other; messages may be sent by a conferee at any time, and read anytime thereafter by other conferees.

There are of course many ways to characterize ACC beyond the simple definition above, depending upon what comparisons or contrasts with other methods of communication best serve the writer's purpose. In this section of the report it is most important to understand the historical roots of ACC and the influence of that history on present concepts and uses of ACC.

The Origins of ACC

The first decade of activity involving ACC, which began with a 1968 article proposing its use as a means of speeding up and improving Delphi studies, is chronicled in major works by its originators and earliest user-advocates (Johansen, Vallee, & Spangler, 1979; Hiltz & Turoff, 1978; and Linstone & Turoff, 1975).

Among the earliest uses of ACC were automating classical Delphi techniques, and managing a national wage-price freeze in the U.S. Office of Emergency Preparedness. The conferencing system developed for the Office of Emergency Preparedness, EMISARI, is widely regarded as the first full-fledged conferencing system. As these two applications show, "the emphasis in conferencing was originally for real-time exchange of information, proposals, and instructions in situations requiring fast response time and the coordination of the efforts of many different kinds of actions at locations widely separated geographically" (Price, 1975).

The use of the term, "real-time," does not necessarily mean synchronous timing of communications. It means that computer conferencing was being used, in both synchronous and asynchronous modes, to share information and make decisions in response to events as they happened. While virtually all analysts of asynchronous computer conferencing have pointed to freedom from time and space constraints as valued characteristics, this freedom can serve either to relax or compress the time in which any task is accomplished. Asynchronous computer conferencing originated in situations in which it permitted more work to be done in a given time, and

under conditions where speeding up the method of communication ostensibly improved the quality of the work.

In terms that have great currency and portent today, it could be said that ACC may be most valuable in that it permits more efficient parallel processing.

The Nature of ACC: A Closer Look

If the homage of "seminal work" were to be bestowed on one publication in the area of computer conferencing, it would have to be given to The Network Nation (Hiltz & Turoff, 1978). This text provides a wealth of conceptual and empirical detail concerning current and future applications of ACC. Ironically, the potential of the text for communicating the nature of computer conferencing to the largest possible future audience may have been diminished by the authors' enthusiastic predictions of future social and organizational transformations which could be wrought. In short, their chosen emphases regarding the social implications of computer conferencing brands the writing as part of the social transformation rhetoric of the 60s and 70s. Their predictions concerning the prominence and diffusion of the technology in society at large in the 80s have not been realized. It is quite plausible that the import and flavor of their transformational values and their overly ambitious predictions have dissuaded later readers from attempting to separate facts from values and practical utility from promotional hype.

Electronic Information Exchange System (EIES): ACC Prototype. The development of the EIES computer conferencing system, financed by the National Science Foundation and designed by Murray Turoff, is described in The Network Nation. Most important for present purposes is the fact that EIES was designed expressly for scientific communications among so-called "invisible colleges" of geographically dispersed scientists.

Through its widespread use in the research community, EIES became the prototype for computer conferencing systems. Its four main functional structures, derived from an analysis of existing communication structures of geographically dispersed scientists, included messages, conferences, notebooks, and bulletins. The messaging function provided the capability for an individual to send a message to another individual, many specific individuals, or a pre-defined group. The conference function provided the ability to build up a permanent transcript of the proceedings of a group meeting. The notebook function provided a space for composing and editing messages and documents, and the ability to send a copy of one or more "pages" of the notebook to other conferees. The bulletin function provided a public bulletin board or newsletter for announcements or dissemination of short articles or abstracts.

It was realized from the beginning that a computer conferencing system of this kind replaced other methods of communication but did not replace the many human roles critical to the successful organization and coordination of a group meeting; in fact, the need for these human roles was amplified by the unfamiliar character of computer-mediated communication. The computer conference required "social host" and "meeting chairperson" roles, an administrative coordinator, and bulletin editor. The attendant computer system management roles included a system administrator, technical consultant, and console operator.

The social dynamics of computer conferencing are as important to understanding its nature as are the functions performed. In this method of communication only typed text was transmitted. The visually evident personal characteristics and non-verbal cues that affect conventional face-to-face communication were absent. Typically, the individual was alone while using the computer to confer, interacting with the computer system rather than other persons. The social dynamics were, in short, perfectly complementary to the design of the system for scientific communications in which the normal consequences of impersonality, i.e., filtering out interpersonal "noise," enhances the desired qualities of reflection and reason.

The functions and social dynamics described above are not in any sense intrinsic to computer conferencing per se. Any of these general characteristics can be modified or eliminated through a combination of hardware enhancements, software engineering, and different roles assumed by persons managing and coordinating the activity. The fact is however that these general characteristics are a part of the inheritance of ACC that still affects the shape of new systems development and persons' attitudes and expectations of computer conferencing.

ACC vs. Electronic Mail. By the time The Network Nation was written, computer conferencing was understood to be one member of a family of communications technologies that depended upon computers in different ways, but that were viewed as a set over against conventional means of communication (Martino, 1979). The most popular and widespread of the new technologies was electronic mail. In many ways, electronic mail is more like ACC than any other communication technology: it takes full advantage of the processing and storage capabilities of the computer, it can be used synchronously or asynchronously, and it is based on text rather than verbal or visual communication modes.

Hiltz and Turoff (1978) contrast ACC and electronic mail at a philosophical level, proposing that electronic mail represents the philosophy that one generalized system is best while ACC represents the view that the communication process must be customized to a particular group and application. They acknowledged what is still true today: In practice there is

very little difference between a simple computer conferencing system, or a complex one used simplistically, and an electronic mail system that has been programmed to process group mail and to retrieve messages indexed by group and topic.

Institute for the Future. The EMISARI system developed in the Office of Emergency Preparedness had other offspring besides EIES: most notably the FORUM and PLANET systems at The Institute for the Future (IFF). IFF and New Jersey Institute of Technology (NJIT), birthplace and home of EIES, were the sources of most of the research done on computer conferencing during the first ten years.

An important part of the background of the work at IFF was the research effort begun by the Institute for Defense Analysis in the early 1960s on the use of teleconferencing (at the time consisting mainly of telephone, teletype, and television) in international crisis-negotiation situations (Johansen, Miller, and Vallee, 1975). The National Science Foundation was also supporting IFF work in order to improve interaction among experts.

From the beginning, IFF research on computer conferencing appears to have been set in the broader frame of reference indicated by the term, "teleconferencing." Then and now, the amount of research and development work done on video and audio teleconferencing media far exceeds that devoted to computer conferencing. IFF, through the FORUM project, produced what may have been the first major research reports specifically targeting computer conferencing as a means of communication (Vallee, Johansen, Lipinski, Spangler, Wilson, & Hardy, 1975; Vallee, Johansen, Randolph, & Hastings, 1974; Vallee, Lipinski, & Miller, 1974).

Other ACC Systems. Other major computer conferencing systems developed in the early 1970s include CONFER and ORACLE. ORACLE was used at Northwestern University as an adjunct to computer-assisted instruction. CONFER, developed by Robert Parnes, was used originally at the University of Michigan for experimentation with citizen involvement in public issues. In both cases, different applications were quick to multiply, but in neither case was there the same kind of research activity found at IFF and NJIT.

Early Research on ACC

It is very easy to summarize the research on applications of ACC to executive development during the first ten years: there is no evidence that ACC was used for executive development, and no evidence that the question was a topic of research.

What was studied at IFF and NJIT that bears on the topic of this report were general social and psychological effects of

computer conferencing, especially as these differ from conventional methods of communication such as the face-to-face meeting. Even that research is of very limited value from a developmental perspective. The early literature includes a great deal of speculation on future impacts of ACC on organizational structure and culture, but little systematic study. In considering the implications of the early research on psycho-social effects of computer conferencing, it is important to keep in mind the origin and design of the conferencing systems used.

Psychological Aspects. The most salient psychological aspect of ACC as a substitute for more common interactive communications is the absence of audio and visual cues:

What happens to new users, without their conscious recognition in most cases, is that they are faced with a kind of "culture shock" in which all of the very complex "rules" for combining the various kinds of communications channels described earlier do not work, because the nonverbal channels are missing, there are some new channels or means of communication available, and the rules or possibilities for using the written equivalent of the spoken verbal channel work differently. (Hiltz & Turoff, 1978, p. 81)

Of course, what kinds of cues are useful for accomplishing a certain task depends very much on the goals of communication and the supplemental communications contexts available to the conferees. It is crucial to recognize that this and many other social and psychological effects of computer conferencing stress the subjective experience of the novice user of a system, over face-to-face interaction or other synchronous communications practices. Such findings must obviously be taken into account in developing orientation and training procedures in a situation where computer conferencing exists as a voluntary alternative to face-to-face or other conventional forms of communication.

On the other hand, this finding is nearly irrelevant to the opposite extreme case: the objective effectiveness of ACC when used by a person who has mastered the system, over other asynchronously communicated text-based media. The import for future application of ACC to executive development lies somewhere in between, but perhaps closer to the latter extreme than the former.

Social Aspects. In the area of social dynamics, involving the impact of computer conferencing on group problem-solving, decision-making, and risk-taking, the studies undertaken by Hiltz and Turoff (1978) focus on the clearly dysfunctional aspects of face-to-face group processes and the possibilities for eradicating or overcoming such negative aspects through use of computer conferencing. Some evidence was found for alleviation of such dysfunctional aspects of face-to-face communications such as pressure to conform, dominance by

"fast-talkers," and dominance by high-status group members. As with the cues and rules findings, the relevance of these early studies is not clear. What social dynamics prevail in a real-life setting depend a great deal on the organizational and functional statuses of the group.

There is a parallel consideration between the psychological and social phenomena reported with respect to the comparison of ACC to other communication methods or media. The point can be illustrated with the following hypothesis of Hiltz and Turoff (1978):

. . . it is quite possible that intelligence and correctness might be much more highly correlated with the leadership and dominance processes in decision making that developed in a CC group. Specifically, it is hypothesized that in computer conferencing, there will be less tendency for a single dominant individual to emerge, and that this contrast in degree of dominance will increase as the group size increases. The hypothesized reason for these anticipated contrasts is that one participant making a statement in no way interferes with the ability of another person to be making a statement that overlaps in time; those with slower (more latent) verbal responses will not be shut out by the faster reactors in the group. (Hiltz & Turoff, 1978, p. 107)

The significance of the hypothesis and implications of findings are different depending on the point of comparison and the goals of communication. It would seem obvious enough that over time, the "intelligence and correctness" of the product of a computer conference would be greater than the product of a "free-for-all" face-to-face meeting, but less than the product of a publication process of a typical refereed research journal. Where the hypothesis has its greatest significance is not surprisingly in the situation typified by the earliest implementations of computer conferencing: real-time management of a crisis situation or automation of a Delphi process. The implications for executive development depend upon the goals of development and the actual conditions, including time-frame, under which development must take place.

Task Related Aspects. Foremost among the task related findings from several studies is that the permanent transcript of the conference is crucial to some tasks, and generally more useful the more complex the topic of the conference.

Summary of Strengths and Weaknesses

In Electronic Meetings (Johansen, Vallee, and Spangler, 1979), IFF researchers summarized the first ten years of empirical studies in terms of the following strengths and weaknesses of computer conferencing, both synchronous and asynchronous.

Strengths included:

1. The print mode provides some advantages over the spoken word or other media.
2. Computer conferencing increases continuity of communication by making it less dependent on time and space.
3. It is possible to get a sense of interpersonal interaction with computer conferencing.
4. Computer conferencing is particularly well suited to tasks involving the management of technical information.
5. Computer conferencing promotes equality and flexibility of roles in the communication situation.
6. Computer conferencing can be used by people without highly specialized skills.

Weaknesses included:

1. Written communications inherent in computer conferencing are less efficient than other media.
2. The self-activated nature of the medium may inhibit use.
3. The communication process in computer conferencing is very demanding.
4. The sense of interpersonal interaction is sometimes weak in computer conferencing.

When Conferencing Failed. The scope and depth of the early research record was naturally limited by the researchers' interests, choice of research methods, and the embryonic stage of system development and use at the time. While the individual attitude and behavior results, and the social dynamics results, may be too closely bound to the research conditions to have important implications for future executive development applications, the conclusions concerning why conferencing fails have a timeless quality. Among the most important reasons for failure were (Hiltz and Turoff, 1978, p. 123):

1. Lack of adequate physical access to equipment needed.
2. Lack of a need or desire to communicate with others.
3. Lack of adequate training in use of the system.
4. Lack of strong or adequate leadership.
5. Lack of a "critical mass" within the conferencing group.

Recent Reviews of ACC and Computer-Mediated Communication

The Institute of Electrical and Electronics Engineers (IEEE) Professional Communications Society devoted a special issue of its Transactions to computer conferencing (Arms, 1986). In the preface, the editor claims that "today, computer conferences are ubiquitous and important to engineers, scientists, educators, and businessmen." The articles offer information on network and conference design, writing styles in computer conferences, moderating computer conferences, and conferencing in support of scholarly and scientific communications. The claim of ubiquity may be an exaggeration, but the biographical information on the contributors revealed a branching out of activity from the early centers of research and development. The issue reported no new research germane to the present topic.

An extensive review of ACC and related computer-mediated communications was conducted by the Army Research Institute (Chandler, 1986). The review considered technical design considerations and compares conferencing to other electronic media such as audiographic and video teleconferencing. Distance education applications of computer teleconferencing are identified. The use of ACC in distance education, or higher education and continuing education more generally, appears to be the major growth area over the last few years according to this review and others (Harasim, 1986; Osgood, 1986).

An even more recent report by the Gartner Group (Hughes, Cook, & McGrath, 1987) surveyed current computer conferencing products and future product directions in the corporate marketplace. No research is reported, but it does include fairly detailed accounts of the evolution of two corporate conferencing environments, Digital Equipment Corporation (DEC) and the Hewlett-Packard Company. A more detailed account of the latter case is available from company sources (Fanning & Raphael, 1986).

Outside of IFF and NJIT, one of the more informative research efforts on social psychological aspects of computer mediated communication is the work of Sara Kiesler and colleagues at Carnegie Mellon University (Kiesler, Siegel, & McGuire, 1984; Siegel, Dubrovsky, Kiesler, & McGuire, 1986). Kiesler et al. categorized research on behavioral and social effects of computers used for communication into technology assessment studies, organizational studies, technical capabilities

studies, and social psychological studies. (Note that cognitive developmental studies are not mentioned.)

Kiesler has studied the effects of computer-mediated communication on communication efficiency, participation, interpersonal behavior, and group choice. It was found that the same group will make decisions differently when communicating by computer compared to face-to-face meetings. Unfortunately for present purposes, Kiesler et al. employed synchronous computer conferencing, not asynchronous conferencing in their initial studies, and their experiments were not conducted in an organizational setting. They indicated that some data have been collected on decision making by business managers and university administrators, but again in a simultaneous conferencing mode. The main finding was that persons were less effective in considering all the issues and coordinating their discussion when using the computer, than they were in face-to-face meetings.

A major issue, which will be revisited in the next section of this report, is that nearly all of the already small body of previous social and psychological research has been conducted within the subdisciplinary boundaries of experimental social psychology. Neither cognitive psychology (see Eysenck, 1984) nor developmental psychology (see Cairns & Valsiner, 1984) is represented in previous studies of ACC. Some studies have looked at cognitive phenomena, such as problem solving or decision making, as dependent variables, but the processes examined, the independent variables, were social processes.

Use of ACC for and by Executives

The Army. Not surprisingly, given the origins and early support of ACC in centers of government and research, the Army was a prominent user of ACC through its Delta Force, "... a network organization that was set up by the Army to explore new ways of achieving individual and organizational high performance" (Burns, 1986). One focus of the network was to develop recommendations for the Army's senior executives, but the constituency of the network was mostly from middle level Army ranks and civilian researchers working in "think tanks," universities, and industry. The organizational roles of participants in the conferencing group were not substantially different from the groups which developed and used the first conferencing systems. Burns was director of the Delta Force until 1982 when he founded Metasystems Design Group (MDG). MDG was one of the first, if not the first, new enterprises to bring computer conferencing to the world of microcomputers and to market small entry-level systems to business as management tools.

The School of Management and Strategic Studies (SMSS).

One example of computer conferencing applied to executive development (in the broadest meaning of the term) in the literature is the six-year SMSS established by Richard Farson at Western Behavioral Sciences Institute (WBSI), La Jolla, California. Unfortunately for the purposes of this report, WBSI has apparently not undertaken the kind of research necessary to address our most fundamental questions about the role of ACC in executive development. On the positive side, it provides a convincing demonstration that there are at least some executives in some circumstances that have participated in ACC for seemingly developmental purposes.

SMSS is an executive education program that has been compared to programs such as Harvard Business School's Advanced Management Program, Massachusetts Institute of Technology's (MIT's) Program for Senior Executives, and Stanford's Executive Program (Rowan, 1983). Whether it actually competes for the same students is not public knowledge. WBSI uses the EIES conferencing system at NJIT; the necessary computing equipment is included in the tuition. Although SMSS starts each semester with a week long residential seminar, all other coursework is conducted using the conferencing system. The name of the school and the comparisons with other executive education programs belies the fact that the curriculum is decidedly not standard management fare; it concentrates on the humanities and social sciences rather than quantitative courses.

Farson, who was trained as a psychologist, presents the executive development objective of SMSS as providing what he calls "interpretive skills" in contrast to analytic skills. Interpretive skills are defined as "the ability to take the long view, to understand the larger environment in which the organization is functioning and to assess the deeper meanings of situations and behavior" (Farson, 1987).

Whether the program does in fact improve "interpretive skills," is not known. There are testimonials (Carlson, 1988). One participant is quoted as saying, "It's one of the most clear examples I've seen of a new technology enhancing personal growth." Another participant attests, "my life and career have been totally changed by the experience. . . . I have become more effective as a manager and have introduced modern information processes in my organization that have dramatically increased efficiency and employee morale. I have a terminal on my desk now too."

The last comment represents what is undoubtedly the most common consequence of participation--a more positive attitude toward the computers and computer mediated communication. An article appearing in The Wall Street Journal (Gottschalk, 1983) reported that several of the first class of students did make efforts to improve their organizations' use of computers and/or computer conferencing as a result of their participation.

Persons associated with WBSI as professional staff or instructors have played major roles in expanding the use of computer conferencing for educational purposes (Bellman & Arias, 1988; Feenberg, 1987).

Related Data on Computer Use By Executives. A study of CEOs and COOs of Fortune 500 companies conducted by Kepner-Tregoe, Inc. found that almost 70% of top corporate managers did not have computer terminals in their offices. Half of those responding said they never personally used computers, even though more than half believed that computers can help managers do their job better. The most frequently mentioned application of computers by executives was financial analysis, and second was word processing. Telecommunications was mentioned, but clearly is not yet perceived as a common application.

What would induce executives to use a computer in the office? One interesting and supremely practical criterion is "whether use of the system can produce an answer more quickly than a phone call" (Dick, 1987). There is no consistent pattern however in reports of executives' attitudes or explanations of what would make them use computers more than they do. What is no surprise is that the more computer education an executive has, the more valuable it becomes and the more they use it (McCullough & Wooten, 1986).

McCullough and Wooten (1986) surveyed 135 upper-level managers in petroleum, chemical and banking industries to determine: a) the present state of the relationship between top management and the computer, b) the attitude of top management toward the computer, and c) the future relationship between top management and the computer. In their study, age did not appear to be a determinant of attitude toward computer usefulness, as is often thought, but computer education did. Asked how helpful computer output was to the executive's job, 57% of those that had three or more computer courses responded "very helpful," and 75% of those familiar with three or more languages responded "very helpful." In comparison, 50% of those familiar with only one computer language responded "slightly helpful."

The impact of computer use by executives on the distribution of work and on work relationships is often given too little attention before the fact. It is not uncommon for the manager to assume or reassume tasks previously assigned to subordinates because it now takes longer to delegate than it does to do the job oneself. Contrary to popular belief that computers depersonalize the workplace and further isolate workers, a computer in the manager's office has been found to increase interaction because of the need for support and shared experience. While all studies confirm the fact that computer-using executives are still a small minority, there are accounts of individuals who have transformed their operating style completely with computer-mediated communication. Typical

of the atypical executive account is the following (Rubin, 1983):

As vice-president of Xerox's systems program in Stamford, Connecticut, Strassman deals with a large number of Xerox customers, business executives, field personnel and government officials around the world. During the four to five years he has been using a Xerox 820-II computer, his operating style has undergone a complete transformation. "If I didn't have the computer, I'd be playing phone tag with people all day long," he says. "At most, I'd be able to have maybe 20 intensive involvements with individuals in a week." With his computer, though, Strassman is participating in over a dozen electronic mail systems and at least half a dozen computer conferences, and his circle of communications has expanded to some 100 or more contacts a week. Everything from short memos to drafts of lengthy position papers can be prepared on the computer and sent via electronic mail or computer conferences without the recipient having to be available for delivery, so Strassman never wastes time trying to reach his contacts. He makes extensive use of a computer conferencing network called EIES, operated by the New Jersey Institute of Technology. With this network, Strassman can send documents to the EIES conference from his computer, and then other members of the conference can access the document with personal computers from their own locations to review, edit, or comment on it at their convenience (asynchronous).

Corporate Computer Conferencing

Although the executive population of immediate interest in this report is for the most part a military population, it was felt that recent surveys of the use of ACC among leading corporations would be an important piece of the picture.

Center for the Study of Future Management Survey. Two independent surveys of corporate use of computer conferencing have been completed by the Center for the Study of Future Management. These surveys were designed specifically to address the use of computer conferencing, which previous surveys, have not. In previous studies of executive computer use, financial planning (using spreadsheet programs) and word processing applications have usually been the center of attention; and in the general area of telecommunications, almost all attention has been focused on electronic mail. The Center's survey of corporations took two forms: first a random sample of 50, or 10 per cent of the Industrial Fortune 500, was conducted by phone; and second, a mail survey form was distributed to the Fortune 1000 (Industrial Fortune 500 and Service Fortune 500) CEOs using a mailing list provided by Research Project Corporation.

The telephone survey of a randomly selected group of Fortune 500 companies was conducted to obtain a reasonably reliable

estimate of the percentage of large industrial organizations in the private sector who were using ACC in any way. ACC was distinguished from electronic mail and only the former was considered. No attempt was made to gather detailed data concerning who was using it for what purpose. Only 2 out of 50 organizations contacted were using ACC. This one sample indicates that perhaps less than 5% of large industrial organizations are currently using ACC for any purpose. Even if this estimate is considerably off the mark, the clear conclusion is that ACC is not widely known or used in leading private sector organizations. And it must be stressed that this is so even though computer conferencing has been available as a communications technology for nearly twenty-one years, and even though computer and communications technologies have been among the most impressive growth industries of that same period.

Understanding why this is so must be part of the near-term research agenda. There is no shortage of plausible reasons, but determining which are "real" and to what degree is an empirical question. Two hypotheses which can be derived from the responses to our telephone survey are: (1) ACC is, along with other computer-mediated communications technologies, still not a familiar application of computers compared to conventional computational and information processing applications; and (2) electronic mail is used, and the distinctive value of ACC for group communication is either not known or not accepted.

A mail survey, prepared by the author, was sent to Fortune 1000 CEOs during the fall of 1988. The survey was designed to maximize the probability that it would be completed by the CEO or another senior executive and returned promptly, meaning it was short and to the point: one page, three questions (and only two questions for those organizations not using computer conferencing). The survey was mailed to the CEO of firms on both Service and Industrial Fortune 500 lists, using mailing labels purchased from Research Project Corporation, Woodbury, Connecticut. The actual number of surveys mailed was 995. A total of 120 usable surveys were returned.

Question 1. Does your organization use or plan to use computer conferencing? Of the 120 usable responses returned 14 organizations currently use computer conferencing, 12 plan to use it, and 94 do not use it. Since it may be assumed that those using ACC would be more inclined to respond to the survey than those who did not, the fact that 12% of the responding Fortune 1000 companies currently use ACC is consistent with the results of our phone survey. (If every Fortune 1000 company using or planning to use ACC were among our respondents, the percentage would be 3%.)

More significant than the raw number or the percentage for present purposes is that nearly as many reported planning to use ACC (12) as reported that they currently use it (14). This is nearly a doubling of current use. This finding is one small

piece of evidence favoring the hypothesis that ACC is still an ascendant technology and not one "whose day has come and gone."

Question 2. Is the CEO using or planning to use it? Who else in the organization is or will be involved? In keeping with all other evidence, only 3 out of 26 CEOs answered affirmatively.

The other executive categories specified in the survey were Board of Directors and Department/Division Heads. Only one affirmative was given for Directors. Department/Division Heads were involved in 14 or 54% of organizations using or planning to use computer conferencing.

A line designated for "Other Management" drew 12 responses. The descriptions offered included operating management, sales management, regional managers, project managers, and technical managers. Technical staff, engineers, and other professionals were mentioned as well. One description fit exactly the mold of most conferencing groups outside of large formal organizations: "multi-discipline work groups with specific mission orientation."

Question 3. How is computer conferencing used, or how do you plan to use it? This question offered three application categories and an "other" category. The three specified categories were (1) Decision Making, (2) Information Sharing, and (3) Education and Training.

A 100% response on Information Sharing was expected and received; this is the most basic reason for using computer conferencing across situations. (It is also a need that can be satisfied by several variants on ACC like electronic mail or electronic bulletin boards.) What was most unexpected is that over half (17 of 26) of the organizations using or planning to use computer conferencing reported Education and Training uses. This figure is evenly divided among those reporting that they currently use computer conferencing and those that plan to use it. A follow-up survey of these education and training applications should prove valuable

The question also provided space for indicating if the application was used locally, nationally, or internationally. Applications of computer conferencing are consistently more likely to be national in scope than local, and more local than international.

Those who stated they were not using computer conferencing were asked why, and given the following reasons to select from:

1. Don't know what it is or what to do with it
2. Know what it is but not interested
3. Have tried but quit because of access problems
4. Have tried but quit because of poor conference leadership
5. Have tried but quit because technology was inadequate
6. Other (Please explain)

Half of those who do not use it or plan to use it say they know what it is but are not interested. Thirty per cent responded that they didn't know what it was. The percentages selecting responses 3, 4, or 5 were very low: 0, 1, and 5, respectively. Seventeen per cent gave other reasons. The other reasons fall into three categories: need, alternatives, limitations. Over half of the "other" reasons indicate there is no need, incentive, or opportunity. One-quarter indicate other methods of electronic communications are being used, including electronic mail, voice mail, and audio or video teleconferencing. The final quarter mention technical limitations either in the adequacy of the conferencing medium or in their own ability to support conferencing.

Most encouraging was the fact that 42 of the 120 respondents indicated they wished to receive information on the results of the study. While some respondents chose not to give title information, among those that did, about half were at or above the level of Vice President and half were at a Director or General Manager level. A dozen of the respondents identified themselves as CEO, Chairman, or President.

In conclusion, the Fortune 1000 CEO survey confirms that the absolute number of large service and industrial organizations using computer conferencing is small, but relatively speaking, the number of organizations planning to use computer conferencing suggests significant expansion in the near future. Further analysis of the returned questionnaires will reveal if there is any systematic variance in responses by type of business and management level of the respondent.

Although the use of ACC by top executives is rarely identified in the literature, there have been some notable instances of corporate adoption of the technology in recent years. As might be expected, corporations in the computer industry have been in the vanguard (Cook, 1987). In the case of DEC, an "in-house" conferencing system was developed over several years, and its eventually recognized critical role in enabling economical coordination of geographically dispersed marketing and engineering teams led ultimately to corporate adoption and further development of their conferencing software, Vax Notes, released as a commercial product in 1986.

Other Corporate Studies. A case study of corporate computer conferencing in a major drug company (Zuboff, 1988) provides the richest detail currently available on the impact of ACC on personnel and communication patterns in a major corporation. The study brings into sharp relief the pitfalls of ACC when introduced into the corporate setting as a "grass-roots" phenomenon, without executive sponsorship or participation.

An innovation at DEC, which will be a necessary part of all future conferencing systems, is a configuration in which the conferencing software is not located on one central computer which all users must access directly, but is distributed on thousands of interconnected computers, making the system available to tens of thousands of DEC employees and associates around the world.

At Hewlett-Packard, the corporate adoption of computer conferencing was a deliberate top-down management decision beginning in 1984, championed by Chuck House, Director of Corporate Engineering. On the whole, top management does not participate, but from the ranks of upper middle management on down, ACC has begun to play a key role in information sharing and project management among engineering and marketing units around the world. Interestingly, Hewlett-Packard opted to use the Confer conferencing system developed at the University of Michigan, but acquired their own "copy" to use on one of their corporate mainframe computers.

Other major corporate users of ACC identified in the literature include Bechtel, Citicorp, Exxon Chemical, IBM, Kodak, and Proctor & Gamble. As has been repeatedly observed, these and other corporate users seem to benefit most from the use of conferencing when it helps them link a base of geographically dispersed work groups.

Summary of Findings Related to ACC and Executive Development

The background literature on ACC does not provide much guidance or knowledge about the use of ACC for executive development. There is little knowledge to be derived concerning the impact of ACC on organizational life either. Although many articles make claims about impacts on formal organizations, the reported applications of computer conferencing seem to have occurred either outside of formal organizations or inside decidedly informal organizations.

One case was found in which ACC was ostensibly being used for executive development, broadly defined: WBSI's School of Management and Strategic Studies. The WBSI program, and most distance education projects for that matter, were founded at least partly on the fact that in many circumstances ACC is

better than the alternatives as a communications system to deliver text-based training and development activities. WBSI's program, for example, was designed to solve four persistent problems of providing effective executive level education: a) residential programs are too short, b) frustration with "business as usual" upon returning to work after being stimulated to change in a residential program, c) erosion of learning when the support system of a residential program is left behind, and d) failure to address the issue of lifelong learning. Whether there are specific aspects or types of training that are qualitatively improved by the use of ACC can not be answered without research designed to answer that question.

The literature shows that some executives do participate in ACC, certainly for message transfer, and for some decision-making. The WBSI executive education program shows that some executives will adopt ACC as an educational aid under certain conditions. Yet that is something very different from using ACC at work in the conduct of their executive functions. The answer to that question is different. The literature indicates that executives have not begun to use ACC for work purposes on the whole. Many executives in the WBSI program chose to have their terminals at home; many executives who have championed increased use of computers for information processing and communications in their organizations still do not chose to use the systems themselves.

The existing social psychological research on individual impacts would obviously apply to executives as individuals, but not necessarily to their executive functions or capabilities. For example, executives would be expected to go through the same kind of "culture shock" as novice users of a computer conferencing system. They would to varying degrees develop or adopt new ways of representing non-verbal communications in text form (e.g., spelling out "<grin>") in a text message. There have been no studies of impact on executives per se, and there are no research data in the literature on the question of leadership effectiveness.

The potential effects of ACC on organizational structure, dynamics, and culture have not received much study. An outstanding exception is a case study of ACC in a major drug company (Zuboff, 1988). ACC has not been adopted in enough formal organizations as a means of organizational communication to answer these questions. A preponderance of the pioneers and early adopters of ACC have demonstrated strong egalitarian and anti-bureaucratic values in their writings and in their selection of applications of ACC. Their claims about the probable influences of ACC on organizations have received their first solid research report in Zuboff's (1988) study. To the extent there has been any influence, it is probably closer to the truth to say that the values of the pioneers have been in some ways designed into current ACC systems and that ACC is

identified with these values, and that these facts have indirectly discouraged adoption of ACC by formal organizations. Zuboff's case lends support to this interpretation as well.

CURRENT STATUS OF ACC AND EXECUTIVE DEVELOPMENT

Interviews With Experts

All of our interviewees were or had been directly involved in several computer conferencing environments that included top executives from their own organizations, or organizations with which they had consulting or other peripheral relationships. The following points summarize the results of the interviews. Numbers in brackets after each entry indicate individual interviews, which are provided in Appendix A.

1. The consensus was that it will continue to be a problem to get top executives to participate directly in computer conferencing as it is presently conceived and practiced. In addition to limitations of the available technology, there is also an acknowledged "generation gap" that it is assumed will be overcome by time. [3,4,6,7,8, 10]

2. Executives are more likely to get involved with ACC as a means of communicating with others outside their organization rather than in it. There are some executives who have personally adopted ACC as a means of communicating with their peers in other organizations. [3,4]

3. ACC will continue to be most effective in work groups for which there is not only a purpose, but a sense of urgency. There was a shared feeling among many of those interviewed that ACC is not the best tool for communications in hierarchical organizations, and some even believe that ACC breaks down formal communications structures. This view has the weight of at least one extensive case study behind it (Zuboff, 1988). [2,3,4,5,6,7,8,9,10]

4. Several of those interviewed believe that the future requires new forms of organization that are more adaptable to fast changing environments, and that for this type of organization, computer conferencing is an ideal communications tool. There does seem to be an issue here, however, about what comes first. Some believe that the kinds of communications tools we have lead to particular forms of organization. The form of organization for which ACC was created, a geographically dispersed project team with a definite and urgent purpose and a definite time frame, is in the process of becoming a norm, as a necessary response to a changing world. ACC as a type of computer-mediated communication is part of the technological change in the environment to which organizations must respond. [1,3,4,6,7,8]

5. The requirements for successful use of ACC, in addition to the form of organization, include commitment of top executives, a "champion" of the technology, and the necessary infrastructure (e.g., computer networking and terminal access). [1,2,5,9]

Legal Issues in ACC

It was mentioned earlier that Hewlett-Packard acquired its own copy of the CONFER conferencing system to install on a corporate mainframe. The company would not consider using the university-based original system for security reasons. Public awareness of electronically mediated communication is greatest on the issue of security as a result of stories in the popular press on computer crime and "hackers" who have illegally accessed supposedly secure government and corporate computers.

While security is an important issue, computer professionals continue to devise better methods of securing access and controlling other kinds of computer crime. The concern over security has probably negatively affected managers' interests in computer-mediated communication as much as any other issue. The concern over security may be greater than is warranted because of its sensational treatment by the press.

The legal issue which should and will have a greater impact on the uses of ACC is copyright protection. Appendix B provides more details on this increasingly important issue.

DISCUSSION AND CONCLUSIONS

ACC Technology and Human Values

ACC is an information and communications technology, and as such has no inherent value system, nor does it promote any particular psychological, management, or organizational theory that would either favor or preclude its use for any particular purpose. On the other hand, no instance of the technology as a working system occurs without embedded values and theories of human action and organization, whether explicit or implicit. While for many detached observers these words may only state the obvious, more than a few early adopters of ACC, and many who have written about ACC, appear to assume or even claim that ACC itself either establishes and reinforces certain human values and purposes or disestablishes and supplants others.

Even with this understanding, it is not difficult to fall into one of two common traps: either (1) drawing conclusions about the utility and probable influences of ACC for some new purpose based upon the record of its uses and influences (or lack thereof) for other purposes; or (2) assuming that some ACC system created for one set of purposes can be borrowed, sans the values and operating theories of its developers, and applied for a very different set of purposes. The prospects for a successful application of the technology within any particular constellation of human values and purposes depends upon a deliberate and systematic program of research and development, based upon an adequate conceptualization of the desired end in both human and organizational terms.

In the present case, it cannot be concluded from the record of research and application that ACC would not or could not be an effective means of improving executive development activities. Since there is no known record of research and development of ACC for the expressed purpose of executive development, with the limited exception of WBSI's executive education program, it cannot be concluded that any current ACC system could or would enhance executive development activities within a specific work domain or organizational setting.

Definitive answers and effective solutions will only come from a program of controlled experimentation and development, designed around the questions and problems of attaining the desired kind of executive development under conditions most salient in the actual environment. This research philosophy is most concisely represented in the Lewinian dictum, "if you think you understand something, try to change it!"

Can ACC be Used to Enhance Executive Development?

If top-level executives won't become personally involved with computer conferencing, what chance is there that it can become an effective instrument in executive development? If computer conferencing is not part of the top-level executive's environment, then it provides no experience of that environment. Using ACC at lower levels of the organization may facilitate lower levels of development, but will not affect executive leadership development as defined by the Army. To the extent that the executive leadership skills and cognitive orientation build on earlier skills and orientations, in time ACC may be adopted at the executive level.

But a developmental framework would suggest that the critical transition to a cognitive orientation required at executive levels of the organization would require the challenges which come with engaging directly in executive activity. Computer conferencing may be used in instructional situations to simulate some presumably executive-level problem, independent of the real world of executive action. The claim here is that there can be little system understanding, however, without being part of the system.

The only way around the evidence is to argue that current and past experience are not relevant in some fundamental ways. Not surprisingly, that is not too difficult to do. There are both organizational and technological reasons why current and past experience may not be very relevant. From an organizational perspective, the main argument is that current and previous uses of ACC have not included managing large bureaucratic organizations. There has been no concerted effort to shape ACC to fit the requirements of management in such organizations. In fact, an argument can be made that there has been a concerted effort to promote ACC as a vehicle for transforming or replacing bureaucratic organizations. From a technological perspective, the main argument is that the near future will bring advances in computer and communications capabilities that will push all kinds of organizations to depend much more on computer-mediated communications to conduct their business and attract many more executive users.

Organizational Issues. It has been established that, even though ACC is nearly twenty years old, it has been adopted by a very small fraction of large organizations, and then only for technical and middle management functions. In these organizations ACC has been used by a negligible number of top executives. At the same time, ACC has seen extensive use in some environments. Is there any consistency among the environments in which ACC has thrived, and is there any inconsistency between such environments and the large commercial organizations surveyed, or the environment of the U.S. Army?

There are such consistencies and inconsistencies, and many of them can be readily perceived through the lens of Jaques' (1976) general theory of bureaucracy. The history of ACC over the past twenty years is a history of the application of ACC technology in specifically non-bureaucratic environments. In Jaques' terms, ACC has been applied almost exclusively in associations, and not in bureaucracies such as the U.S. Army or larger commercial and governmental organizations. Previous applications of ACC in the Army, including the well-known FORUMNET, simply illustrate the possibility of an association within an otherwise bureaucratic organization. Associations are fundamentally groups of individuals with a common goal; a bureaucracy is a "hierarchically stratified managerial employment system in which people are employed to work for a wage or salary; that is to say, a stratified employment hierarchy with at least one manager who in turn has a staff of employed subordinates" (Jaques, 1976, p. 49). Jaques' analyses of the requirements of managerial leadership in such organizations, which have had an obvious impact on the understanding of executive leadership in the Army, are grounded in this distinction between associations and bureaucracies.

Murray Turoff, the acknowledged "father" of ACC, stated repeatedly in his early writings that a key feature of conferencing software is that it could be customized to meet specific organizational and individual requirements, even to the point of declaring the distinction between conferencing and electronic mail to rest on the philosophical difference between conferencing as communications custom fitted to needs and electronic mail as "one size fits all" communications. Most later promoters of ACC, whether because of deficient technical understanding or ideological intent, have ignored the complete malleability of ACC systems and insisted that ACC (as if it were a fixed entity) would transform or destabilize hierarchical, bureaucratic organization. ACC will serve the purposes it is designed to serve.

Much of the current and past experience with ACC is virtually irrelevant to the problem of using ACC to enhance executive development in large hierarchical, bureaucratic organizations. The design of the first ACC system was created through an analysis of the scholarly communications customs and requirements of scientific groups. The basic structure of all extant ACC systems still mirrors that original design. It is questionable whether this structure is suitable for executive work and executive development activities.

The typical functional components of an ACC system are correlates of communication functions comprising a scientific meeting or traditional professional conference. There is a private message space that whispers in and around conference sessions. There are conference sessions involving a common space and common discussion. There is personal space for reading, composing and revising material in the form of editors

and single owner files. Finally, there are public spaces or bulletin boards for posting items for public dissemination. It is a system of simple functions, but complex operation. The complexity is necessary to preserve as many options as possible for the order and direction of activity. A typical executive's world of communications is a much more complex world, and would require more complex functionality while at the same time requiring simpler operation. For example, the typical executive has many aides who are critical elements of his or her communications system. Those aides and their special roles in executive communication would be an explicit part of an executive ACC structure. This is not just a matter of who pushes the keys. It reflects one aspect of a fundamental difference in executive leadership from lower levels of leadership: increasingly indirect means of influence and concern with second order effects.

Reliance on Technology. There is little doubt in informed circles that the general application of computer-mediated communications technologies will continue to expand into all areas of organizational communications, with the rate of expansion gated by software development more than anything else. Increased reliance on communications technologies is as inescapable as the more advanced reliance on computerized transaction processing and information systems. In the private sector, competition will require it; in the nonprofit and public sectors, related equipment and labor costs of performing essential services will require it. In the military, maintaining the fundamental mission of national defense will require it. While communication has always been recognized as important in combat doctrine, it has always been regarded as a support function to the tactical control, first of terrain, and more recently, of mobility. In the future, preeminence in and control of communication itself will be a central tactical objective.

Expanding Technology. There will be continuing development in component technologies that will increase speed and capacity in processing and storage, broadening the options for combinations of text, voice, and graphic input and output, and bringing to the personal computer existing and yet-to-be artificial intelligence, simulation, and hypertext software tools. The ACC systems currently in use are for the most part still relics of the early days of "dumb" terminals attached to timesharing systems on central mainframes or minicomputers. We are in the midst of a leap forward in advanced graphics and networking of personal computers that will radically alter the nature of ACC systems in the next few years. The personal computer will be as widely recognized as a communications tool as it is today recognized as a personal productivity tool. In short, executives will have to use computer-mediated communication, and they will find the technology much more usable and useful for this purpose than it is now.

ACC is not the whole of computer-mediated communications. It is already evident that some tasks that have been attempted through the medium of ACC are better served by other increasingly available and affordable communications technologies, such as audiographic telecommunications and video teleconferencing. It is patently clear that any future research should incorporate experimentation with the increasingly rich mix of communications technologies and not attempt to force all communication needs on a single medium.

Discussion Summary. If it is accepted that the kind of high level development required for executive leadership can only be acquired through actual experience dealing with the challenges of the executive's world, then computer-mediated communications, including but not limited to ACC, will add value by providing more, and more varied, kinds and levels of participation in the executive's world than are possible with conventional methods. A crucial point is that this participation is not simulation, but controlled rehearsal in the real world of executive action.

If electronically mediated communications are going to be the dominant form of all future communications, then executive development not only can but must be pursued now using these media. Whether or not the currently available media are adequate to the task is largely irrelevant. Future research must involve development of the media, the user interface, and the integration of ACC in the emerging concept of an executive support system (ESS) (Rockart & DeLong, 1988) in parallel with efforts to use and evaluate the media for purposes of executive development.

Psychologically meaningful development, especially in terms of stages of cognitive functioning such as Jaques and others conceive as necessary for effective executive leadership in large bureaucratic organizations, has not been touched by social and psychological research on computer-mediated communications. There are deep veins of knowledge and research practice among developmental theorists and researchers, however, that can and should be mined generally for the study of executive development.

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APPENDIX A

EXPERT INTERVIEW SUMMARIES

1. Interview with a director of information technologies

This is a prominent researcher and educator in the field of management information systems (MIS) who oversees two in-house research staffs, one in the U.S. and one overseas.

One of the major issues which must be addressed in the introduction of telecommunications technologies is the changing power relationships. The director believes that organizations need to develop different forms which are more adaptable, more flexible, and more responsive to their global environment. As telecommunications technologies develop, managers will have to have a broadened span of control. This firm is working on restructuring organizations through many different types of technology.

The director was unaware of any plans of the affiliated firm to offer computer conferencing in addition to its successful mail utility, but commented that the firm has an organization wide computer conference.

This computer conference software has become imbedded in the day to day activities of the firm's personnel, who are changing their working life around it. The director commented that this system has substantially reduced the amount of paper used in the office. It has also become the "real flow of work" of the organization. Anyone who joins the staff must learn to work with the system, or be cut off from the management process of the organization.

According to the director, "perceived need" is the most important driving force for computer conferencing usage and when there is a real need for a computer conferencing software system like theirs, senior managers have a sure sense of value.

The main constraint to the introduction of telecommunications generally seems to be a lack of existing infrastructure. On the other hand, this situation provides an advantage where it permits an organization to implement a new system from the ground up. When an organization has already made a major telecommunications investment, that investment itself becomes a constraint on introducing new technologies.

2. Interview with an assistant professor of social science

This individual has been a Kellogg Fellow, under the W.K. Kellogg Foundation National Fellowship Program. The Kellogg Fellowship Program involves 50 new fellows per year, and provides a \$30,000 grant over three years to carry out a study plan of one's own design. The professor won the fellowship with a proposal relating to how long distance telecommunications could be used to affect rural education.

Recipients of fellowships under W. K. Kellogg Foundations National Fellowship Program and International Fellowship Program are an extraordinarily diverse group of people, including doctors, lawyers, college presidents, a dairy farmer, and many other professions. All are issued a Tandy 102 personal computer upon selection for a fellowship, and all are trained in computer conferencing at the first meeting of each new group.

The Kellogg Foundation has adopted ACC as its mandatory means of communication between its fellows and the Foundation, and provides each fellow with a personal computer for this purpose. As a result, it is one of the largest not-for-profit applications of ACC in the United States.

The resource base represented by Kellogg's "on-line think tank" is "beyond any artificial intelligence because it is real. ... You will not find a greater concentration of eclectic academicians in the United States."

Since many Kellogg Fellows use their grants to travel, the network receives regular on-site reports from around the world. One group was in the Soviet Union, and sent on-line reports from there during the time of the Chernobyl nuclear accident.

The professor believes that (1) the medium is ideally suited to mentorship type teaching of the liberal arts; (2) it is an excellent vehicle for teaching and enhancing writing skills; (3) political awareness and activism can be enhanced in a computer conferencing environment; and (4) the lecture content on 200 campuses nationwide is being changed by the on-line activity.

"What happens when you send a dairy farmer to Japan to study management techniques?" "The answer is that he has incredibly astute things to say about Japan, which you would not expect from a dairy farmer." The implication is that the on-line community learns something important about the dairy farmer, as well as learning something about Japan.

The professor says that the medium is used as a "think tank" for the foundation, in which the conversations result in policy decisions on funding.

When asked about the negative aspects of computer conferencing, the professor candidly commented that the cost of the technology and network fees make it "elitist." In some ways it is frightening "that such a powerful tool is in such a few hands. It is an incredible way of changing the world."

The professor's group of Kellogg Fellows was one of those which was introduced to computer conferencing as an option, and the members of the group have now completed their fellowships. Out of 25 fellows in the group, who originally used the Kellogg system, 12 are still active on the network. This group was not provided with personal computers, unlike later groups.

3. Interview with a key figure in electronic networking

This individual is highly influential in the area of electronic networking and is also an internationally known authority on the subject of computer conferencing.

Interviewee pointed out that ACC is "multi-modal," meaning that it is accomplished through many different versions of software. At Hewlett Packard, for example, interviewee believes that eight different types of conferencing software are in use.

The principle applications of computer conferencing seem to be at the project or division level, and not company wide. The technology works well anytime a group of people is organized which should be working together. Companies are "not making new things to do because they are on-line."

Interviewee reports that "the way that executives use [computer conferencing] is different. It is not necessarily that they have meetings with other executives within their own organization." Interviewee met a number of executive users through participating in the Western Behavioral Sciences Institute (WBSI) program. "Chuck House (General Manager, Software Development Environments, Hewlett Packard), Doug Strain (Vice Chairman, Electro Scientific Industries, Inc.), and Ray Alden (Retired Vice Chairman, United Technologies Inc.), do not use the technology to communicate with their own vice presidents. Rather, they use it to communicate with the world beyond their own organizations." They find it particularly useful to communicate with executives in other companies.

"As with any other key productivity tools that organizations have, the way executives use [ACC] most often is not direct hands on use. But they do take advantage of the products of those tools. For example, if I'm an executive at a corporation and my corporation has a PC system, and an engineer is talking about marketing, engineering, etc., related to a certain product on a computer conferencing system, the information I get about that product is very different from what I would get without the tool. An executive does not have to be at every meeting held, in order for it to be useful for the organization to have meetings. The quality of the information provided to the executive by his or her deputy is different depending on who got to contribute to it, and who contributes is changed by computer conferencing."

"There are some significant executive success stories, thanks to executives who have experienced WBSI; thanks to the early work of Norman Solomon; and thanks to the White House Conference on Productivity, which involved 50 CEOs of Fortune 500 companies using computer conferencing. Doug Strain's

company is a big supplier to DEC. He can talk with vice presidents at DEC and HP regularly. I am not privy to what they are talking about, because they do not do it in the public spaces of their systems, but I do know they are discussing trends and being mutually influenced in ways that have large impact on their companies."

"I know that Pam Saloky, Manager of Business Office Systems Engineering at DEC, and Gary Regensburg of McNeil Pharmaceutical, who facilitated the White House Conference on Productivity, use computer conferencing every day. They are interacting with their peers in other companies. This is not happening with a huge percentage of companies yet, but what has been happening so far is more like that, and therefore more in keeping with the executive role. You would not want an executive in every meeting and every conference, but you would want them communicating with people outside the organization."

"There are all kinds of executives doing things on EIES. They are not discussing issues in a conference that some 15 year old could happen by and join. Rather, they discuss with other executives on the system, who are invited to join their private topics, like 'standards for measuring equipment' or 'productivity.' This is the kind of thing that is happening on every public system, but you don't find it just by signing on and looking at the public index."

Interviewee points out that success with computer conferencing is inversely proportional to the distance the participants in the conference are from a computer and a modem. The greater the distance from the hardware, the smaller the chance for success of the technology becomes. Success occurs when participants "have something clearly in mind, that has a purpose and a specific time frame. One needs to think, 'I need to logon now to do [something] specific'."

Interviewee observed that computer conferences are generally free from bureaucratic control. It is normally easy to add new accounts, and to start discussions on new ideas. Interviewee pointed out that there has been tremendous growth in the system installed at Boeing.

4. Interview with an associate director of a nonprofit research institute

An interview was conducted with an associate director of an independently incorporated nonprofit research institute working in the United States, Japan, the United Kingdom, and Sweden. Interviewee has been involved with computer conferencing (ACC) at Bell Laboratories, the School of Management and Strategic Studies, the Maccoby Group, and with a research group at the John F. Kennedy School at Harvard called the Harmon Fellowship, which is considering issues of union-management collaboration.

Interviewee does not see ACC being used where a hierarchical concept must be enforced, but has seen generals participate effectively in the School of Management and Strategic Studies. Points out that ACC is really a tool for enhancing anti-hierarchical trends. Observed that the quality of communications in hierarchical organizations is very "thin." Believes that subordinates only report upward in a chain of command when they believe that a senior executive (leader) can help them perform their work.

Interviewee believes that the best applications of ACC occur when good horizontal communications enhance "some kind of strategic vision" for the organization. In the best applications, ACC begins to feel like a "living entity," which creates an atmosphere of collaboration among peers. It works best when there are real purposes for using it.

Interviewee believes ACC can be extremely empowering to those who are not hierarchical in their outlook. When leaders recognize that there should be conversations which cut across the traditional organizational disciplines, it is appropriate for them to empower personnel to use ACC as a tool.

Interviewee predicts that ACC will be adopted very quickly into the work environment, almost as a generational change of technology.

Interviewee believes that effective organizations of the future will be unable to rely on hierarchical models. Argues that "hierarchies are breaking up as technologies are coming in" [to organizations]. Stated that "even a matrix [type organization] is too tight a view." Organizations of the future will require the flexibility to make rapid change. An example is Volvo, where the specifications of cars can be changed while they are actually on the assembly line. This kind of flexibility requires a workforce in which everyone "knows the game plan" and information flows quickly.

When asked about executive applications of ACC, interviewee observed that such applications are "difficult to separate out." Commented that the School of Management and Strategic

Studies involves very senior people, but the result of the exercise has created a very coherent group of people at a specific level, rather than offering management decision-making models. Further observed that it is difficult for any particular group to reach consensus, but that participation on an ACC system provides new perspective on how different people are in attitudes and points of view.

Bell Laboratories uses ACC to create task forces around all kinds of issues emerging in the organization. Each task force may involve a group of about 10 people. The principle objectives of the system are to make a traditionally very hierarchical organization more responsive to customers; to product development; and to the changing demographics of the organization. Interviewee said that, running UNIX, any team can select any node in the system, and conduct an on-line conference. The result is that project work tends to be done on-line.

Interviewee does not envision a top management application for ACC within Bell Laboratories, at least not at this time. One issue relates to whether top management people are willing to "take the risk" of using a written medium. Top management work tends to be in face-to-face meetings at Bell. There is also a danger of subordinates developing a "Big Brother" mentality if senior management has the capability of scanning their conferences. The principle issue to be addressed vis-a-vis executive level management is whether the technology will be used as a control device, or as an empowering technology.

ACC works best when it has a feeling of urgency for the participants. When systems of this sort are implemented, people tend to use them, and natural work groups of 10-50 people begin to emerge. Interviewee's definition of the best type of groups for ACC are "small new groups cutting across standard hierarchical lines [of management], on strategically important issues."

Interviewee believes that very soon a superior application for ACC will be in planning and follow-up of conferences, because it will have the added value of making people part of a network. Commented that every seminar creates 10 good questions, but once the seminar is over, there is no good way to continue the discussion.

5. Interview with a staff member of the John von Neumann National Supercomputer Center

A member of the staff of the John von Neumann National Supercomputer Center at Princeton, New Jersey, was interviewed. This individual is associated with the Gartner Group OIS Strategic Analysis of Computer Conferencing, and with the EIES 2.0 project at New Jersey Institute of Technology under contract with Computer Sciences Corporation.

Implementation of a computer conferencing system requires an internal champion. Gifford Pinchot's book Intrapreneuring had a case study of Chuck House at Hewlett Packard. It was House's recommendation and persistence, rather than a strict cost/benefit analysis, which caused computer conferencing to be adopted. Mr. House believed that you had to let people try the system if you want them to use it.

Interviewee is not aware of broad usage for executive decision-making, per se, but it is used heavily for committee and collaborative work, particularly at firms like Hewlett Packard, DEC and IBM.

One excellent application is the preparation for face-to-face meetings. Eric Bloch, Director of the National Science Foundation, is currently using three different Confer based conferences at the University of Michigan.

6. Interview with an Exnet developer

One of the developers of Exnet, the computer conferencing system operated by Exxon, was interviewed. Interviewee now maintains a private consulting practice, centered in New York City, and is reputed to be the first computer conferencing consultant.

Interviewee commented that the U.S. Army is among the farthest along of all organizations using computer conferencing as a work tool.

Interviewee believes that there are educational applications for computer conferencing, but states that the whole possibility of using computer conferencing for educational applications has just barely been tapped.

Interviewee does not believe that computer conferencing, as the software is currently configured, will ever be successful in any important way, but does believe that the "way of working," which is currently exemplified by computer conferencing, will become more and more significant.

"I hold that computer conferencing as computer conferencing, as a discrete thing, like Parti, Caucus, EIES, ... is never going to happen in any major or important way. I think the window of opportunity for that is passed...."

"What I do expect is that the concepts of computer conferencing, the ability of groups to work interactively together over geographically dispersed distances, in a space and time disconnected environment, in other words in a store and forward [not real time] environment, will absolutely happen. ... I believe that way of working will prevail, while those forms of software will not."

Interviewee believes that the "way of working" will leapfrog the current technology, but the new technology will not be available for two to four years. Referred to hypertext and artificial intelligence applications, such as computer conferencing with graphics, spreadsheets and intelligent mailboxes, as ways that the software will change in the relatively near term.

Interviewee does believe that computer conferencing may be an appropriate way to get people used to the "way of working" together. If an organization selects the "way of working," then it should select the best software available at the time, moving to newer technologies when it becomes available.

7. Interview with the president of a communications firm

An interview was conducted with a president of a communications firm and adjunct research scientist at the University of Michigan. This individual was involved in the original design of the Confer software, and the firm licenses the use of the program to Wayne State University (WSU). WSU runs private conferences for a wide variety of clients, including the U.S. Army's Forum.

Interviewee stated that the best place to look at executive applications of ACC is the U.S. Army. Said that there are three major conferences being conducted at WSU, including Army Forum and a major National Guard command which uses the system for command and control.

Interviewee said that Hewlett Packard (HP) is another good place to look. Believes that there are now over 2,000 people linked together there but does not believe that the system is "installed at the highest levels of decision-making. [The HP ACC system] came from linking engineers to collaborate." Also does not believe it is used to any great extent at the management level of Chuck House, General Manager, Software Development Environments, who was the original champion of computer conferencing at HP. Confer is used on an in-house computer for part of HP's conferencing needs.

Certain kinds of organizational hierarchy "developed because of the kinds of communications tools available within organizations." Believes that now that new communications tools are readily available, because many managers have personal computers on their desks, new kinds of organizational structures will evolve to make better use of these tools.

In terms of ACC use for executives, interviewee stated that one "must look at other computer tools an executive should have [as well]. It is not easy to get someone who is very successful at what they're doing to change how they're doing things, on the promise that they can be more successful."

Commenting on public conferences: "it is not an easy thing to have a group of strangers to talk with one another." It is best to focus on already established groups.

Interviewee also said that hierarchical values are generally not reflected in computer conferencing. These are "reflected in electronic mail," rather than ACC. Said that computer conferencing was originally designed by people with egalitarian values, and the medium reflects that. Asserted that when Confer was being designed, deliberately non-hierarchical decisions were made.

8. Interview with a department manager

A department manager of Exxon Chemical Corporation, Darien, Connecticut, was interviewed. Interviewee has been using a computer conferencing system for about five years.

The Exxon Chemical system operates as a private network on The Source, primarily as a means to deal with the security concerns of Exxon Chemical's systems people, who do not want non-Exxon people having access to a system which contains Exxon data. Interviewee is not concerned about the security implications of having the Exxon system operating on equipment maintained by an outside vendor.

Interviewee was an original champion of establishing the computer conferencing system, and uses it heavily as a work tool. Says that there are currently about 60 Exxon managers and 40 outside consultants and experts using the system.

The Exxon system is not currently being used for executive development, and the CEOs of Exxon operating units are not active in computer conferencing, although they all do use electronic mail. When asked why, interviewee explained that it is as though "they are walking before they run."

The principle applications of the Exxon system are: a) collaborating on projects at a distance; b) completing pre-work for meetings; and c) conducting some meetings entirely on-line.

Interviewee believes that CEOs will begin using computer conferencing "as a matter of course." Believes that this may be a function of better design of systems. Primary criticisms of current systems are that they require too many steps to access the system; they permit only typing as a means of data input; and they are currently limited only to words, not permitting transmission of graphics and spreadsheets (for example). "Few business conversations can rely solely on words."

One reason for the slow adoption of the technology is that people in North America are not conditioned to collaborate on work.

9. Interview with a U.S. Department of Agriculture executive

This individual has been heavily involved with the implementation of computer conferencing within the Agricultural Research Service (ARS).

Interviewee believes that the success of a computer conferencing system depends upon the commitment of the top person in an organization. Cited a firm in which the president of the company said to his staff, "This is how we will communicate."

Facilitation of the system is also an imperative, according to interviewee, who began connecting people through USDA's Headquarters Telemail mail system in 1982. Used it to develop a strategic plan for the agency, connecting about 500 people in a "conference like" environment, using electronic mail and distribution lists. In order to succeed, however, "had to load in 'goodies' each day." Once interviewee moved to ARS, the Telemail conferencing approach fell into disuse, but interviewee established a Participate system to operate in conjunction with ARS's BIONET database. The overall ARS system now has 360 active users.

Computer conferencing in general needs "missionaries" who can excite other people through the emotional appeal of the medium.

Interviewee plans to develop and teach a systems engineering course on-line. Hopes to link interdisciplinary teams in the development phase. By having the discussion on-line, a record will be created of the entire project, and broader groups can be added as appropriate.

Interviewee offered one example of how ARS's Participate system was used for executive decision-making. In a recent case, a Congressional group was changing the ARS budget, and it was necessary to have quick input from a diverse group of people. Using Participate, interviewee was able to tap the knowledge of those that knew the answers. "Everyone had their say" in a timely manner.

10. Interview with a computer network president

Interviewee's organization is a new venture using ACC, but interviewee's experience with the medium dates back to the early 1970s. During the earlier experience, used Planet software, the prototype for Notepad, offered by the Institute for the Future. Spent about three years concentrating on executive applications, and published under the auspices of Sperry Univac and the Institute for the Future.

Interviewee has not seen any articles on executive applications of computer conferencing recently, but "wrote a few articles" on the subject in the early 1970s.

During the earlier experience, 1973-75, interviewee organized, ran and moderated three sets of international issue discussions. In one case this involved five executives in the United States and five in Europe, and on another occasion ten executives in the United States and ten in Europe. Interviewee commented that as long as the conferences dealt with "extremely relevant" issues, the executives would make the effort to stay involved. The outputs of the on-line conferences were fed into a series of face-to-face meetings with 90 senior executives at Davos, Switzerland. During the Davos meetings, the on-line panelists continued to participate through personal computers set up at the conference site. Interviewee believes these conferences were very effective, and allowed the face-to-face discussions to have "real substance."

The new venture is based on "a lot of market research," during which executives themselves were asked to identify the issues for discussion on the new network. The objective is to bring together pragmatists (executives) and experts/observers into a common forum. Using the Caucus software, interviewee hopes to develop a "constellation of networks" with common interests, "by tapping the minds of people with a variety of views and opinions."

APPENDIX B

MORE ON LEGAL ISSUES IN ACC

The primary concern is likely to be over legal liability of system operators and conference organizers for their own actions and the actions of other users of the system. Since this issue will undoubtedly increase in importance in direct proportion to the increase in use of ACC for official business, a review of the current law has been included here.

In 1976, Congress passed a general restatement of the original 1909 copyright law. Provisions especially pertinent to computer conferencing are: 1) copyright protection accrues to creators of original works of authorship, including specific exclusive rights to use, and to authorize others to use, the created work, and 2) the judge-made equitable rule of reason; "fair use," was formally codified. The doctrine of fair use is the main defense against copyright infringement. The defense involves weighing several factors whose application will vary from case to case. The factors are: a) purpose and character of the use, b) nature of the copyrighted work, c) amount and substantiality of the portion used in relation to the whole, and d) the effect of the use on the potential market for the copyrighted work or on its value.

Notice, deposit, and registration requirements were also retained, although certain specifics have been changed. As a major departure in the 1976 law, federal protection is accorded a work from the time it is set down or "fixed" in a sufficiently tangible form, reducing the importance of actual "publication" as a legal requirement.

The copyright standards relating to conferencing consist of: subject matter (copyrightability), formalities, and "fair use," each of which is described in greater detail below. Copyrightable subject matter includes any original work of authorship, however slight the originality or creativity, "fixed" in a suitably tangible form (as opposed to mere ideas), including written words, music, paintings, sculptures, jewelry, and fabric designs. Formalities include such requirements as notices, deposit of copies, registration, and recording of interests. Essentially a limitation on the exclusive rights of a copyright owner, "fair use" doctrine provides that reproduction in the form of copies or by any other means for certain clearly delineated purposes is not an infringement of copyright.

Copyrightable subject matter. Copyrightability of computer programs presented a controversy in the old law. Under the old law, the Copyright Office classified computer programs as books for the purposes of the "subject matter" test and thereby required the program to be "published" and that a human-readable form of the program be deposited with the Office. The new law explicitly addresses the existence of computer programs and databases and provides a statutory definition of "computer program" as "a set of statements or instructions to be used directly or indirectly in a computer program in order to bring about a certain result." Also, the new law liberalized publishing and deposit requirements. In question is whether "suitably tangible form" requires human-to-human communication as a prerequisite for copyright protection. The rationale is that the subject matter must be intelligible to copyright examiners. Therefore the source code is doubtless copyrightable, but the object code is in question.

Arguably the fixation requirement would operate to deny copyright protection to a work however creative or original existing solely on the computer display or in volatile memory, although it is not clear how disk storage would be treated. Since protection of the right to reproduce a work in copies depends upon a fixation in a "copy" it is not clear that reproduction of a work on such non-tangible media as referred to above constitutes a copy such as would amount to infringement of copyright protection.

Copyright formalities. Formalities include such requirements as notices, deposit of copies, registrations, and recording of interests. With respect to notice, errors or omission resulted in loss of copyright under the old law. The new law provides ways to rehabilitate some rights in certain circumstances where notice is flawed. There are similar provisions regarding deposit of copies and registration.

Fair use. Fair use was a judge-made equitable rule of reason that, although applied using various guidelines depending on the judge and jury selection, was applied on a case-by-case basis. Codification in the new law takes this discretion away from the courts and expressly provides that "fair use" is not an infringement of copyright.