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COMPUTER-BASED TELECONFERENCING AND ITS IMPACT ON COMMAND AND STAFF RELATIONSHIPS WITHIN THE UNITED STATES ARMY

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MATERIALS RELIABILITY DIVISION

June 1989

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ABSTRACT

This thesis considers how computer-based teleconferencing, as a new communications technology, is changing the way the United States Army performs its peacetime staffing functions and may be altering traditional command and staff relationships. It describes the Army's use of teleconferencing and attempts to forecast how this technology will shape headquarters' functions (the preparation of staff studies, plans, and policies) in the future. This thesis examines "white collar" productivity within the Army and attempts to analyze how personnel who use teleconferencing view their work. Concepts explored are: teleconferencing and its impact on overall job effectiveness; teleconferencing and staff officer efficiency; teleconferencing and its impact on information access; and teleconferencing and its impact on responsibility, authority, and organizational structure. A survey was conducted on-line within the ARMY:FORUMNET system. Survey respondents represent a cross-section of the Army ranging from general officer to sergeant (N=203 respondents). Results show that computer-based teleconferencing is having a positive effect on staff procedures and command and staff relationships. Users report teleconferencing has increased their overall job effectiveness and has made their jobs easier.

Approved by

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I. Introduction -- The Birth of a New Staff Technology

The Army is known for its regulations and bureaucratic tendencies. Computer-based teleconferencing may assist the Army in achieving a position of leadership in the information age. My hypothesis is that teleconferencing can (and is) changing the Army for the better. This research is, therefore, amongst the first such efforts to study how change will occur in a large complex public organization.

If you were to tour the cadet barracks at West Point or walk the halls of the Pentagon, one would see that today's Army (like other institutions in the United States) is well along the way in entering the information age. Every cadet at the United States Military Academy buys a personal computer as a part of his or hers basic issue. Each cadet company, battalion, and regiment maintains an electronic bulletin board and message system. Academic departments at West Point require that assignments be prepared and submitted for grading on floppy disks. Nearly every Pentagon action officer in the Army's headquarters is equipped with a personal computer or a terminal linked into a local area network. Their staff actions are logged into a system called OPTIMIS and tracked electronically. The Army's computer literacy improves as each day passes.

As more and more of the Army's staff personnel becomes computer literate, there will naturally be accompanying improvements in the command and staff procedures and functions performed. How will the Army

adapt to these changes? What will the Army look like in the Information Age? Will the leadership anticipate this evolutionary process and prepare its personnel for the future? Will staff studies be hand carried through the maze of Pentagon offices so as to become a completed staff action? How will computer-based teleconferencing assist in decision making and policy formation? This thesis explores many of these questions.

Since the US Army spends the majority of its time preparing for rather than fighting in a war, it makes sense to improve upon staff effectiveness and efficiencies while the Army can focus on these clear-headedly and not worry about such things while dodging bullets. Rosabeth Moss Kanter (1984, 1986), Peter Drucker (1985) and others have studied organizational change and effectiveness in business. Starr Roxanne Hiltz (1977, 1978), Robert Johansen (1979, 1984), Bob Parnes (1981, 1987) and others have studied teleconferencing and its impact on private firms. Kathleen Carley (1988) has studied the diffusion of scientific information resulting from the use of electronic mail. Defense analyst, Edward Luttwak (1985), and numerous others are quick to point out what's wrong with the Pentagon as it prepares for war. This thesis offers the reader an analysis of a new staff technology and suggests ways in which teleconferencing improves on Army staffing. This thesis deals little with the theoretical. But, its significance lies in the realm of the practical.

A. What Does an Army Do?

The United States Army exists to deter war or, if deterrence should fail, to fight and win a war. Both missions are complex. To understand all that goes into either far exceeds the scope of this thesis. But, in order to understand what our Army does, it helps to think of the Army as a system. By using the language of systems theory we can better study the Army. The Army is more than a sum of its parts. It is an American institution, the largest armed service within the Department of Defense and, as such, the largest single bureau or agency within the federal government. The US Army is not the largest standing army in the world. It may not even be the strongest. But it is vitally important to the nation. Because of its importance, we as citizens should understand its structure and its internal functions.

The leaders of the US Army are located all across this country. Many are stationed in the Pentagon. Others are assigned to the numerous forts and headquarters scattered throughout the continental United States and abroad. As these leaders advance through their respective careers, they attend a number of staff colleges and senior service schools. It is in these colleges and schools where one learns of the theories behind our national defense. At the Army's War College, tomorrow's general officers learn about strategy, the operational art , tactics, and the logistics of war. They study command, control, communications and intelligence (C3I), leadership, and management. In their leadership and management studies they learn that:

> "The Army can be considered an open organizational system of three primary components: the combat, production, and integrating/coordinating subsystems. Each of these has tasks to accomplish, each operates in a given environment, and each requires and acquires resources."[1]

These three primary components must function in a coordinated fashion both in war and while preparing for war.

B. In War -- Maximize Combat Power

During an armed conflict the sense of urgency and the need for coordinated actions among the combat, production, and integrating headquarters is crucial. Lives depend on the success of coordinated efforts. Infantry, armor, aviation, artillery, and air defense forces fight. They are supported by combat support and service support units. All these soldiers have as their aim the concentration of combat power focused against a common enemy.

While at war the combat subsystem is that which actually closes with and destroys the enemy. This Army, the combat army, will actually do the shooting and the dying. "The Armies in the field" -- the US Army Europe (USAREUR), Eighth US Army (Korea), US Army Japan, Western Command (WESTCOM), Forces Command (FORSCOM), etc. -- consists of the generals,

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[1] ARMY COMMAND AND MANAGEMENT: THEORY AND PRACTICE. Reference Text for the US Army War College's Department of Command, Leadership, and Management 1985-86 Carlisle Barracks, PA 17013-5050. p. 8-1.

colonels, majors, captains, lieutenants, warrant officers, sergeants, specialists, and privates. This Army reports to the President, through the Joint Chiefs of Staff (JCS) and the Commanders-In-Chief (CINC) within the various theater or unified commands. In combat, generals command by forming task forces and positioning materiel; colonels coordinate or direct the combat power; and the captains, lieutenants, and sergeants (through the specialists and privates) fight the battle.

The production subsystem supplies the Army in the field with whatever it needs. Wartime production of ammunition and weapons makes one think of "Rosie the Riveter" and of the national mobilization of US industry. Wartime personnel needs are produced through the recruiting and training agencies of the Army. The production subsystem consists of the Army Materiel Command (AMC), the Training & Doctrine Command (TRADOC), and a number of "stovepipe" or specialty commands such as the Army's Information Systems Command (ISC), the Health Services Command, the Criminal Investigation Command, etc. These commands, interestingly enough, do the same things in war that they do in peacetime. In war they must, however, meet "surge" or emergency needs.

The National Command Authority starts with the President and reaches the troops in the field by a variety of communications means. The Worldwide Military Command and Control System, the Army's Tactical Command and Control System (ATCCS), radios, wire, arm and hand signals, a sergeant yelling orders to his squad --- all these attempts to maximize and

direct combat power theoretically are integrated by the Pentagon, headquarters for the Department of the Army (HQDA). The Pentagon does this directly and indirectly. The integration of all combat power happens in real time and through the planning and programming of resources for the next battle.

C. During Peacetime -- Preparation for War

What does all this have to do with computer-based teleconferencing and its impact on command and staff relationships? Why discuss combat power and the Army's Tactical Command and Control System (ATCCS) in a thesis for a technology and policy program? What is new here? Haven't armies always performed these missions? The answers to these and other questions will make up the remainder of this paper. Before we can generalize between management theory that works in private or civilian organizations and that which works within the Army, we need to understand the purpose for the organization's existence. Now we know that the US Army fights our wars or prepares for future conflicts so as to be able to deter them. What's next?

Luckily for our nation, history has shown that we spend more time at peace than we do at war. Our Army's peaceful preparation for the next war is now occurring in a new age. This new age -- the information age -- frames how all levels of the organization function. Today, the United States Army is "on the edge of a historical transformation of immense propor-

tions"[2]. The Department of Defense Reorganization Act of 1986, recent "procurement scandals", a shift of focus toward low- and mid-intensity conflicts, and the shrinking budget for the Department of the Army -- these all have made the headlines in today's press. The age of information coupled with these turbulent times is reshaping the Army. It is during this period of peace that we can perhaps best compare the military as an organization to other large, complex organizations.

During peacetime, the combat subsystem is involved with training exercises. Annual tests such as the Return of Forces to Germany (REFORGER) and rotations through such sites as the National Training Center (NTC) at Fort Irwin, California occupy the "soldiers'-of-the-line" or "line unit's"[3] time. The production subsystem and the integrating or "stovepipe" headquarters continue to do their support tasks. The vast majority of these personnel are dedicated and hardworking. They, unfortunately, lack the sense of urgency found in a wartime setting. During periods of peace, HQDA serves as a planning and programming staff. "Budget battles" with Congress are more likely to occupy the energy of these staff officers than is preparing directly for the next battle. While preparing for war, staffs do staff studies; attend seminars, conferences, and in-process reviews; and participate in meetings, promotion boards and sources selection boards. Spare parts are ordered, equipment is

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[2] Shoshana Zuboff. In the Age of the Smart Machine (Basic Books, Inc., New York, 1988) p. xiii. Although professor Zuboff's book speaks of a historical transformation on the order of that experienced during the industrial revolution, the change occurring in today's Army is of similar proportion.

[3] "Soldier-of-the-line" or "line unit" are to be considered here as the term "ship-of-the-line" is used in most navies. To be assigned to line duty means you belong to the combat subsystem of the army. Staff duty is usually pulled away from troops or in staff assignments found in the production or coordination headquarters.

maintained, doctrine is reviewed, and units modernize. Most, if not all, of these peacetime staff functions can be assisted using computer-based group networks or teleconferencing.

D. Teleconferencing in the U.S. Army

This thesis is specifically focused on those who are actively using computer-based teleconferencing today in the U.S. Army. This user group has grown from a handful of hackers to a multifaceted network of subscribers approaching two thousand. Two thousand users is not a large portion of the total Army. But, I think these few commanders and staff personnel are impacting upon the future Army in a way disproportionate to their numbers because they are the advanced guard, the pioneers, or future leaders who will have the know how to reshape the Army. Furthermore, the pool of teleconferencing users is growing. After all, with each generation of soldier comes a greater familiarity with computer-based technologies.

To study the impact of computer-based teleconferencing on the Army's command and staff relationships is to look into the future. By studying the Army in particular, one perhaps can assess the impact of this information technology upon other large, complex bureaucracies. The structure of this thesis hopefully will assist the reader in this forecasting process. Chapters II and III look at the organization of the Army. Chapters IV and V examine the concepts of work in the information age and trace the evolution of staffing techniques within the U.S. Army. Chapter VI is a

detailed account of the "nuts and bolts" of computer-based teleconferencing. Chapter VII explores my hypotheses in detail. Chapter VIII covers research methods. Chapter IX contains my findings and results. And finally, Chapter X sums it all up by analyzing how teleconferencing may affect the organizational effectiveness of tomorrow's Army staffs.

II. Organizational Structure

Before we can examine the impact of computer-based teleconferencing on command and staff relationships, we must develop a frame of reference for organizations in general. With a taxonomy for organizational structure in place, we can then analyze the US Army and how the technology of teleconferencing affects this structure.

The Army's organizational structure serves three basic functions. Army units or agencies are intended to produce organizational outputs and to achieve organizational goals established by the President or his Secretary of Defense. Secondly, the Army is designed, theoretically, to minimize and regulate the influence of individual variations on the organization. The chain-of-command ensures that individuals conform to requirements of the organization, not that the organization conform to individuals. Third, units are the settings in which power is exercised. Each unit has one commander who's position has power by definition and law. Decisions are made and the flow of information leading up to these decisions is largely up and down the chain-of command, channeled by the Army's organizational structure. Subordinates within the organization carry out the commander's orders.[4]

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[4] This is based on Richard H. Hall's description in Organizations: Structure and Process (Prentice-Hall, Inc: Englewood Cliffs, New Jersey, 1982), p 54.

We have already outlined the functions/purpose of the U.S. Army. Therefore, its goals and objectives supporting its wartime or peacetime missions naturally follow. The Army reacts to pressures on and within its organizational structure. These reactions are limited by organizational size and environment. We will defer some of the discussion on how the US Army reacts to these pressures to the chapter on processes.

A. Nature & Bases of Structure

The Army's size affects the nature and bases of its organizational structure.[5] Its budget is an important factor determining its size. And although the US Army is large, its budget and physical capacity seem to be fixed or shrinking in relative terms to the other uniformed services. The Army is limited by its physical capacity. It has a fixed number of authorized spaces or billets for officers and enlisted soldiers. The number of forts or posts is finite. A recent initiative by both the Department of Defense and Congress will close or re-align many of the bases the Army now holds. The exact extent of this initiative has yet to be determined for the Secretary of Defense has approved the plan for closures and re-alignment and is waiting for Congress to act. And to a certain extent, the number of units (measured in active and reserve divisions) and commands (those support organizations mentioned in the introduction) are fixed. Congress has set limits on the number of uniformed and civil servants serving the Army.

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[5] John R. Kimberly outlines a more in depth look at how size affects organizational structure in "Organizational Size and the Structural Perspective" *Administrative Science Quarterly*, 21 no. 4 (December 1976), 577-97.

In addition to these limits on size, we next must consider the amount of discretionary resources available to the Army. As an illustration of this last component of size, (namely, the Army's discretionary resources), consider the 1988 and 1989 funding overview of the Department of Defense's (DoD) Research, Development, Testing and Engineering (RDTE) budget and/or the DoD's Procurement budget.[6] Figures 1 and 2 illustrate a "shrinking pie". Fiscal year 1989 dollars will be fewer than in fiscal year 1988. The Army has far less discretionary resources available to it than do the other services. Its funds on a per capita bases for developing and procuring new weapon systems are less than that of either the Navy or the Air Force. Simply, the Army has to do more with less given its discretionary dollar resources. This impacts directly on the flexibility within the Army's organizational structure. "To add perspective to the situation, [the Army's Under Secretary, Michael P.W. Stone] notes that the Army is the biggest institution in the United States, with total employment about five times as big as IBM, and with assets about 10 times those of IBM."[7] The size of such an organization with the limited discretionary dollars it uses for its investment account is key to understanding its overall efficiency.

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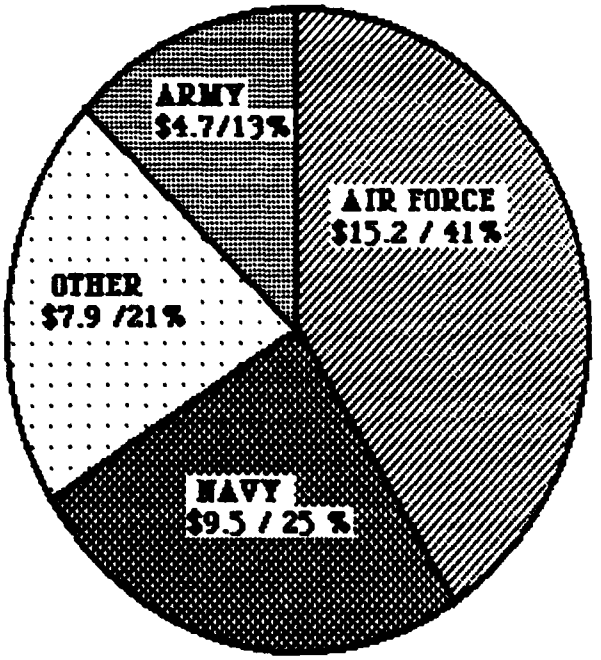
[6] "Materiel for Winning, September 1988" is a joint publication released by the US AMC, US Army TRADOC, and US Army ISC. Figures 1 and 2 are found on pages 18-19.

[7] "Stone says procurement system works", AMC NEWS, a newspaper published by the Army Materiel Command HQ, vol. 16, no. 11, September 1988.

Funding Overview for FY 88 Total DoD RDTE and Procurement Budgets.

FY 88 TOTAL
RDTE $ 37.3 B



FY 88 TOTAL
PROCUREMENT
$ 84.2 B

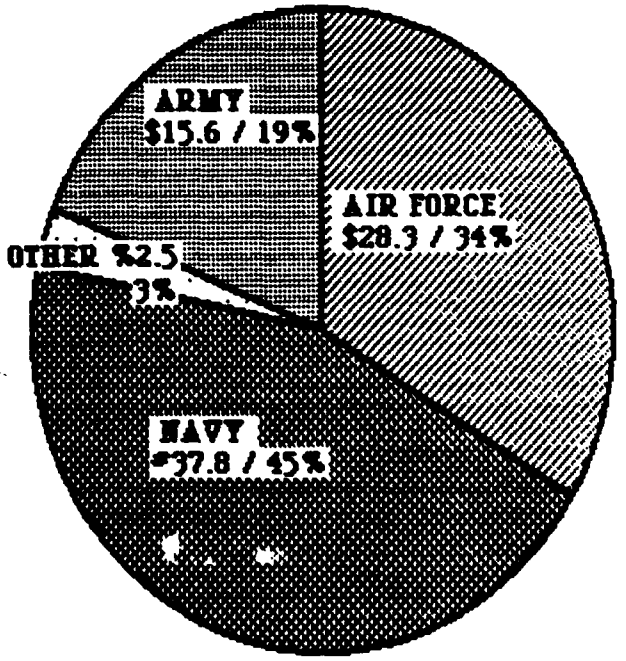
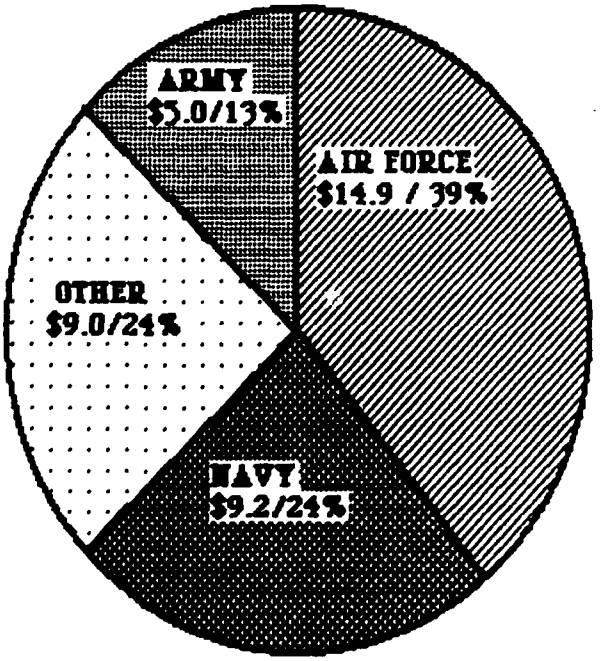


figure 1

Funding Overview for FY89 Total DoD RDTE and Procurement Budgets.

FY 89 TOTAL RDTE $38.2 B



FY 89 TOTAL PROCUREMENT $80.0 B

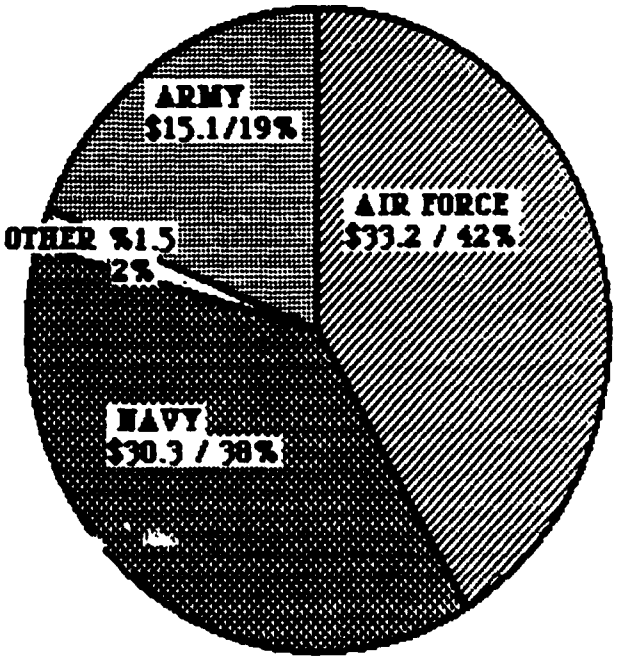


figure 2

The environment in which the Army operates is second in importance to budgetary matters. Consider the opinions of Jeffrey Record, a senior research fellow at the Hudson Institute.

> "A large, firepower-heavy US Army can no longer be taken for granted. The issue is not whether the Army can survive the present defense budgetary retrenchment (it can and will), but whether it can adapt effectively to probable future ground warfare requirements of the United States"

Four major factors will shape the Army's future. First, our nation seems to have extreme sensitivity to changes in US military commitment to NATO and the European's defense. This will re-shape our concepts for ground warfare and the role the US Army will play in the future. A multi-faceted change (diplomatic, political, macroeconomic, defense budgetary and demographic) has begun on both sides of the Atlantic. These collective pressures may lead to significant reductions in our commitments to our allies by the year 2000.

The second factor is the Army's inability to respond rapidly in force to many overseas contingencies. The Army's most ready combat units depend on intercontinental military airlift and sealift, which the other services provide. And frankly, it seems the other services do not see air and sealift as their highest priorities. The Air Force's C-17 has yet to be fielded and the Navy's 600-ship goal concentrated on the formation of carrier and battleship task forces rather than on vessels designed for quick on loading and off loading of Army vehicles. The third factor is the Army's limited ability to operate in many Third World countries. The United States is not welcomed

nor can it secure military access to many regions of the globe during peacetime. Finally, the fourth factor impacting on the Army's future is its lack of a political constituency and popular support. The Army has an image problem. It is usually the last of the uniformed services to fill its recruiting needs. Whereas the Navy and Air Force present hi-tech images of individual pilots becoming "Top Gun"; the Army fails to recruit the top high school graduates due to its low-tech image. Only recently has there been the emergence of a political force in the Congress supporting an Army agenda. The self-proclaimed Army reform caucus pales in comparison to the clout which Navy, Air Force, or Marine lobbying groups wield.[8] The Army reform caucus's primary failure is because of its newness. But it has not been effective in championing Army-related initiatives as has groups lobbying for naval or air force concerns.

The environment in which the Army must operate is unique. This environment shapes not only the way this organization deals with Congress or with the American people but also with how it deals with its sister services and the armies of U.S. allies. The Army, when compared to the other services, seems to wait longer for new equipment modernization. The Army seems to be the target for personnel and budget cuts whenever the DoD must trim its budget (for example, the last cuts in officers has come at the expense of the Army). And, the Army is usually the last service to be chosen by our young recruits entering military service. Becoming an

[8] Jeffrey Record, "The Army's Clouded Future" Washington Post Dec 88.

infantryman does not seem to have the same "sex appeal" as does joining an Air Force wing or the Navy's submarine force.

How does the Army function given its size and the environment in which it must operate? What is the internal environment like within the Army? How could computer-based group networks help with the internal efficiency and effectiveness of this bureaucracy, the Army?

Recently the Army has begun to study how structure, size and environment are intertwined and interrelated. The Army has been studying leadership and management since its beginnings. Volumes have been written on leadership down in the trenches --- at the squad, platoon, and company levels. Military histories have outlined leadership traits, addressed the question of charisma, and document extensively the strengths and weaknesses of men in command like Eisenhower, MacArthur, Patton, Bradley and Marshall. But it has taken until 1987 to publish a manual on leadership and command at the senior executive levels written not as a biographical sketch but rather as a theoretical model for command. Within this manual we find the following remarks on structure:

> "Structure gives the organization its form, establishing the manner in which tasks are accomplished. Normally, the operational structure of an organization is a composite of formally established means of organizing unit activities -- its formal structure -- and the day-to-day ways soldiers and units actually conduct their business -- the informal structure.

> The closer the formal and informal structures match, generally, the greater the unity of effort and effectiveness of the organization. In addition, in good organizations the informal structure provides the means for organizational change -- an inherent ability to innovate and adapt. A close look at formal and informal structures will highlight their importance."[9]

The next section of this chapter will address what is meant by the formal and the informal structure of our Army. The complexity of these structures lend themselves to the application of computer-mediated communications.

B. Complexity, Formalization, and Centralization

Complexity. Complexity takes several forms: horizontal differentiation, a measure of an organization's division of labor; vertical differentiation, referring to the hierarchical configuration of the organization; and spatial dispersion.[10] The US Army scores high in all three categories. It is made up of hundreds of different military occupational specialists (MOS) and civilian job series. The Army's vertical differentiation serves as a model for any large complex bureaucracy. The chain-of-command starts with the President, includes the various theater Commanders-in-Chief, and then there are approximately seventeen layers of hierarchy to the lowest soldier. As for spatial dispersion, Army personnel are stationed on every continent (with the greatest concentrations in Europe and North America). To borrow a British slogan --- "the sun never sets on the US Army". The Army is

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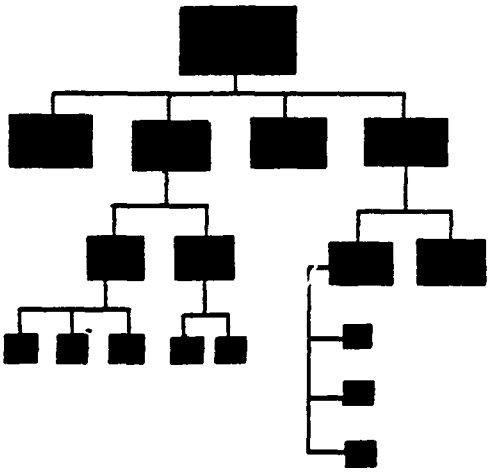
[9] FM 22-103 Leadership and Command at Senior Levels, June 1987, HQDA, p. 51

[10] Paraphrase of Hall's summary remarks on complexity, op. cit., p 93.

perhaps the foremost example of a complex structure. It is probably the most fully developed complex organization in the world.

Figure 3 represents one level of the formal hierarchy. The full hierarchy would consist of many more layers of this type.

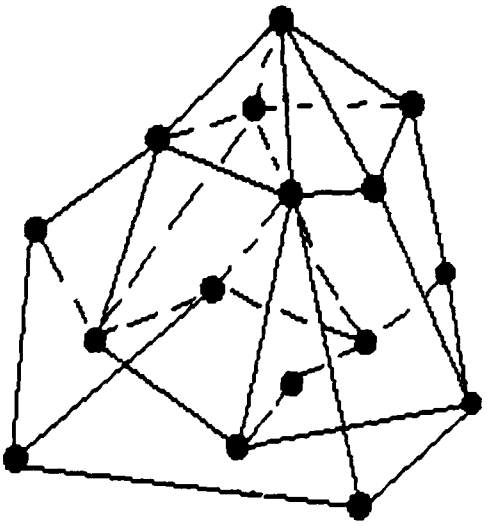
Figure 3: THE FORMAL ORGANIZATION



The flow of information within the formal organization is supposed to follow the lines which connect each suborganization or box. Consider this formal structure to represent one battalion or one hospital or one research laboratory or one departmental staff within the Pentagon. Place seventeen layers of this formal organization above or below the present one. If you then measure the speed at which the information flows through all the links (along the lines between each box) one begins to appreciate the complexity of the formal organization.

The informal organization is a complex structure as well, as represented in Figure 4. This structure could be the telephone links between all the offices within the formal organization or this informal structure could represent the human relationships within an "old boy network". This informal organization might even represent how the non-commissioned officers within the Army oversee and direct all that goes on in the day to day affairs. The informal organizational structure represents information flows that do not necessarily follow the paths of the linkages in the formal organization, as illustrated in figure 3.

figure 4: THE INFORMAL ORGANIZATION



The informal organization is complex in its own ways. Informal organization will be discussed when we examine the organizational processes of the Army.

Formalization. Formalization is multi-faceted. The process of determining what each soldier does within his or her unit is tied to a set of formalized Army regulations and standing operating procedures (SOP). Many of us envision an army of clerks manning most governmental offices. These clerks go by the book and are allowed little discretionary authority. Luckily, the US Army is attempting to lessen the effects of formalization. With the US Army, there are various degrees of formalization superimposed upon the seventeen layers of complexity.

The degree of formalization within an organization indicates how its decision makers think of or regard subordinate members. If subordinates are thought to exercise good judgment and self control, they will be empowered and formalization will be low. If subordinates are incapable of making their own decisions, a large number of rules to govern their behavior will be found. "Formalization involves control over the individual and thus has an ethical and political meaning in addition to being a structural component."[11]

The US Army has come a long way since blind obedience and a lack of discretionary authority were the norm. The Army's doctrine of today is called AirLand Battle doctrine. This doctrine's four basic tenets are: initiative, agility, depth, and synchronization. The first two, initiative and agility, dictate the Army's need for less and less formalization. Based on my observations made over ten years in the Army, it is my opinion that some

[11] Hall, ibid., p. 95.

officers claim that doctrine is only a warfighting doctrine, applicable only to those units in the combat subsystem of the Army. But, as the Army's leader-managers prepare for war, we can find today new policies that allow subordinates greater flexibility in their duties. For example, the Model Installation Program is an Army-wide attempt at identifying and eliminating barriers to installation and post commanders' attempts to do their jobs. If a commander or staff officer can do it better than the prescribed or formalized way, this program permits and encourages the local authorities to try the new methods.

In short, increased formalization "threatens professional autonomy... [and]... it is in these relationships that a potential source of conflict between the professional and the organization can be found."[12] Over formalization may result in decisions being "kicked upstairs", talented people leaving the service if a better offer is available, or in professionals avoiding service within the Army in the first place. These are structural concerns which hamper the effectiveness of the organization.

Centralization. Centralization is defined by Jerald Hage as "the level and variety of participation in strategic decisions by groups relative to the number of groups in the organization."[13] Therefore the measure of centralization or decentralization within the Army depends on how well both

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[12] Richard H. Hall. "Professionalization and Bureaucratization", *American Social Review*, 33, no. 1 (February 1968), p 102.

[13] Jerald Hage. Theories of Organizations. (John Wiley & Sons: New York, 1980) as quoted by Richard Hall in Organizations: Structure and Process, p 114.

the formally and informally structured organizations seek out and use input from all those boxes and nodes found in figures 3 and 4. Accordingly, centralization might be measured as the extent to which there is interaction among the boxes and nodes in the formal and informal structure. A highly centralized organization my tend to make decisions at or near the top of the structure. A decentralized organization is more likely to push the decision making responsibilities down to the lowest level possible.

To label the Army as a centralized or a decentralized bureaucracy is difficult. Because of the formalization resulting from Federal Acquisition Regulations, DoD Directives, Army Regulations, and the Uniformed Code of Military Justice, much of what the Army does in its day to day affairs indicate a tendency toward centralized control. In areas where professional judgment are exercised -- e.g. within the Health Services Command or the Army's Laboratory Command -- the Army displays signs of decentralization. In combat, the level of control tends to favor the fellow closest to the actual fighting. The Army tends toward greater decentralization in war than in peacetime. In peacetime there is greater emphasis on predictability and control. Many have written about the "top heavy" Army and of the colonels who work in staff officer jobs with a narrow focus but with very little power.[14] The degree to which this is true or false is a question of the centralization or decentralization of authority and power.

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[14] I'd recommend Chapters 6 and 7 in Edward N. Luttwak's The Pentagon and the Art of War (Simon & Schuster: New York, 1985) which are entitled, "The Officer Surplus and the Research Merry-Go-Round" and "The Officer Surplus and the Decline of Leadership".

Complexity, formalization, and centralization affect the structure of all organizations. The Army is is no exception. Its complexity rivals that of any multinational conglomerate (five times larger than IBM with ten times the assets). Its formalization surpasses that of most law enforcement agencies (police forces call themselves para-military organizations and imitate the armed services). And the Army's tendency toward centralization seems at times to be taken to the extreme.

The Army currently faces declining resources which place new demands for increased efficiency in how it spends its discretionary funds. It also needs to improve its efficiency as the technologies of its weapons become more complex. The Army's complexity, high degree of formalization and its centralization may also be inhibiting its communications. Will teleconferencing improve the formal and informal communications? Has the environment change to an extent which warrants a re-organization? Have the technologies of command, control and communications changed to an extent which makes old procedures obsolete? The use of computer-based teleconferencing may be a tool which leads to less complexity, less formalization, and decentralization. If so, then the use of teleconferencing may facilitate change in the structure of the Army in a way that is supportive of a more adaptive warfighting doctrine and war preparation policies.

III. ORGANIZATIONAL PROCESSES

Size, the environment, complexity, formalization, and centralization affect the formal and the informal organizational structure. Organizational structure establishes the foundation and framework in which actions take place. Organizational processes guide how personnel within the organization act. Whereas an organization's structure appears to be static on a day to day basis, organizational processes are dynamic. These dynamics, actions, or processes can also be categorized as either formal or informal. Within the structure of an organization, personnel either adapt or innovate. Those who adapt seem comfortable with the formal processes. Those who innovate seem comfortable with the informal processes.

A. FORMAL -- "In Accordance With Regulations"

The Army's field manual for Leadership and Command at Senior Levels lists the following principles that maximize effectiveness within the formally organized Army:

> "* Unity of Command. At every level in organizations, there is only one source of authority. All effort is directed toward ensuring that orders and guidance flow from the established authority.
>
> * Chain of Command. A clearly established line of responsibility carries with it the authority to reward, punish, command, and direct units and subordinates, whether they are officer, noncommissioned officer, or civilian.

* Standardization of Functions. Standardization exists in the required performance of all activities, regardless of the person performing the task. Such standardization makes planning possible because the functions being performed are assumed to be predictable and replaceable if lost.

* Specialization of Functions. All members of the organization learn specific tasks and are assigned particular jobs. Then each soldier executes his responsibilities with a minimum of additional training or effort.

* Clarity of Task Specification. Detailed specifications for each position within the organization provide the ability to know what to train for and how to employ soldiers and units.

* Line and Staff Functions. Accomplishing planning and execution functions requires a division of labor. Staffs complement the line by assisting with necessary planning and support functions."[15]

The objective of this formalization of processes is to build a reliable system upon which others can depend as they perform their own tasks. Within the ideal formal Army, everyone acts in accordance with (IAW) regulations and standing operating procedures (SOP).

When a superior asks or orders a subordinate to do something he is exercising power. A conflict occurs only if there is a disagreement with the subordinate's willingness to obey. Within the formal organization, power for the most part rests with rewards and punishment. Leadership and decision making rest with those in authority. Those in authority have all the power.

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[15] FM 22-103 Leadership and Command at Senior Levels, June 1987, HQDA, p. 52.

And through their orders and directives they communicate what they feel is best for the organization as a whole. Within the formally prescribed procedures, change and innovation are limited to doing something better but not something different than is accepted or IAW the SOP.

B. INFORMAL -- "Guys/Gals Who Really Know"

In the informal organization, power rests with the expertise people bring to the job, guys and gals who really know as Robert Mueller terms it, "GWRK".[16] Within the Army, this means that commanders and their staffs should not be as concerned with how the boxes and lines are drawn (see figure 3). But rather, they need to pay attention to how their desires and objectives are being communicated along the links within the informal organization (see figure 4). This is not to say that the informal communications process can be controlled. It's just more responsive.

The Army's official manual on senior leadership acknowledges the role of the informal structure:

> "Try as they might, senior leaders or commanders cannot totally influence the informal structure. The size of the organization and its complexity ensure that there will be a network of smaller groups. When these smaller groups undergo common experiences as part of the larger organization, many values and standards are similar. However,

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[16] The acronym "GWRK" is taken from Robert K. Mueller's Corporate Networking(Free Press· New York, 1986) Mueller's chapter 1 explains "How to Tap Expert, Unconventional Wisdom: GWRK". Although his book speaks of networking as largely an act of maintaining an up to date rolodex file and calling upon GWRK when needed, the concept of talent banking or cataloguing expertise is key to improved staff work.

> general organizational activities can also lead to unique experiences....[When] formal and informal structures are complementary, senior professionals enhance effectiveness by working through the informal structure because it supports the aims and rationale of more formal systems. They know that the values and standards exhibited will more quickly impel action because they have been internalized."[17]

This synchronization of the formal and the informal processes is key. The closer the two can come to matching, the better things work within the organization.

When the commander of a unit, "the old man", asks or suggests that a subordinate do something he also is exercising power. A conflict again occurs if there is a disagreement with the subordinate's desires and those of the boss. Within the informal organization, power rests with whomever holds the trust and confidence of the group. This may be a seasoned veteran or a young soldier with a good sense for what it will take to motivate his or hers peers. Leadership and decision making rests with the GWRK. Those in authority share the power with the person or persons who have situational authority as a consequence of their expertise. Through the climate they set and through their actions they communicate what they feel is best for the organization as a whole. Within the informally prescribed processes, change and innovation are likely to occur on a routine basis. If the SOP or regulations make no sense, then the informal norm is to ignore the SOP or regulation and just get the job done. How many times have you heard the expression, "What the boss don't know won't hurt him"?

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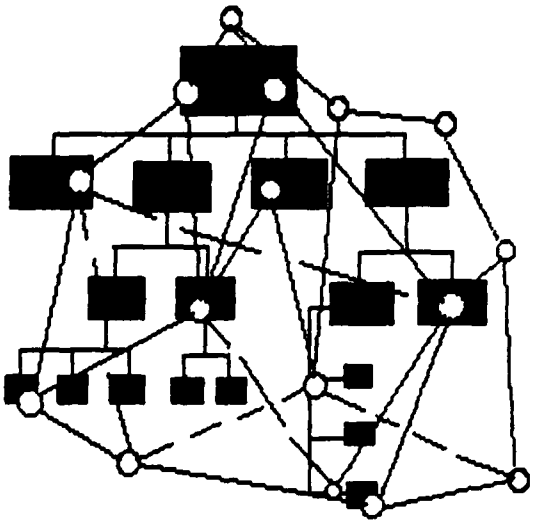
[17] FM 22-103 Leadership and Command at Senior Levels, June 1987, HQDA, pp 53-54

C. The Parallel Organization

Within the computer and information management community, networks are things. They are local area networks (LAN) or they are communications networks like the ARPANET and BITNET systems or they are ETHER networks with shared processing capabilities. The parallel organization or network is not a thing, it is a process. Figure 5 depicts the parallel organization. This organization is greater than the sum of the formal and informal structures and processes describe above. The parallel organization is a network of individuals. The parallel organization represents the path of least resistance. Individuals within a parallel organization know what doors to open, which offices to avoid and which procedures can be by-passed.

Figure 5: THE PARALLEL ORGANIZATION



Notice that in the parallel organization the boxes and the nodes do not necessarily line up. Some offices may hold personnel who do not matter at all to the question at hand. Some offices may be filled with personnel no longer serving a productive role in the organization. Many lines or links cross or skip over layers within the hierarchy. Some of the nodes and links are outside of the boundaries of the formal structure. This is because friends, family, and associates outside the organization can and do help those within the formal and informal structures. There is so much going on within the parallel organization that we cannot notice nor attempt to capture what's happening inside it. The parallel organization is akin to an organization s climate or culture. But it is more than the environment within which people work. The parallel organization is the closest thing to real organization we can imagine. It recognizes the formal and informal yet is bound by neither. Changes in organizational processes seem to start in the parallel organization.

Throughout the remainder of this paper, I will use the terms parallel organization and network interchangeably. Computer-based teleconferencing or computer-based networks are shaping the US Army as tools used within the parallel organization. The parallel organization includes both the formal and informal structure and processes. It is, therefore, greater than the sum of the organization's parts. The synergism within the U.S. Army's structure and processes go beyond ceremony and mission accomplishment. The Army's workers are now linked interdependently in a parallel structure

using computer-based tools to act upon the formal and informal processes involved in the Army's preparation for war.

Within the parallel organization, unity of command and the chain of command are improved upon because the meaning of the message communicated through the parallel organization is less likely to be distorted or filtered. Clarity of purpose and standardization of function are enhanced because within the parallel organization more people know what can be achieved and who is best able to do what needs to be done. And if those working within the parallel organization do not have the required expertise, they reach out and attempt to incorporate those who are expert into process. The next chapter examines how knowledge laborers and knowledge workers within the formal, informal, and parallel organizations contribute to the decision making process.

IV. LABOR vs. WORK

Frederick Herzberg claims that, "people labor to avoid the growing pains of depravation, while they work to create products that express growing levels of ability."[18] To Dr. Herzberg and others, "... labor is related to the cyclical ... nature of man; it produces objects which are essential to life but are immediately consumed." Work, on the other hand, "is a function of man the fabricator. Its products are lasting and are the source of satisfaction in themselves ... Labor is private activity; it leads to no increase in renown for the individual. Work is public, and its fruits are productive of history and of individual reputation."[19] Productivity within the realm of the laborer is measured using terms of efficiency. Productivity within the realm of the worker is measured using terms of effectiveness.

In the traditional sense, a division of labor was made between the manual and the mental. Machines began to replace man first in areas of manual labor and then in the more mundane mental tasks. This replacement devalued the skills which these laborers possessed. Those manual and mental skills which can not be automated retain their value. We automate those activities which are labor intensive thereby improving on the efficiency. In this age of information we find that managing "blue collar" versus "white collar" personnel still apply for measures of efficiency and

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[18] Frederick Herzberg. "Maximizing Work & Minimizing Labor" *Industry Week*: 13 October 1980.
[19] Herzberg. Ibid. As cited from his The Motivation to Work (John Wiley & Sons: New York, 1959).

effectiveness still exist --- though the line between these may be clouded at times.

A. "Blue collar" vs. "White collar"

Within the structure and processes of the Army organization, the Army must continue to perform its preparation for war and deterrence missions. Within the Army there are laborers (consisting mainly of enlisted and lower paid civilians) and workers (including sergeants, officers, and higher paid civilians). The laborers are those who perform the "blue collar" jobs --- i.e. they do "the grunt work": they carry rifles, drive tanks, work in the mail room sorting the massive amounts of paper, they drive trucks, supply the force with food, fuel, and spare parts. Their labor is largely manual or menial in nature. The workers are those who perform the "white collar" jobs: they do "the brain work", they lead those carrying rifles, command tank formations, devise new electronic message systems to replace the paper-based distribution, schedule the transportation to deliver supplies most efficiently, and they are involved with improving the rations or fuel economy or they work on improving weapon systems. The Army's workers do the mental tasks though they at times can be found pitching in on the menial to set the example or to cover a back log. The laborer is bound by procedure. The worker is oriented on his or her product. These distinctions between labor and work are key.

How do we motivate laborers and workers? We manage laborers but lead workers. Frederick Taylor's rules of scientific management apply to laborers for their output is predictable. Taylor's ideas on scientific management reduces processes down to their simplest tasks or component parts. "Under scientific management the 'initiative' of the workmen (that is, their hard work, their good will, and their ingenuity) is obtained with absolute uniformity and to a greater extent than is possible [without scientifically organized craftsmen]."[20] Workers and craftsmen had more autonomy before Taylorism took effect on the production line. Under Taylor's scientific management, "The manager assumes, for instance, the burden of gathering together all of the traditional knowledge which in the past has been possessed by the workmen and then of classifying, tabulating, and reducing this knowledge to rules, laws, and formulae which are immensely helpful to the workmen in doing their daily work."[21] Taylorism does not work as well with workers in today's organizations. The rules are different now. Generally speaking, people will avoid labor and welcome work in their day to day activities. Automation and computers have reduced the number of labor-intensive tasks which once were scientifically managed as Taylor envisioned.

B. "Knowledge laborers" vs. "Knowledge workers"

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[20] From Frederick W. Taylor's *Principles of Scientific Management* as quoted in Critical Studies in Organization and Bureaucracy edited by Frank Fischer and Carmen Sirianni. (Temple University Press: Philadelphia: 1984) pp 71-78.

[21] Taylor. ibid. p. 78.

The Army's staffs are composed of both laborers and workers. Staff personnel deal with finding, processing and communicating information. As such they work with or manipulate knowledge. They are, therefore, either "knowledge laborers" or "knowledge workers". Those staff functionaries who repeatedly deal with manipulating data share many of the characteristics of laborers. Staff personnel who create courses of action, solutions to the numerous military problems of the day are more like the workers.

Examples of those considered knowledge laborers are: administrative officers, quality control inspectors, procurement clerks, and/or safety and occupational health specialists. These laborers are primarily concerned with the format and handling instructions found in the Army's administrative regulations, with making sure a product meets a pre-established specification, with following the codes outlined in the Federal Acquisition Regulations, or in maintaining the materials safety data sheets so as to comply with safety codes. Knowledge laborers have little discretionary authority. The knowledge laborers are quasi-professionals.

Examples of those considered knowledge workers are: intelligence officers, production engineers, designers, and/or program managers. These workers are primarily concerned with the analysis of information or the creation of new knowledge turning data collected from sensors into intelligence reports, involved with the design and use of computer-assisted manufacturing or computer-assisted design, and/or the management of resources so as to field new weapon systems. Knowledge workers have discretionary au-

thority. The knowledge workers are true professionals in that they apply discretionary judgment rather than rely on a programmed or regulated response.

In the age of information, this means we need to examine the staffing techniques used within the Army. Knowledge laborers and knowledge workers view their work differently. The laborers "act on" the product whereas the workers "act with" it. To improve on the productivity of the Army's staffs, managers should try to "turn as many laborers as possible into workers".[22]

C. "Automated" vs. "Informated"

The transition from laborer to worker involves a number of subtle yet key steps. Earlier I said that laborers "acted on" their work whereas workers "acted with" it. Another key step toward becoming a worker is found when the individual laborer begins to question the procedure he or she is following. Thinking about how things could be done differently or better has not been part of the laborer's function. Taylorism helped to build the managerial structures needed to organize and achieve greater efficiencies. Now with greater knowledge of the system any worker can access the kind of data that includes him in the process of improvement. Management has had to pay attention to a number of measures within a large system.

[22] Herzberg. Ibid.

Compiling this data makes it subject to systematic analysis and may yield new insights into process or product improvements.[23]

In the information age, this enormous effort on the part of management may not be as cumbersome as it had been in the past. As we automate more and more of our labor-intensive functions, laborers move toward becoming knowledge laborers then toward becoming knowledge workers. They change first from being a manual laborer to becoming a mental laborer. They still are "working on" or "doing something to" the product. They react to automated processes. As a knowledge worker, they first develop know how and then challenge the procedure which at one time governed what was "done to" the product. Now they "work with" not on the process. A worker is proactive when he changes the procedure to better it. Knowledge laborers tend to favor the formal organizational structure and processes. Knowledge workers handle the informal structure and processes. The laborer adapts while the workers understanding of the process allows them to innovate.

As work becomes more abstract and dependent on understanding the process rather than just working as a laborer, future Army managers must recognize and adapt to these changes. With the development and growth of the staff worker comes a need for new leader-manager skills. A new organizational view is also needed. The new knowledge worker knows more about the organization to which he or she belongs. Shoshana Zuboff claims that:

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[23] Zuboff. op. cit. p 302.

> "... [Information] technology is characterized by a fundamental duality .... On the one hand, the technology can be applied to automating operations by replacing the human body with a technology that enables the same processes to be performed with more continuity and control. On the other, the same technology simultaneously generates information about the underlying productive and administrative processes through which an organization accomplishes its work."[24]

Information technology allows many more people to see through the activities that had been previously hidden or partially hidden before. Zuboff coins a new word to explain how new information technologies supersede the traditional automation process. Her new word is "informate". And she claims that, "Activities, events, and objects are translated into and made visible by information when a technology informates as well as automates."[25] Knowledge workers see and understand more about their organization than do the laborers of yesterday. Today and tomorrow's Army leaders will have to understand what is meant by working within an "informated organization".

So what will an informated Army look like? How will such an army function? What will be the values and norms within such an organization? Applying Zuboff's logic, an informated Army would promote "the possibility of useful learning among all members and thus presupposes relations of

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[24] Zuboff. op. cit. p 10.
[25] Zuboff. op. cit. p 10.

equality." This does not mean that all soldiers or civilians within the Army assume identical orientations and capacities. In an informated Army each member has the right to learn as much as his or her can. An informated Army is an organization through which "information circulates, information to which intellective effort is applied ... [And] quality, rather than the quantity, of effort will be the source from which added value is derived."[26]

As computer-based telecommunications and computer-mediated decision making take hold within the U.S. Army, our understanding and application of "informated" processes will benefit Army readiness. Theoretically, the scope of each staff officer will enlarge. The purpose and meaning behind each order, instruction, or policy should become clearer to those who operate within an informated organization because they will know why such an order or policy was issued or initiated.

Computer-based teleconferencing cuts diagonally through the organizational structure of the Army. In doing so, the realm of the senior executive is shared with the mid-level manager. Likewise, the concerns of those in the middle and at the bottom of the organization are more apparent to the policy maker. Teleconferencing changes the workview of all concerned for it informates the organization. The powerlessness associated with being a laborer is transformed into an empowerment through knowledge. Laborers become workers, informed workers collaborate as co-workers, and the organization prospers.

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[26] Zuboff, op. cit. pp 394-395.

How do we quantify the benefits of establishing and working within an informated organization? What are the specific skills needed to function within such an organization? How do we capture the "added value" mentioned above? These issues and questions are addressed in subsequent chapters.

V. Staff Technologies: From Quill to The Smart Machine

From the Army's beginnings it has employed many communication techniques in order to get the word to all its soldiers. Face to face instructions, an order written in long hand and delivered by a trusted messenger, holding a "pow-wow" or "orders group", traditional conferences and symposia, bugle calls, the use of signal flags, Morse code, telephone calls, video and satellite hook up, the use of electronic mail, and the establishment of computer-based group networks --- these are but a few techniques a commander uses to control the organization. The commander and his staff choose one or more techniques in order to communicate their intent to others. The communication of the "meaning" of the message is key. As such, these techniques represent command and staff know how. In order to standardize staff communications, field manuals and standing operating procedures exist.

Field Manual 101-5: Staff Organization and Operations "prescribes basic doctrine for staff organization and operations. It is intended for use by staff officers in carrying out their duties and responsibilities as they assist the commander in accomplishing the mission.... [It] applies to operations in the field or in garrison, in peace or in war."[27] This manual serves as the

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[27] FM 101-5: Staff Organization and Operations. HQ Department of the Army. May 1984. p i. To the best of my knowledge this manual reflects the latest doctrine for Army staff relationships and functions. It is the key references used by staff officers throughout the Army. This manual contains an outline of the specific duties and responsibilities for each staff officer from chief-of-staff to veterinary officer. It is one of several key texts used at the US Army's Combined Arms and Services Staff School (CAS3) and Command and General Staff College.

bible" for the formal organizational structure and processes of the US Army. In FM 101-5, Chapter 4, entitled: Staff Activities, describes in eight pages the common functions and procedures used within a staff. The manual assumes that every staff position is full, every staff officer is trained and competent, and that if a staff officer follows the procedures outlined he or she will succeed at assisting the commander accomplish the unit mission. Little to no mention is made of the informal organization.

In real life situations, there may be vacancies in key staff positions. Inexperienced junior officers may be asked to function in jobs rated one or two levels beyond their formal training or rank. Informal teams are formed and shortcuts are taken to accomplish daily missions. Necessity and expedience cause new techniques to be invented and tried. Trial and error are more likely to be the norm than the picture presented in FM 101-5.

Student officers at any of the staff colleges or schools most likely would report that this manual reflects how things are done "in the school house" and not how things are really done in the field. The informal organizational structure and processes are missing. FM 101-5 does not mention the parallel organization. The lessons learned from the many years of staffing experience have not been captured in this manual either. FM 101-5 speaks very little of staff technologies.

In the 1984 version of this manual, "Appendix H: Emerging Staff Techniques and Procedures" consists of one page. This page explains that the

intent of the appendix is to share innovative staffing techniques and procedures which those in the field are using. Since the 1984 version of FM 101-5 was the initial publication, this page specifically called for "input from the field ... on the following suggested issues: maneuver control systems, microprocessing systems, teleconferencing, facsimile, and decision graphics."[28] This chapter will look at the techniques used by staff officers with a specific focus on how computer-based group networks and teleconferencing may help improve staff effectiveness and efficiency.

Teleconferencing is but the next step along the staff officers evolutionary use of communications tools and staffing techniques. Computer-based teleconferencing has evolved from other office automation innovations. Teleconferencing is a link between telecommunications and computer-mediated decision making. In order to understand this new staff technology, it is important to first understand a little about office automation..

Robert Hirschheim s book. Office Automation: A Social and Organizational Perspective, traces the evolutionary nature of these tools. He states, "there are presently four conceptual models through which office automation may be viewed, and which may be helpful in the implementation of computer and communications technology in the office: 1) Extension of

[28] FM 101-5. Ibid. p H-1.

Data Processing (DP) Tools, 2) Paperless office, 3) Knowledge worker support, and 4) Decision support."[29]

Office automation has been viewed as an extension of data processing. New hardware and software products bring new features to handling the processing of word or numbers. These tasks are highly structured and many times exclusively clerical in nature. Teleconferencing is more like the real office, interactive and constantly changing. The concept of a paperless office also focuses on basic clerical tasks. Handling information with the aid of computer-based tools such as word processors, electronic filing cabinets, and electronic mail; our savings are found in increased transmission speed and fewer pieces of paper having to be mailed, sorted, delivered, and read. Studies of the paperless office look at what is done and on the savings to be made by the application of modern technology to these tasks.

Through data processing and the electronic transmission of data the knowledge worker (usually a technical expert or professional) now has tools which allow these workers to manipulate information themselves. A new class of software (called groupware) can aid coworkers in composing, correcting spelling, and sharing documents. Groups can now work via computer conferencing. Finally, by combining telecommunications and groupware, decision makers are provided with tools that assist them in accessing and analyzing information. These tools support an unstructured or

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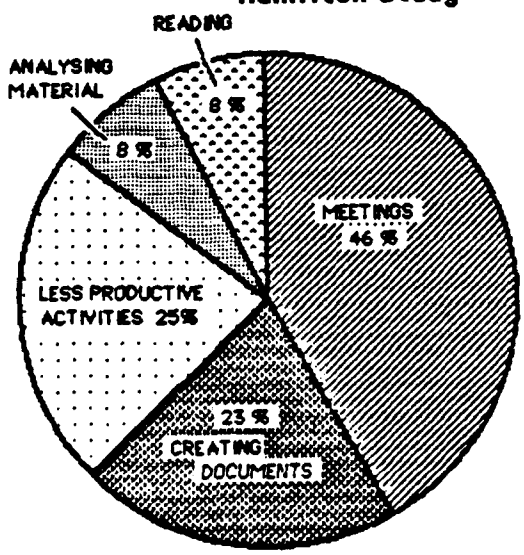
[29] R.A. Hirschheim. Office Automation: A Social and Organizational Perspective (John Wiley & Sons: Chichester, Great Britain, 1985) p 19

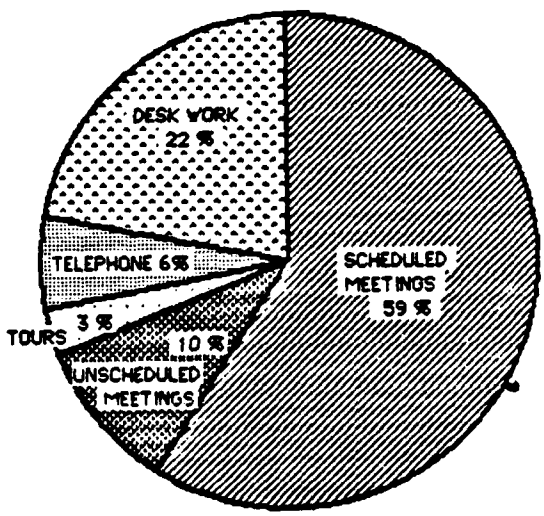
semistructured decision process. Expert systems and collaborative effort are now complemented by machine intelligence. Teleconferencing combines knowledge worker support concepts with those of decision science. The traditional literature on office automation explores the ways knowledge workers spend their time. The vast majority of time spent by staffers is spent in some kind of meeting. Figure 6 summarizes some of the best research.

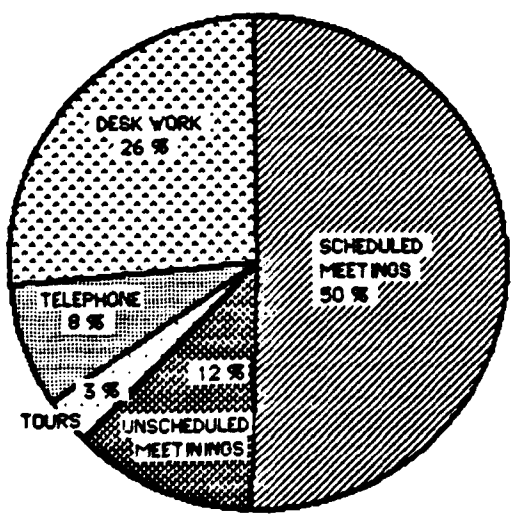
HOW KNOWLEDGE WORKERS SPEND THEIR TIME....

Poppel (1982) Booz, Allen, and Hamilton Study

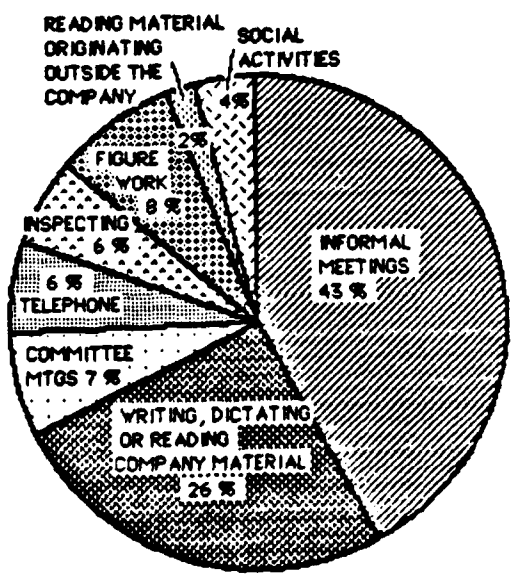


Managerial Work Distribution Mintzberg (1973)





Managerial Work Distribution Kurke and Aldrich (1983)



Managerial Work Distribution Stewart (1967)

Figure 6

A common proposition is that staff officers spend a lot of time on the telephone. However, much of that time is not productive. Knowledge workers who rely too much on the telephone find that they have difficulty reaching the other party with whom they need to do business. Playing "telephone tag" with the other party's office secretary or answering machine occupies a substantial amount of time. Time which is unproductive and slows the work process. In an in depth look at telephone use Dr. Hirschheim reports that:

> "... Studies have shown that over 50 percent of business telephone calls involve one-way communication such as calls to distribute or request information. This kind of communication does not require simultaneous contact and would seem to be precisely where electronic message systems are of value. Moreover, much of the simultaneous communication people engage in is of the 'social etiquette' variety which is ostensibly non-productive. Electronic message proponents also argue that a much greater proportion of office communication could be done just as effectively in a non-simultaneous mode, meaning a higher proportion of time could be spent communicating with more message to a variety of sources; so instead of the telephone where a message is delivered to one person, an electronic message can be sent to may people inside and outside the organization."[30]

We seldom think about this when we pick up the telephone. Perhaps the knowledge worker has been conditioned to use the easiest or most available staff technology. We could save time if we choose a more efficient staff technology. The use of the telephone may not be the best way to transmit

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[30] Hirschheim. Ibid. p. 211.

what we've got to say. How long a message can we send before the receiver starts to forget what's said? What are the potential impacts of using new communication techniques?

Dr. S. Roxanne Hiltz has done pioneer research in the use of teleconferencing. There are difficulties with directly comparing one communications technology with another. But, Hiltz does suggest that:

> "The number of words passed in a communication process is not a measure of the actual cognitive transmission of information. We do not have sufficient knowledge to quantify the relative efficiency of the transmission of information in audio form versus written form. We suspect that the more complex the situation under discussion, the more beneficial is the written form. We also suspect fewer words are needed in written form because what is transmitted receives a greater investment of prethought."[31]

Figure 7 identifies potential time savings by substituting computer-based telecommunications and teleconferencing for time spent on the telephone and in small meetings. If these potential savings are realized, a greater percentage of time could be spent on the more productive tasks needing attention.

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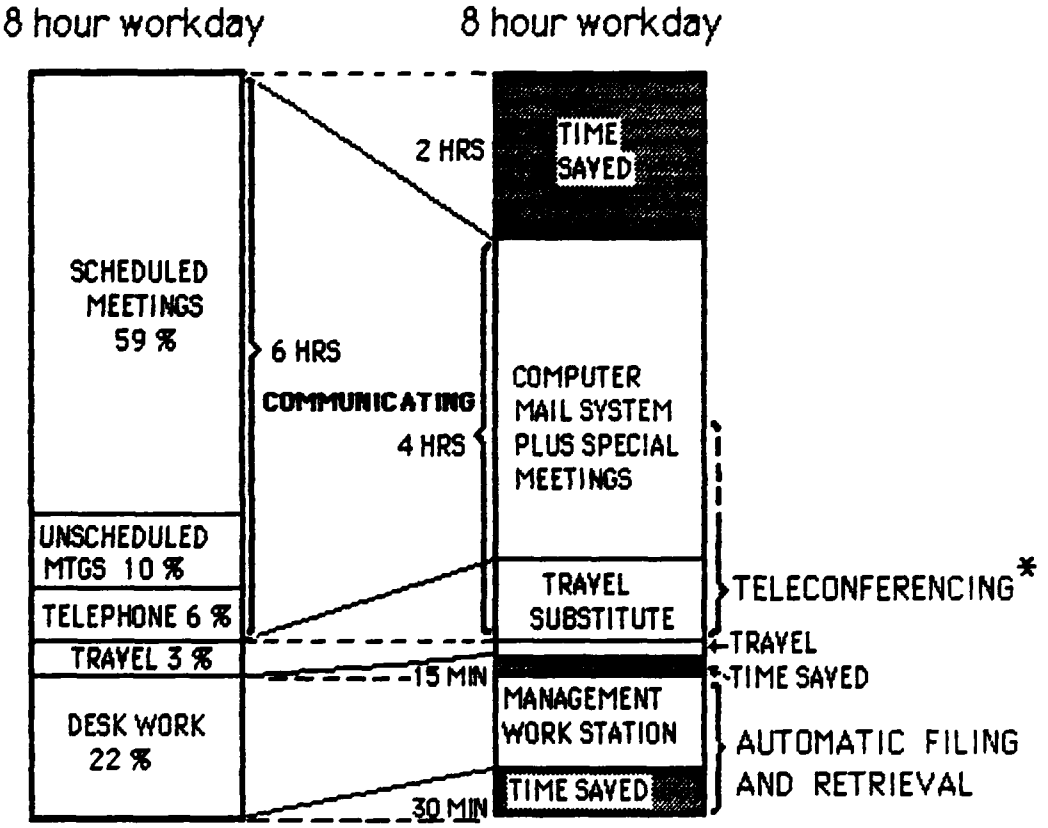
[31] Starr Roxanne Hiltz, THE NETWORK NATION: HUMAN COMMUNICATION VIA COMPUTER (Addison-Wesley: Reading, MA, 1978) p. 430

POTENTIAL OFFICE AUTOMATION IMPACT ON MANAGERIAL OR "WHITE COLLAR" PRODUCTIVITY

[from Hirschheim's OFFICE AUTOMATION: A SOCIAL & ORGANIZATIONAL PERSPECTIVE]



*** What's the potential impact of teleconferencing on Army Command and Staff procedures and functions?**

Figure 7

Computer-based teleconferencing may result in either a higher quality staff effort or in greater efficiencies. Since this thesis does not attempt to measure cost-benefits associated with substituting teleconferencing for other staff techniques, we will only present qualitative or subjective analysis in future chapters concerning such benefits. The next chapter will briefly outline the essential features of computer-based group networks and explains how this new staff technology may deliver on the potential savings found in figure 7.

VI. Essential Features of Computer-Based Group Networks

Computer-based group networks use computers to store, process, and transmit communications. Teleconferencing users type items on terminals or personal computers linked to a central computer. Packet-switching technology supports the integration of user inputs. If you imagine a meeting or a conference held without the limits imposed on it by time and space, then the power of teleconferencing becomes clear. Teleconferencing allows geographically dispersed individuals to communicate. Teleconferencing speed is superior to telephone, mail, and face-to-face meetings (when you figure in the time traveling to and from the meeting). A permanent record is kept in the form of conference proceedings. Teleconferencing is asynchronous. Time and space as barriers to communication are eliminated. People can participate at the time and place most convenient to them.[32] Through computer-based teleconferencing, knowledge workers can meet anytime, anywhere. This should allow for savings in travel and preparation for travel. Teleconferences can be held no matter what the time or time zone. This is especially important given the geographically dispersed nature of the U.S. Army.

This new staff technology results from a convergence of several technologies based primarily on computer science, communications theory, and information science. Although the Army uses video conferencing to

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[32] The most through description of the technology of teleconferencing is found in Elaine B. Kerr's and Starr Roxanne Hiltz's COMPUTER-MEDIATED COMMUNICATIONS SYSTEMS: STATUS AND EVALUATION (Academic Press: New York, 1982) p. 2.

attempt a linkage of separated officials, computer-based teleconferencing is quite different. First, teleconferencing differs from videoconferencing because users do not have to meet at the various television studios or stations at a prescribed time. Secondly, teleconferencing differs from video because the record can be later searched without having to recall the image or video picture. Text retrieval is easier than picture recall or video replay. Thirdly, teleconferencing allows for participants to work at their own pace. Teleconferencing resembles a written version of the telephone conference call. But again, teleconferencing allows for participation "at the user's convenience" and text items are stored in the computer for future reference. Items and responses from a teleconference may be copied or edited. Teleconferences allow latecomers to catch up with the business at hand and allows the user to take a break without missing anything.

A. System Elements and Technical Features

Kenneth Kraemer and John King have conducted a survey of all or nearly all such computer-based teleconferences as they relate to decision support technology. In their study they report that these computer conferences share the following components and features:

"ELEMENT	GROUP NETWORK FEATURE
Hardware	Offices; file servers and computer work stations; telephone; computer network.
Software	Interactive/asynchronous computer conferencing; terminal linking; real time meeting scheduling; shared bit map display.

Organizationware	Conference chair conducts meeting; item facilitators control particular agenda items; sponsor funds/directs network.
People	Participants (in two or more 'local' places); group leader(s)."[33]

As examples they list: the Massachusetts Institute of Technology's Laboratory for Computer Science and the networks --- RITAL and MBlink, the New Jersey Institute of Technology's Electronic Information Exchange System (EIES), NOTE-PAD, PARTI, and Wayne State University's CONFER II.

Kraemer and King introduced the term "organizationware" to explain what is now referred to by computer users and software producers as groupware. Groupware represents the rules or norms of the group of participants within each network much like the informal processes described in the chapter on organizational processes. But in this case, groupware is more closely tied to the teleconferencing system in question.

Peter and Trudy Johnson-Lenz define groupware as:

> "The processes and procedures used by the group ... plus software which supports and facilitates those procedures ... Effective group work in the electronic medium thus requires both explicit and intentional group processes and procedures and the software to support them. This union of group process and software support we call groupware to distinguish it from either process or software alone ... [Therefore the] GROUPWARE equation be-

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[33] Kraemer, Kenneth L. and John Leslie King. "Computer-Based Systems for Cooperative Work & Group Decision Making" *ACM COMPUTING SURVEYS.* Vol 20 No 2. June 1988, p 125

comes: GROUPWARE - intentional GROUP processes and procedures to achieve specific purposes + softWARE tools designed to support and facilitate the group's work."[34]

So the Army:Forum system and all its subgroups or networks comprise of its own hardware (the Amdahl main frame computer at Wayne State University linked by the telephone system to hundreds of personal computers or terminals), CONFER II software, its people (numbering over 1500 total participants[35]), and its organizationware or groupware (consisting of the norms and practices that the network organizers attempt to share and use within each teleconference).

The teleconferencing system which the US Army uses is CONFER II. The Army picked CONFER II in the early 1980s largely because the first users of teleconferencing heard of its power and liked its features. In a 1985 *BYTE* magazine review of computer conferences, Mr. Brock Meeks found CONFER II to be "the Ferrari of computer conferencing".[36] As the number of users grew, each familiar with the CONFER II system, a decision was made to stay with CONFER II, "a Ferrari", rather than retrain the users on another system, perhaps "a Chevrolet".

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[34] Peter and Trudy Johnson-Lenz's addendum to Kerr & Hiltz. Ibid. p 47

[35] The total number of participants logged into the Army:Forum system was 1549 on 22 December 1988. This number has fluctuated between 1500 to 1800 in the last three years. As each calendar year comes to a close, the inactive members of Army:Entry are drop-ped or scrubbed from the network. This turbulence is due to normal reassignments as well as subnetworks folding as their ad hoc or task force missions come to an end.

[36] Brock N. Meeks "An Overview of Conferencing Systems" *BYTE*, December 1985, p 184.

The most consistently cited negative comment on teleconferencing (as least on the Army network) seems to be that CONFER II's text editor is cumbersome. Other negative comments come from the system's baud speed of 1200 bites per second transmitted. If a user is accustomed to working at a higher rate of speed or it he or she dials into the network a peak time, then a few seconds may pass between when an entry is typed on the terminal and the software allows the participant to move on. Most Ferrari's are known to be a little temperamental and demanding users at time expect more than can be given by the packet-switching network.

B. Value-Added or Social Features

Without going too deeply into the pros and cons of CONFER II, here are many of the benefits or strengths of computer-based teleconferencing as viewed in a social context: (1) increased information accessibility, (2) increased people accessibility, (3) increased control over personal activities , and (4) increased individual contribution. Increased information accessibility provides search and retrieve capabilities. Getting information quickly and cheaply means not wasting time re-inventing the wheel. Electronic message systems allow the user to make non-simultaneous contacts. This is a great advantage given that many telephone calls fail because the other person is not available when called. Computer-based communications systems enables individuals to schedule when they wish to look at messages. Rather than having to be interrupted by the telephone

while trying to concentrate, computer teleconferencing saves your messages for when it is best to review them. Teleconferencing users spend more time on their primary jobs than do non-users. Secondary tasks can more easily be handled by placing the issue on-line. Delegation via a teleconference is easy because usually there are many people on-line who are willing and able to help out.

There are several other social advantages to computer-based teleconferencing. In "computerized conferencing ... only your words (which can be carefully considered and edited) are transmitted. Your appearance or other personal characteristics (or handicaps) or other nonverbal cues need not be known."[37] All users of teleconferencing are more equal than participants in a meeting. Rank, seating arrangements, and protocol do not get in the way of what needs to be said. It is also possible to send an anonymous message or respond to an item anonymously. Such impersonal comments are therefore considered on their merit rather than due to who said them. Starr Roxanne Hiltz claims that a teleconference user. can feel more free to express disagreements or suggest potentially unpopular ideas."[38]

Both the technical and social features of teleconferencing allow for improvements in organizational communications. Computer-based

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[37] Hiltz, Starr Roxanne. THE NETWORK NATION. op. cit. p 27.

[38] Hiltz, Starr Roxanne. THE NETWORK NATION. op. cit. p 27.

teleconferencing fulfills a social need for information flow that is uninhibited by organizational barriers. This relatively new technology connects individuals who would not have been communicating with one another under a more traditional organizational structure following traditional organizational procedures. Lessons learned by others can be shared with many users. The next chapter will present hypotheses on how teleconferencing might be impacting on the U.S. Army.

VII. Hypothesis: Computer-Based Group Networks Are Changing Army Command and Staff Relationships and Functions

To understand the impact of teleconferencing on the U.S. Army, we should understand a little about leadership and the change process. James MacGregor Burns writes of *transforming* leadership.[39] Warren Bennis and Burt Nanus advance James Burns' ideas by stating that "power is the basic energy needed to initiate and sustain action or, to put it another way, the *capacity to translate intention into reality and sustain it.* Leadership is the wise use of this power: *transformative* leadership."[40] And Rosabeth Moss Kanter defines the change masters as "those people and organizations adept at the art of anticipating the need for, and of leading, productive change."[41]

Jacob M. Braude said, "Consider how hard it is to change yourself and you'll understand what little chance you have of trying to change others." Multiple this difficulty with the factors mentioned earlier (namely resistance to change due to complexity, formalization, and centralization) and one learns that to change how the Army's staffs function is a colossal task. The mere size and complexity of the Army are barriers to effecting even the smallest change in how staffs operate. Traditions, standing operating

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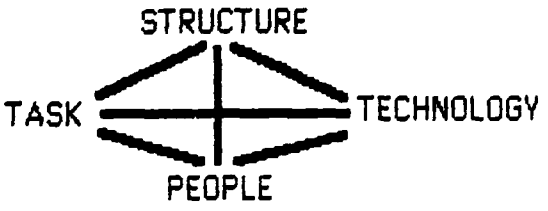
[39] James MacGregor Burns. Leadership (Harper & Row. New York. 1978) pp 141-256.
[40] Warren Bennis & Burt Nanus. Leaders: The Strategies for Taking Charge (Harper & Row. New York. 1985) p 17
[41] Rosabeth Moss Kanter The Change Masters: Innovation and Entrepreneurship in the American Corporation (Simon & Schuster, New York. 1984) p iii.

procedures, regulations, and inertia all inhibit change. Yet organizations do change, and must in order to adapt and survive in changing times. In the first half of this chapter, several models for change and what it takes to effect change within an organization will be discussed. In the second half, my hypotheses are that the use of computer-based group networks are changing the Army's command and staff relationships and functions for the better in relationship to our change models.

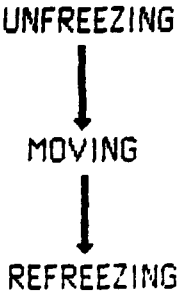
A. Models for Structural and Procedural Change

As we attempt to predict how computer-based teleconferencing will impact on command and staff relationships, we will need to test for leadership, changes in direction, power, responsibility, and the interaction among these factors. The Leavitt diamond model and the Lewin/Schein model allow for the conceptualization of these changes.

My hypotheses must somehow account for the dynamics of leadership, people, and organizational change. Two models for planned change which can help in the formation of the hypotheses are the Leavitt diamond model and the Lewin/Schein model found at figure 8. From these two models, teleconferencing should hypothetically alter the way the organization is structured. The use of teleconferencing will change the organizational processes as well.



Leavitt Diamond Model



Lewin/Schein Model

figure 8

The Leavitt Diamond model is based on four types of interacting elements: tasks, actors, technology, and structure. Tasks are what the Army's staff personnel do. A staff study is an example of such a task. Therefore, teleconferencing should affect how staff studies are handled within the Army. The staff technologies are the tools used to do the tasks. Teleconferencing should change how staffs use other staff tools/processes. Leavitt's use of term technology is linked to process. How staff officers process information should change as a result of teleconferencing. Leavitt claims that to change any one element will cause a change in the other factors.[42]

The Lewin/Schein model views change as occurring in three phases: unfreezing, moving, and refreezing.[43] Teleconferencing users served in the

[42] Hirschheim op cit. p 162.

[43] Hirschheim Ibid p 163

organization both before and after the introduction of this new staff technology. They know the Army as it was before teleconferencing "unfroze the organizational structure or processes. The teleconferencing user has experienced the "move" or change within the organization. And these users operate in an Army which seems to have accepted the change or at least has accepted the use of teleconferencing. Therefore, these users have seen or will soon see the "refreezing" process as a new organization, one changed by computer-based teleconferencing emerges. To ask a non-user what he thinks of the impacts of teleconferencing on the Army makes little sense for he has not experienced the change directly. Teleconferencing users are experienced enough to measure the unfreezing of stable behavior patterns, the moving or implementation of the new tool, and of measuring its result after refreezing. My hypotheses must examine whether the teleconference user will continue to choose to use this technology in his/her future work.

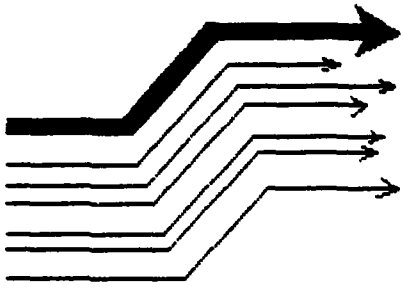
According to research done at the Center for Creative Leadership, the dynamics of change are based upon two components: leadership and creativity. "Leadership can be represented by a bold arrow, signifying a forward thrust. Creativity can be represented by a change in direction. These symbols can be combined in various ways to represent different leadership styles [or organizations]."[44] Graphically, these components could make up any number of organizations. Figure 9 shows three organizations to

[44] David Campbell Take the road to creativity and get off your dead end (Center for Creative Leadership Greensboro, NC, 1985) pp 106-107

illustrate the model. Within this model for change, "if you are both creative and leadership oriented, you will sometimes play both roles simultaneously [i.e. either supplying thrust and power or a new direction for others to follow] ... For maximum effectiveness, you should be able to play both roles, and do them well."[45] A study of teleconferencing should, therefore, examine the concepts of leadership, creativity, and organizational power. Teleconferencing should have some effect on both the direction and the magnitude of the organization.

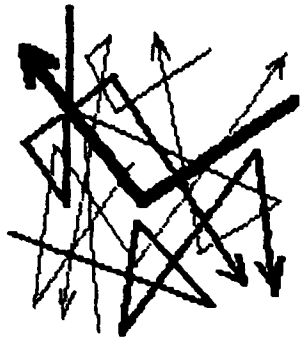
[45] Campbell. Ibid. p. 113.

STRAIGHT ARROW -- ORGANIZATION #1



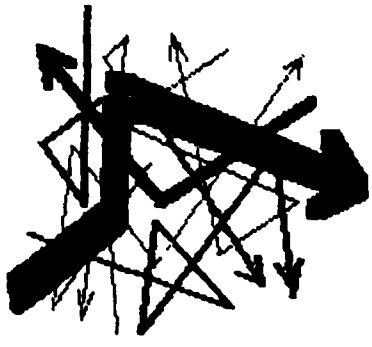
In Organization #1 the leadership is strong, and the people are conscientious and loyal, following orders from the top. When instructed to change directions, they do so quickly, firmly, and in concert. The result is a strong, united front capable of moving great distances quickly.

CROOKED ARROW -- ORGANIZATION #2



In contrast, Organization #2 is filled with creative people shooting off in all directions, and never powerfully, never organized, but in a continually exploring manner. They do not present any single, forceful front, yet they can be strong in their diversity; no matter which direction you look, someone is out in front.

COMBINATION -- ORGANIZATION #3



The most dramatic progress occurs when the strengths of both approaches can be combined, as in organization #3, where there is a creative person with the leadership skills to attract and guide others. Powerful, straight-ahead thrusts coupled with the broad coverage provided by a swarm of creative people -- who are particularly useful in helping the powerful leader decide when to change directions.

Figure 9

B. Hypotheses: Change as a Function of Teleconferencing

The primary focus of this research is in how computer-based group networks are changing Army command and staff relationships and functions. How do knowledge workers use this new technology? Do these networks increase over all effectiveness on the job by increasing staff officers access to information? Will staff officers feel empowered through the use of this technology? How will the staff officers' view of his or her work change by using teleconferencing?

Through computer-based teleconferencing power will be shared and leadership decentralized. Those who can use the technology will gain in responsibility and power. Staff work will be done more easily due to the use of teleconferencing and the inherent structure and processes of staffs will change for the better.

Therefore, I propose to examine the following: (H1) Teleconferencing is changing the organizational structure of the U.S. Army through increased efficiencies which may lead to reduced staff size; (H2) Teleconferencing is changing the organizational processes by empowering subordinates; (H3) Teleconferencing is changing the way knowledge workers view their work and organization by broadening their scope; (H4) Teleconferencing is making staff work easier due to increased access to information and more efficient use of staff personnel's time; and (H5) Teleconferencing is improving

overall effectiveness of the user on the job and subsequently this will improve overall command and staff relationships.

Furthermore, I propose that the strength of the relationships above are influenced by personal computer ownership, prior experience in computer use, rank, and by the amount of time a user spends on-line within the FORUMNET system. Personal computer ownership and increasing years of prior experience in computer use should strengthen the relationships in my hypotheses (H1 - H5). Differences in the age and rank of users should explain any generational relationships that affect my hypotheses. And finally, we should find that greater time spent on-line using the Army Forumnet system will result in stronger relationships within my hypotheses. These relationships in combination will improve the organization with the intent that the future U.S. Army will more likely resemble organization #3 as found in figure 9 rather than organization #2.

VIII. Methods--Survey Development and Data Collection

"Natural sciences talk about their results; the social sciences talk about their methods."

--- Poincare

One of the challenges of writing a thesis in technology and policy is that you can address either the science or the art (or both the science and art) of your topic. I must address the methods used in this research for they are rooted within the technology being studied. Background information was gathered from a literature search and on-line discussions using teleconferencing. Data was collected using an on-line survey.

A. What's in the literature?

The science of computer-mediated communications is well documented. Computer-based communications systems have been reported on through a number of trade and professional journals, books, and the popular magazines we see at the news stands. Teleconferencing shows up as an occasional topic in these same publications. Most of these articles and studies serve as guides for those wanting to purchase such technology for their firms. These articles and studies are filled with charts and tables and formulae covering system performance data or predictions. This literature has as its audience academia and business. The art associated with the application of a new technology has been largely ignored. It seems that once a technology has been chosen, then the "growing pains" associated with its use belong with the consumer.

Little has been published on the impacts of adopting a new staff technology within an organization as large as the US Army.[46] A literature search on the application of new military technologies documents how new weapons have changed the face of battle. Technology has been equated with high-tech weaponry not organizational change. Documentation on how the Army's staffs are organized and function exists in a few manuals from previous eras that focus on regulations and administrative procedure. Most of what is written focuses on tactical command, control, communications and intelligence (C3I) but little written on peacetime staff work.[47]

The Army has it own professional development bulletins and journals. The infantry, armor, field artillery, aviation, and air defense schools each support the sharing of professional thought on combined arms in their own bulletins. These journals focus on warfighting. The ordinance, quartermas-

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[46] Two books which do cover the impacts of technology on society at large were helpful. Each contained one chapter that supported my general research for this thesis. Military Enterprise and Technological Change: Perspectives on the American Experience edited by Merritt Roe Smith and published by The MIT Press: Cambridge MA, 1985 contains an essay by Susan J. Douglas entitled "Technological Innovation and Organizational Change: The Navy's Adoption of Radio, 1800-1919", pp 115-173. Susan Douglas looks at how radio, a new communication technology, was implemented and how it challenged a captain's traditional independence while at sea. Technology, the Economy, and Society: The American Experience edited by Joel Colton and Stuart Bruchey and published by Columbia University Press: New York, 1987 contains an essay by Derk Bruins entitled "Technology and the Military: The Impact of Technological Change on Social Structure in the United States Navy", pp 223-250. This essay addresses the social division between "officers-of-the-line" and the "technical officers" of the US Navy.

[47] A number of student papers on C3I can be found within the Defense Technical Information Center (DTIC) listings. LTC Alan G. Vitters' study project entitled "The Application of Microprocessor Technology in Enhancing Combat Unit Effectiveness" was completed in 1987 at the US Army War College, Carlisle Barracks, PA. It is one of the most recent such papers. It's focus on battlefield command and control is typical of the many papers on tactical staffing.

ter, engineer, and other support branches discuss logistics and combat support missions. The combat support and service support journals do cover the automation of staff and support functions more so than do the journals of the combat or fighting arms. Military Review is published at Fort Leavenworth, home of the Army's Command & General Staff College, and publishes a number of essays from those officers attending the college. Unfortunately, very little has been written on organizational structure or processes. The journal of the US Army's War College is entitled, Parameters, and the Army's executive policy and strategic thought is captured there. Again, there is little on organizational effectiveness or staffing techniques. Jane's Defense Weekly, the Armed Forces Journal, Army, National Defense and others---each published by private organizations with interests in national security focus on C3I or battle drills or training or strategy.

Why is it that so little has been written on staff relationships and functions? An overwhelming majority of the Army's time is spent preparing for war while at peace. Many would say that a focus on warfighting skills should be all that a peacetime army does. Some may add that the issue of "white collar" productivity should be reserved for professional development seminars or executive retreats. Since there isn't much in the way of literature within the Army on staff technologies, this afforded an opportunity to explore new territory. So I set off to investigate this concept called computer-based teleconferencing.

B. On-Line Discussions

I had to develop some way to gather data and feedback from the knowledge workers or staff officers within the Army. These staffers had to be familiar with the technology and with the Army's structure and processes. I had been active in several computer-based teleconferences during the last three years. I had also co-organized a subnet within the Army:Forum system called Army:Technet. Several teleconferences had been discussing related items within the Army:Forum system. But no one had yet captured the opinions of these 1549 users in an organized way.

The Army:Excelnet focuses on leadership and leadership training. Discussions on leadership in the information age have been placed here. Army:LESnet, a prototype network for assisting senior executives, developed a concept plan which was briefed to the Army's Vice Chief of Staff in 1987. As a direct result of Army:LESnet, a group study project was formed at the Army War College in Carlisle to investigate teleconferencing as a decision support system. Army:LEXSYS conducted a prototype conference during the 1987-88 academic year. The Army:LEXSYS group study project at the AWC continues to examine teleconferencing this academic year. Army:NetOrgNet is a group of teleconference organizers who share their knowledge of conference administration and lessons learned or tricks in using CONFER II software.

I joined each of these subnetworks. Then I entered items for open discussion that address staff officer duties, command and staff functions, as well as, questions on the role of a staff. Several test questions from the research of Starr Roxanne Hiltz[48] were entered onto Army:Forumnet. The items on staff skills, staff functions, and the questions on how teleconferencing impacts other modes of communication formed what could be at best described as a pilot survey. The responses I received from these items assisted in developing a seventy-question questionnaire[49] which was then to be placed onto the Army:Forum system. Appendix 1 contains a copy of this questionnaire.

C. Conducting the Survey

One of the features within CONFER II is the ability to choice which type of response is to be used within an item. Available are normal discussion responses, multiple choice responses, and several polling or voting options. One of the first questions I asked myself was how could I conduct a survey of teleconference users on-line and enable myself to do data analysis? Dr. Bob Parnes, author of CONFER II, came through here by aiding me in the format and survey administration. Dr. Hal Salzman assisted with the wording and format of the questionnaire.

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[48] S R Hiltz "Impact of a Computerized Conferencing System upon use of other Communication Modes" A study partially supported by a grant from the National Science Foundation (MCS-77-27813)

[49] A special thanks is due here to Dr. Bob Parnes and my thesis advisor. They each contributed to the final questionnaire in their own way --- Bob Parnes through his technical know how and Hal Salzman through his role as coach and devil's advocate

The questionnaire was posted along with a short bulletin asking for participants to type in "SURVEY" at a "DO NEXT?" prompt. Once a network user chose to complete the survey, the computer at Wayne State University recorded the seventy answers in a file. Complete anonymity was maintained. Within the data file, I'd receive 70 one-digit answers and a four digit alpha-numeric identification code. The ID code allowed me to guarantee that each participant only took the survey once and later afforded me the chance to "correct" three participants responses. They each had noticed keying errors or wanted to change their answers. If a participant did not answer a question, then a code "9" was assigned to this question as a missing value.

Since those who took the questionnaire were a self-selecting group, I worked with other net organizers on Army:NetOrgNet to encourage others to participate. A self-selecting group brings with it certain biases. By posting bulletins at the various subnets and by asking those who answered the survey to coax another associate to do so, two-hundred and three respondents completed the survey. A total population of 1549 participants existed within the Army:Forum system at the time of the survey; 203 users responded for a 13.1% participation rate. The respondents represent a cross section of the general population of the Army. This thesis presupposes that the users knows a little about teleconferencing. There was no attempt to include non-users in the survey.

IX. Results

The best way to introduce the survey results is to describe a composite picture of the participants. Let us first examine the independent variables: age, rank, job type, subsystem in which the users work, number of years of computer experience, personal computer (PC) ownership, whether a PC is used at the office, and how long the user spends on the Army:Forum system. Afterwards, we will look at the dependent variables related to organizational structure, processes, work, staff techniques, and effectiveness.

A. Independent Variables

1. Age of Teleconference Users

The average age of the teleconferencing users is 41 years (2.5 % of respondents were 25 years old or younger, 7.4 % were between 25 and 30 12.9 % between 31-35, 22.8 % between 36 and 40, 30.2 % at 41 to 45, 14.9 % at 46 to 50, and 9.4 % over 50 years of age). Those soldiers above the average are past the half way mark in a twenty year service career. Those older than 41 have attended all but their last formal military school or college. Officers over age 41 have most likely completed the Command and General's Staff College. Non-commissioned officers (NCO) over 41 have finished their advanced NCO training. Users over 41 years of age are about to enter the senior ranks of the Army. Figure 10 shows the frequency distribution or count in the form of a barchart.

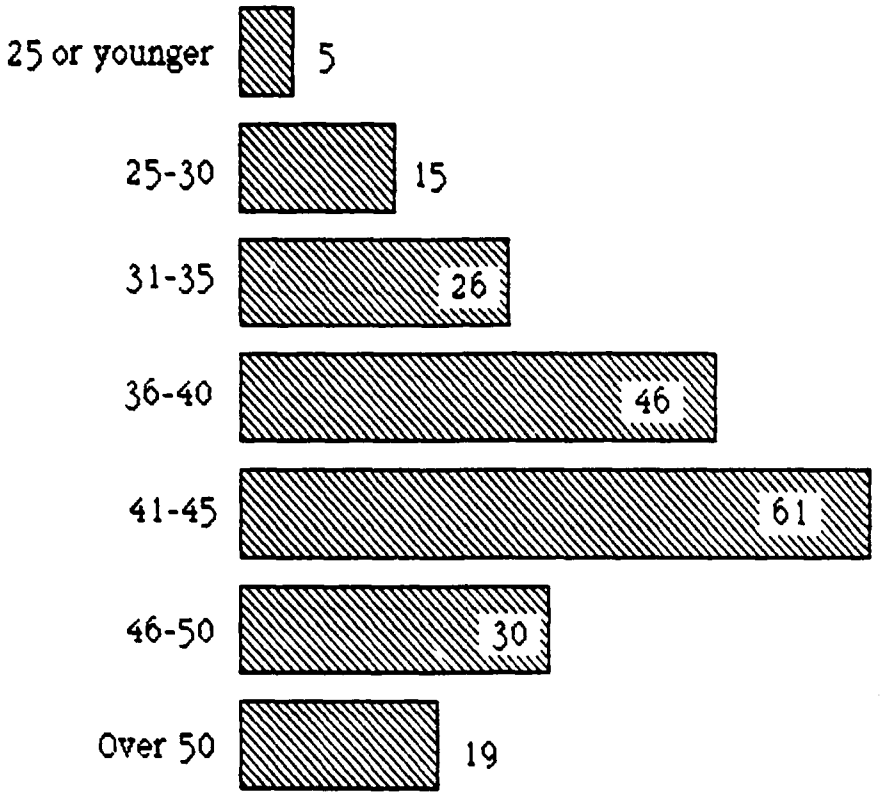

Figure 10: I'm _____ years old.

2. Rank or Position within the Bureaucracy

The respondents are predominantly male (89% male, 11% female) and are most likely field grade officers (10.9 % enlisted or GS 1-9, 31.7 % company grade or GS 10-12, 55.0 % field grade or GS/GM 13-15+, 1.0 % are general officers or senior executive service, and 1.5 % are civilian contractors working with the government). Figure 11 shows the breakout of each rank.

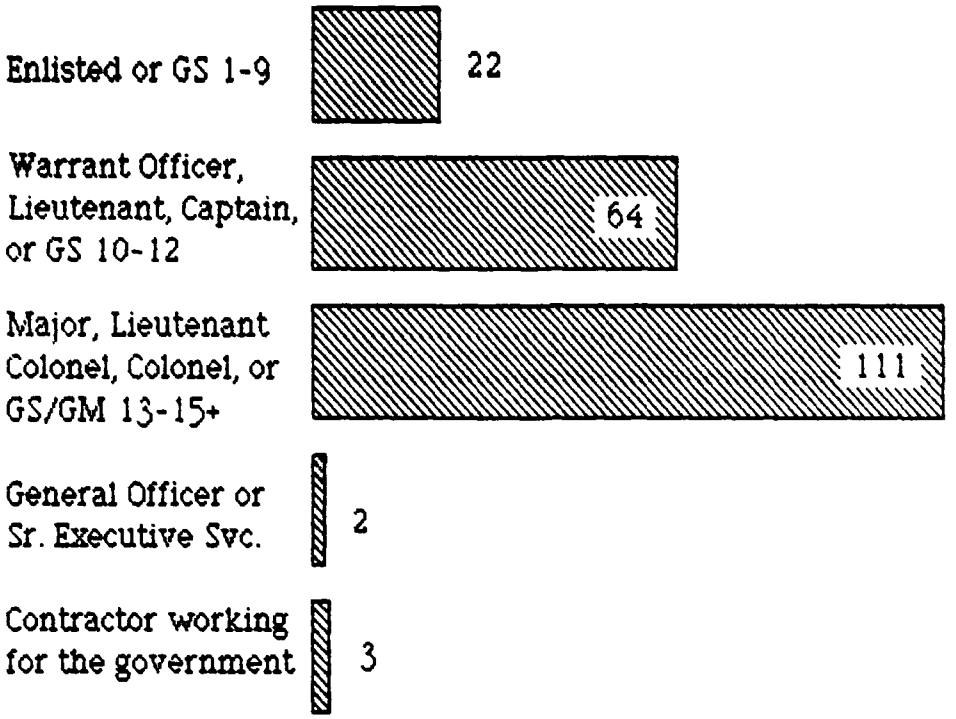

Figure 11: My grade/rank is _____.

3. Type of Job/Duties

. Our teleconferencing users are most likely to work as either an administrator (30.5%), on a technical staff (25.6%), or as a mid-level manager (24.6%). See figure 12. Only 8.0 % of the respondents marked executive as their job type. A little over 10 % chose other. These users are by and large knowledge workers. Their business is the business of information and staff actions.

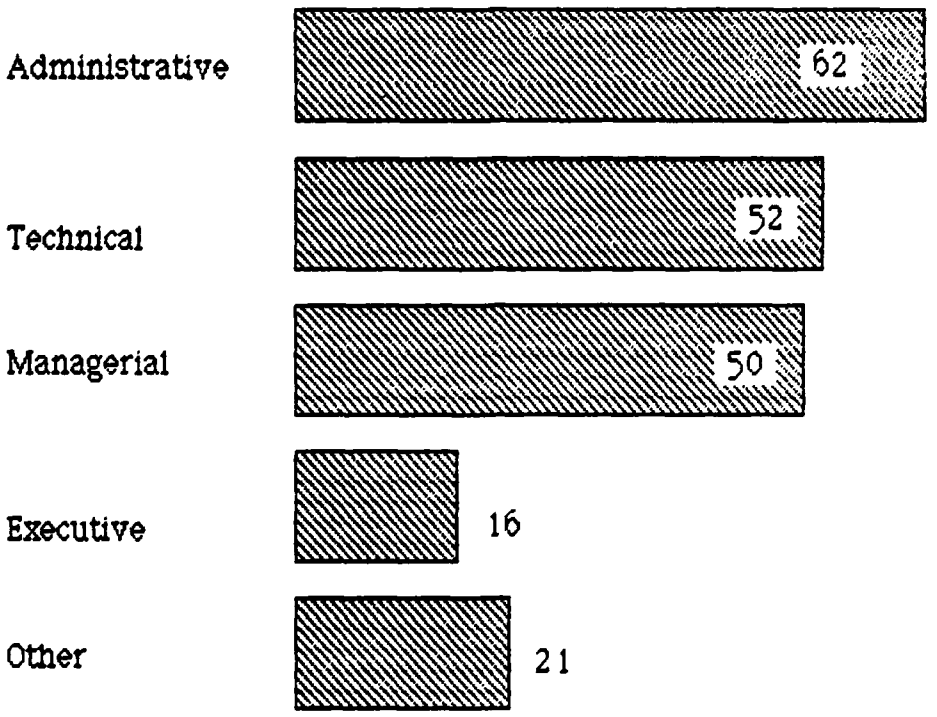

Figure 12: I'd catagorize my job/duties as being primarily _____.

4. Subsystem within the Army

These knowledge workers (43.8% assigned to an integrating HQ, 37.9% to the production base, and 13.8% to a unit-of-the-line) represent all three major subsystems within the Army. One would expect the fewer number of respondents coming from line or combat units. These personnel are busy with training soldiers and maintaining equipment. The production and integrating subsystems, on the other hand, are filled with staff personnel

who's task it is to prepare for war and plan for the future. Figure 13 shows how many users from each subsystem responded to the survey.

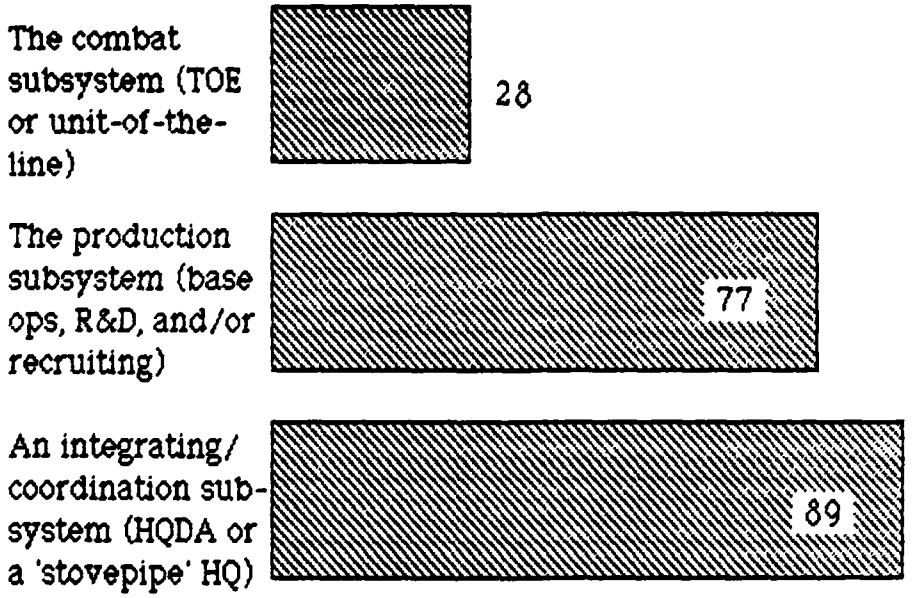

Figure 13: To which do you belong?

5. Number of Years Using Computers

The average number of years of experience with computers is four to five. This experience is most likely to be on a desk top model but all types of machines were used by the respondents either indirectly or directly (5.9 % reported they worked with the output supplied by someone else, 82.2 % used a micro or desk top PC, 5.4 % used mini-computers or super-mini-computers, and 5.9 % had some mainframe or supercomputer experience).

With normal tour length in the United States Army at three to four years, this means that the users have just learned about computers in their present jobs or in the assignment previous to the one they are presently in. See figure 14.

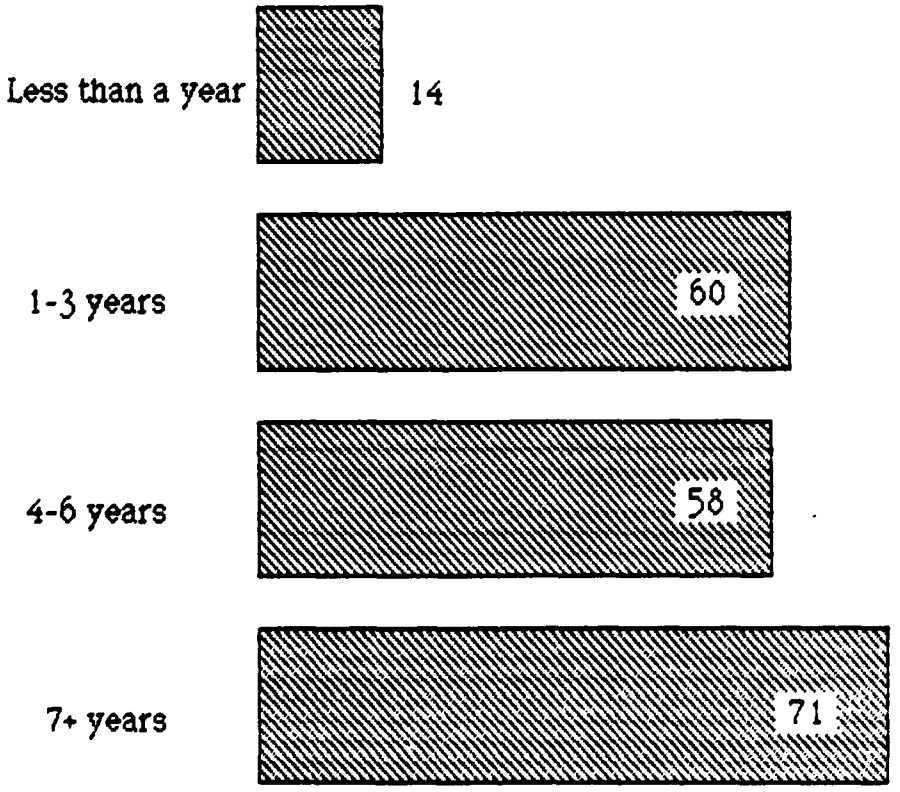

Figure 14: I've been using computers for _____ .

In addition to the above, the majority of users are likely to have recently received training while in their present job (52.7 % claiming they have received formal training in computers, 47.3 % claiming they have had no formal training). Forty and one half percent have had formal computer

training in an assignment before this one. Forty seven percent have had to learn through on the job training (OJT).

6. Personal Computer (PC) Ownership

Nearly two-thirds of those surveyed own a personal computer (62.9%). While this is a large majority, fewer than half claim any proficiency in programming their machines (44.3 % can program, 55.7 % cannot). See figure 15 for an inventory of owners.

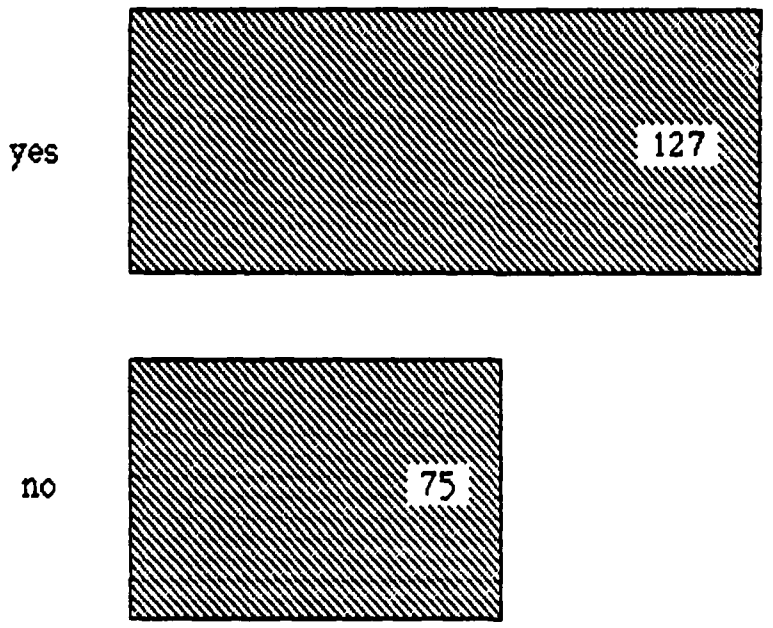

Figure 15: Do you own a personal computer (PC) ?

7. Uses a PC at work

Nearly all of those surveyed (95.1%) use a computer at their work place with 82% of these using desk top (or micro) models. See figure 16. The difference, 4.9 % or ten people, connected with the Army:Forum system exclusively from their homes. When coupled with the fact that many own a personal computer, we can safely conclude that the vast majority find personal computers to be both beneficial and popular (92.7 % agreeing or slightly agreeing to PC use as beneficial and popular, 6.9 % having no opinion. and only one or .5 % slightly disagreeing to PC benefits).

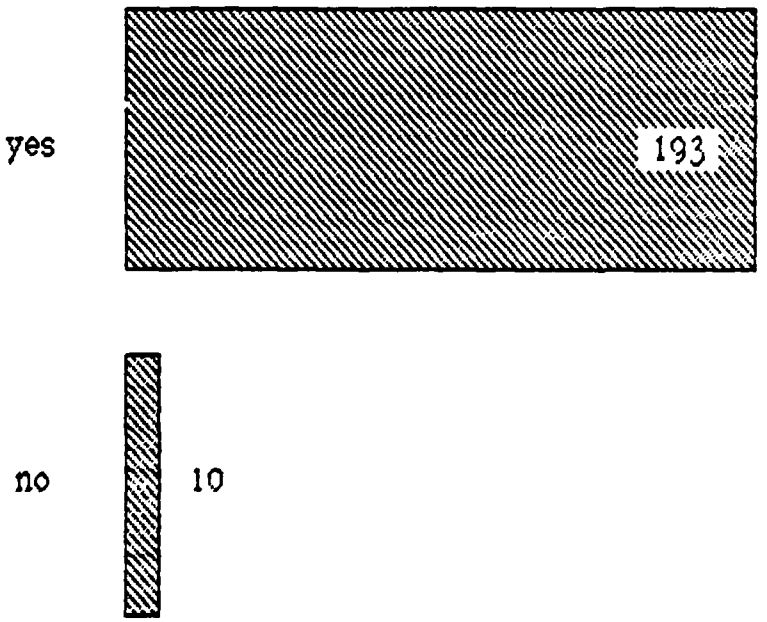

Figure 16: Is there a PC or a terminal in your office?

8. Time Spent on the Army:Forum System

The majority of teleconferencing users do so for less than three hours per week (70.9 %). See figure 17. Eighty-nine and one fifth percent report their bosses know they use the Army:Forum system. But only 20.4 % reported the use of teleconferencing on their Officer Efficiency Report (OER) support form or in their job standards. The OER support form (DA form 67-8-1) is the military equivalent of the civil service job standards. The time spent on-line is a key variable within this thesis. Forum time represents the use of teleconferencing within the Army.

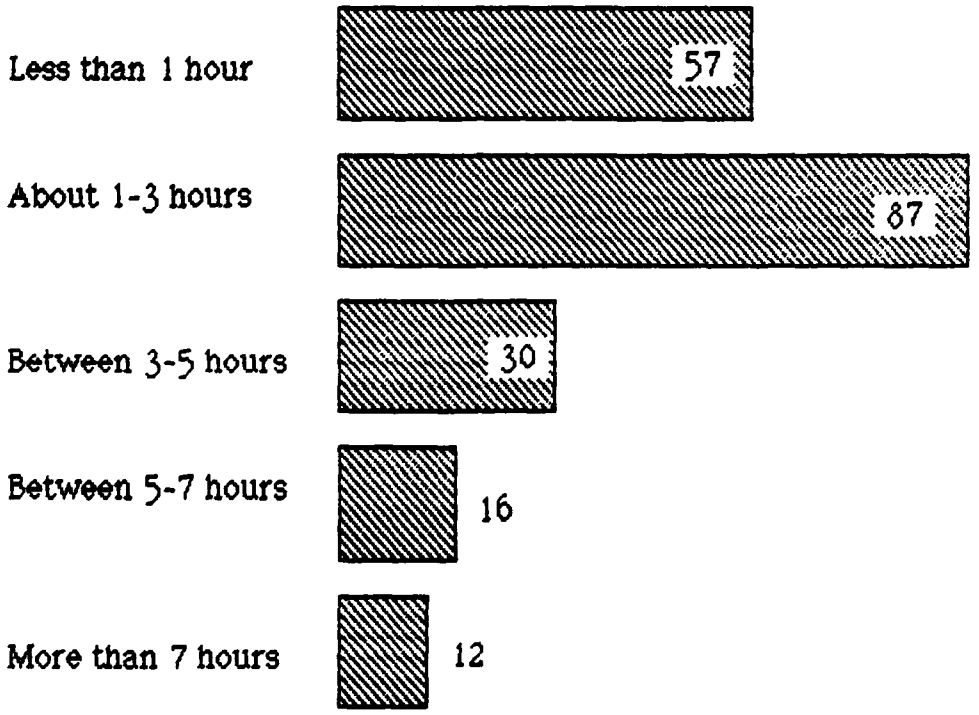

Figure 17: How much time do you spend on any of the networks in the Army:Forum system per week?

In addition to participating in the Army:Forum system, two-thirds (67.5%) of all surveyed also participate in other networks. Personal conversations with a few teleconferencing users indicates that there are a number of user groups and public access bulletin boards which offer similar services to CONFER. These other networks are usually sponsored by a private firm or agency.

B. Dependent Variables

Findings and results in this section are presented as frequency tables and as analyses of variance between at least two variables. Only relationships which are statistically significant (where $p < .05$) will be presented. The practical importance of these relationships will be presented in this chapter when other quantitative analysis supports such a relationship. The order of presentation mirrors the order in which introductory chapters have been presented. Results on organizational structure will be followed by findings concerning processes. Findings on a changing view of work are followed by staff techniques and then measures of effectiveness and efficiency. Qualitative discussions or subjective interpretation as to possible significance of these relationships will be postponed until chapter X.

1. Teleconferencing and Structure

Respondents reported a slight structural change caused by teleconferencing. See table 1. The largest block of respondents were undecided. Only 25.2% reporting a slight change when asked if they thought these networks would change the Army's structure. A combined 27.7 % either disagree or slightly disagree teleconferencing will affect the Army's structure. The findings in table 1a suggests that those who own personal computers are more likely to agree than to disagree that teleconferencing influences structural change. Informal discussions with Army:Forum system

users indicates that some PC owners who have brought their own machines into the work environment. These users have connected personal machines into Army telecommunications nodes until their offices or agencies purchase government owned micro-computers.

Table 1: Over all, I think these networks will change the organizational structure of the Army.

Value Label	Value	Frequency	Valid Percent
Disagree	1	35	17.3
Slightly Disagree	2	21	10.4
Neither	3	59	29.2
Slightly Agree	4	51	25.2
Agree	5	36	17.8
	9	1	missing
	Total	203	100

Mean = 3.158 Std Dev = 1.321 Valid Cases = 202

1.a. Analysis of Variance: "Change Organization" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	126	3.3968	1.3271	
no	75	2.7600	1.2285	
total	201	3.3434	1.3246	.0009

In chapter II we spoke of size as a key measure of organizational structure. Forty-six percent feel that computer-based teleconferencing can reduce staff size. Only 23.8 % disagree and 30.3% are ur decided (see table 2). There is a long tradition of office automation projects being approved in order to reduce staff size. Table 2a suggests a slight potential to reduce staff

size through the use of personal computers. PC owners are more likely than non-owners to agree teleconferencing can down size a staff.

Table 2: Teleconferencing has the potential to reduce the size of staffs.

Value Label	Value	Frequency	Valid Percent
Disagree	1	26	12.9
Slightly Disagree	2	22	10.9
Neither	3	61	30.3
Slightly Agree	4	42	20.9
Agree	5	50	24.9
	9	2	missing
	Total	203	100

Mean = 3.338 Std Dev = 1.313 Valid Cases = 201

2.a. Analysis of Variance: "Reduce Staff Size" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	125	3.5440	1.2983	
no	75	2.9733	1.2625	
total	200	3.3300	1.3114	.0027

A relatively strong relationship (Pearson correlation coefficient, R= +.4172) between the variables for organizational change and reduced staff size exists. It would therefore seem that the direction of change due to teleconferencing is toward reduction of staff size.

2. Teleconferencing and Processes

In chapter III we discussed the importance of both formal and informal processes within an organization. Empowering subordinates runs contrary to the tendency of formalization and centralization within a bureaucracy. A majority of users of teleconferencing (58.1 %) report they are empowered through computer network use (22.7% neither agreeing or disagreeing, and 19.3% disagreeing).

Table 3: Over all I think these networks empower subordinates by including them in the decision making process.

Value Label	Value	Frequency	Valid Percent
Disagree	1	20	9.9
Slightly Disagree	2	19	9.4
Neither	3	46	22.7
Slightly Agree	4	75	36.9
Agree	5	43	21.2
	Total	203	100

Mean = 3.502 Std Dev = 1.208 Valid Cases = 203

3.a. Analysis of Variance: "Empowerment" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.1930	1.1563	
1-3 hours	87	3.4713	1.2089	
3-5 hours	30	3.5333	1.1366	
5-7 hours	16	4.4375	.8139	
> 7 hours	12	3.8333	1.5275	
total	202	3.5000	1.2104	.0057

Teleconferencing empowers the knowledge worker. Table 3a is significant because it shows that all groups share a mean which indicates slight agreement or recognition of the empowerment process. As a respondent uses the Forum system more often, there is a tendency toward feeling a greater sense of empowerment.

The questionnaire had one question which use an acid test or bottom line approach. When asked, "Over all I think these networks are more problems than they're worth" 82.8 % of the users responded overwhelmingly, "no!" (63.1% stating they disagreed, 19.7% slightly disagreed, only 12.3% reported they neither agreed or disagreed and 10 people or 4.9% showed some form of agreement). See table 4.

Table 4: Over all I think these networks are more problems than they're worth.

Value Label	Value	Frequency	Valid Percent
Disagree	1	128	63.1
Slightly Disagree	2	40	19.7
Neither	3	25	12.3
Slightly Agree	4	7	3.4
Agree	5	3	1.5
	Total	203	100

Mean - 1.606 Std Dev - .935 Valid Cases - 203

4.a. Analysis of Variance: "Trouble" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	127	1.4488	.8702	
no	75	1.8533	.9822	
total	202	1.5990	.9318	.0027

It seems that those who have invested into the purchase of a personal computer soon learn about their telecommunications and over come any such trouble.

3. Teleconferencing and a Changing Work View

To say that teleconferencing is changing the way a user views his or her work is an incomplete statement. How is this work changing? Is it changing for the better or worse? How the user views his work is key to whether the Army is best served. The majority responded in a way to reflect there is a change (69.2% indicating teleconferencing has changed their view of work). See table 5 and 5a.

Table 5: Teleconferencing is changing the way I view my work.

Value Label	Value	Frequency	Valid Percent
Disagree	1	10	5.0
Slightly Disagree	2	4	2.0
Neither	3	48	23.9
Slightly Agree	4	59	29.4
Agree	5	80	39.8
	9	2	missing
	Total	203	100

Mean - 3.970 Std Dev - 1.081 Valid Cases - 201

5.a. Analysis of Variance: "Work View" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	56	3.7143	1.0568	
1-4 hours	86	3.9419	1.0885	
3-5 hours	30	4.0333	1.1290	
5-7 hours	16	4.5625	.6292	
> 7 hours	12	4.3333	1.2309	
total	200	3.9650	1.0815	.0491

The number of taskers or assignments given to a user by his boss has increased slightly (55.0% reporting no effect, 31.2% a slight increase, and 12.9% a significant increase). With this increase in the number of tasks a network user is asked to do comes a feeling of control (54.0% disagreeing with information overload and 24.0% saying they felt no effect). When asked, "Does teleconferencing help you handle information efficiently?"; most respondents agree it does (62.8% reporting efficient handling of information via a network). Computer-based teleconferencing seems to significantly add rather than detract from the knowledge worker's work view.

Over two thirds (66.9 %) of teleconferencing users say their opinions are better heard via teleconferencing (with 26.7% reporting no difference in way their voices are heard and only 13 disagreeing). And most feel that teleconferencing doesn't challenge command authority (28.1% disagreeing, 20.2% slightly disagreeing, and 28.1% neither agreeing or disagreeing).

Table 6: Through teleconferencing my opinions are better heard.

Value Label	Value	Frequency	Valid Percent
Disagree	1	8	4.0
Slightly Disagree	2	5	2.5
Neither	3	54	26.7
Slightly Agree	4	68	33.7
Agree	5	67	33.2
	9	1	missing
	Total	203	100

Mean = 3.896 Std Dev = 1.024 Valid Cases = 202

6.a. Analysis of Variance: "Opinions Better Heard" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	56	3.5536	.9129	
1-3 hours	87	3.9425	1.0494	
3-5 hours	30	3.9000	1.0289	
5-7 hours	16	4.5625	.6292	
> 7 hours	12	4.3333	1.2309	
total	201	3.9005	1.0247	.0033

Additionally, 63.1% claim that teleconferencing "cuts through the redtape". As users become more familiar with teleconferencing, they report it is easier to communicate. They feel they are being heard and that the bureaucracy is not keeping them all wrapped in rules and regulations.

Teleconferencing broadens the scope and interests of the user (73.9% agreeing or slightly agreeing, 21.7% forming no opinion, and only 9 people or 4.5% disagreeing). Broader interests, being exposed to "the big picture" is viewed by many as good. Therefore, teleconferencing may serve as a

professional development tool as each user is exposed to larger and larger problems. See table 7.

Table 7: Teleconferencing has broadened my scope or interests.

Value Label	Value	Frequency	Valid Percent
Disagree	1	6	3.0
Slightly Disagree	2	3	1.5
Neither	3	44	21.7
Slightly Agree	4	60	29.6
Agree	5	90	44.3
	Total	203	100

Mean = 4.108 Std Dev = .989 Valid Cases = 203

7.a. Analysis of Variance: "Broadens Scope" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.8947	.9389	
1-3 hours	87	4.0000	.9524	
3-5 hours	30	4.2000	1.1265	
5-7 hours	16	4.8750	.3416	
> 7 hours	12	4.5833	1.1645	
total	202	4.1040	.9895	.0021

The trend toward increases in Forum time show a statistically significant relationship to increased scope or interests.

One hundred and fifty two of the 203 or 75.2 % surveyed claim teleconferencing makes their jobs easier. Only 5.4 % (11 people) disagreed and 19.3 % (39 people) were undecided. See table 8. Job ease resulting from

the use of a PC seems obvious. Furthermore, as users of teleconferencing spend more and more time on-line, they also report this tool assists them in their jobs. Therefore, when coupled with the evidence that most agree using teleconferencing is worthwhile and that most find it helps them in their jobs, it seems that a majority of users strongly endorse this technology.

Table 8: Computer-based teleconferencing makes my job easier.

Value Label	Value	Frequency	Valid Percent
Disagree	1	2	1.0
Slightly Disagree	2	9	4.5
Neither	3	39	19.3
Slightly Agree	4	77	38.1
Agree	5	75	37.1
	9	1	missing
	Total	203	100

Mean = 4.059 Std Dev = .912 Valid Cases = 202

8.a. Analysis of Variance: "Job Ease" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	126	4.1825	.9156	
no	75	3.8533	.8806	
total	201	4.0597	.9146	.0132

8.b. Analysis of Variance: "Job Ease" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.6667	.9129	
1-3 hours	86	4.0698	.8784	
3-5 hours	30	4.4000	.6747	
5-7 hours	16	4.5625	.6292	
> 7 hours	12	4.2500	1.2881	
total	201	4.0547	.9121	.0003

The findings in tables 9, 9 a, and 9 b all seem intuitively obvious. If a user is presently on-line in a computer-based teleconference, then it is most likely that the user will continue using a computer in his or hers next job. If any thing, the user may even trade up or improve upon his or hers machine.

Table 9: I will use a computer in my next job.

Value Label	Value	Frequency	Valid Percent
Disagree	1	2	1.0
Slightly Disagree	2	0	0
Neither	3	13	6.4
Slightly Agree	4	23	11.3
Agree	5	165	81.3
	Total	203	100

Mean = 4.719 Std Dev = .671 Valid Cases = 203

9.a. Analysis of Variance: "Use PC in Next Job" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	127	4.8031	.5779	
no	75	4.5733	.7914	
total	202	4.7178	.6725	.0186

9.b. Analysis of Variance: "Use PC in Next Job" by "No# Years Using a PC"

Group	Count	Mean	Std Dev	Probability
< 1 year	14	4.4286	.8516	
1-3 years	60	4.5500	.7231	
4-6 years	58	4.6897	.8209	
7+ years	71	4.9437	.2872	
total	203	4.7192	.6712	.0019

Likewise, tables 10, 10 a, 10 b, and 10 c seem to logically follow. If a user is on-line presently, it is highly likely they will continue. After all, it is seldom that anyone gives up a skill or tool after mastering its use.

Table 10: I will use teleconferencing in future assignments.

Value Label	Value	Frequency	Valid Percent
Disagree	1	2	1.0
Slightly Disagree	2	2	1.0
Neither	3	28	13.8
Slightly Agree	4	41	20.2
Agree	5	130	64.0
	Total	203	100

Mean = 4.453 Std Dev = .839 Valid Cases = 203

10.a. Analysis of Variance: "Networks in Next Job" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	127	4.5669	.8507	
no	75	4.2533	.7900	
total	202	4.4505	.8405	.0101

10.b. Analysis of Variance: "Networks in Next Job" by "No# Years Using a PC"

Group	Count	Mean	Std Dev	Probability
< 1 year	14	4.1429	.8644	
1-3 years	60	4.2667	.9543	
4-6 years	58	4.6207	.7684	
7 + years	71	4.5352	.7527	
total	203	4.4532	.8393	.0476

10.c. Analysis of Variance: "Networks in Next Job" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	4.0877	.9502	
1-3 hours	87	4.5402	.7895	
3-5 hours	30	4.6000	.7240	
5-7 hours	16	4.8750	.3416	
> 7 hours	12	4.5833	.9003	
total	202	4.4505	.8405	.0016

4. Teleconferencing and Other Technologies

In chapter III we discussed the formal, informal and the parallel processes within the Army. The informal processes are closely tied to how the knowledge worker operates from day to day. Informally, the staffer goes on travel (see table 11), works within his or hers office (see table 12), coordinates with other agencies (see table 13), gathers information (see table 14) over the telephone, and attends meetings. The formal business of the staff officer is to do research in support of preparing staff studies (see table 15), writes estimates and plans, and gathers information (see table 16) through the attendance of conferences and meetings (see tables 17 thru 19). The parallel organization and computer-based group networks add a new dimension to both the Army's structure and processes. These computer-based networks can also be viewed as a new tool. What follows in this subsection are findings about teleconferencing as a new staff technology or tool.

Table 11: What effect has teleconferencing had on the time you spend traveling?

Value Label	Value	Frequency	Valid Percent
Significant Decrease	1	11	5.4
Slight Decrease	2	38	18.8
No Effect	3	147	72.8
Slight Increase	4	2	1.0
Significant Increase	5	4	2.0
	9	1	missing
Total		203	100

Mean = 2.752 Std Dev = .660 Valid Cases = 202

11.a. Analysis of Variance: "Time on Travel" by "Rank"

Group	Count	Mean	Std Dev	Probability
enlisted	22	2.8182	.7950	
jr officer	63	2.8413	.6012	
field grade	111	2.7297	.6171	
general/SES	2	3.0000	.0000	
contractor	3	1.0000	.0000	
total	201	2.7512	.6617	.0001

Although only a slight decrease in travel is reported as a direct savings from the use of teleconferencing, an argument can be made for the benefits accrued when teleconferencing is used before or in preparation for travel. Preliminary discussion of an agenda is quickly and efficiently handled via computer-based teleconferencing. Opinions can be polled, courses of action can be brainstormed, and many of the key factors discussed asynchronously before anyone checks into an airport. It was calculated

during the LESnet prototype that thousands of dollars are saved by using a teleconference to prepare for a meeting or business travel.

The number of contacts within the organization have increased (52.5% reporting an increase, 43.6% reporting no effect, and only 4.0% claiming a decrease). See table 12. Informal discussions on the Forum system indicate that many items are printed and passed along within an office before a network user may respond. Three quarters of the respondents (74.7 %) report they serve as a conduit for information half the time or more while using these networks. By channeling information to those who need it, internal collaborations are formed. This has lead to new members entering the Army:Forum system as coworkers recruit their officemates. These new contacts have been particularly fruitful when the new member is the boss of an existing users.

Table 12: What effect has teleconferencing had on the number of people with whom you consult within your work place?

Value Label	Value	Frequency	Valid Percent
Significant Decrease	1	3	1.5
Slight Decrease	2	5	2.5
No Effect	3	88	43.6
Slight Increase	4	65	32.2
Significant Increase	5	41	20.3
	9	1	missing
	Total	203	100

Mean = 3.673 Std Dev = .877 Valid Cases = 202

12.a. Analysis of Variance: "Contacts at Work" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.4737	.7816	
1-3 hours	86	3.6860	.8577	
3-5 hours	30	3.7333	.9072	
5-7 hours	16	4.2500	.7746	
> 7 hours	12	3.6667	1.2309	
total	201	3.6766	.8774	.0384

The number of contacts outside the organization have greatly increased (72.9% reporting either a slight or significant increase). See table 13. We can conclude that the Army is "shrinking" in size as real cuts are made in the size of the Army's officer ranks and more and more members are drawn into a widening circle of associates through teleconferencing.

Table 13: What effect has teleconferencing had on the number of people you deal with outside of your unit, agency or firm?

Value Label	Value	Frequency	Valid Percent
Significant Decrease	1	1	.5
Slight Decrease	2	3	1.5
No Effect	3	51	25.1
Slight Increase	4	73	36.0
Significant Increase	5	75	36.9
Total		203	100

Mean = 4.074 Std Dev = .850 Valid Cases = 203

13.a. Analysis of Variance: "Contacts Outside the Office" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	127	4.2205	.8157	
no	75	3.8267	.8601	
total	202	4.0743	.8519	.0014

13.b. Analysis of Variance: "Contacts Outside the Office" by "No# Years Using a PC"

Group	Count	Mean	Std Dev	Probability
< 1 year	14	3.4286	.9376	
1-3 years	60	3.9500	.7686	
4-6 years	58	4.3276	.7105	
7 + years	71	4.0986	.9282	
total	203	4.0739	.8498	.0019

13.c. Analysis of Variance: "Contacts Outside the Office" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.8246	.8889	
1-3 hours	87	4.0575	.7370	
3-5 hours	30	4.3000	.8367	
5-7 hours	16	4.5625	.6292	
> 7 hours	12	4.0833	1.3114	
total	202	4.0693	.8494	.0136

Accessibility to others tends to increase with increases in time spent on the Forumnet system. Informal discussions with others on the system reveal that as a user earns more and more about item and file management, they are likely to join new subnets. This has an obvious benefit in that it

introduces a user to new personalities and perhaps exposes the user to new contacts and expertise.

Nearly 73 % of the respondents reported that teleconferencing has improved their abilities to do research, 26.1% report no effect, and only 2 people or 1% reported a slight decrease in research ability. See table 14. Information is more accessible, it's easily managed (62.8 % of the users claim that teleconferencing has helped them handle information efficiently), and the redtape is not as likely to slow the staffer in his or her search for knowledge or information. The relationship between a users ability to do research and owning a PC seems to be obvious. There are many studies in the literature that indicate word processing and number manipulations are far easier with the aid of a computer. These efficiencies would lead to a general sense of improved research capability.

Table 14: What effect has teleconferencing had on your ability to do research?

Value Label	Value	Frequency	Valid Percent
Significant Decrease	1	0	0
Slight Decrease	2	2	1.0
No Effect	3	53	26.1
Slight Increase	4	91	44.8
Significant Increase	5	57	28.1
	Total	203	100

Mean = 4.000 Std Dev = .764 Valid Cases = 203

14.a. Analysis of Variance: "Research" by "Owns a PC"

Group	Count	Mean	Std Dev	Probability
yes	127	4.2205	.7444	
no	75	3.6267	.6529	
total	202	4.0000	.7662	.00005

14.b. Analysis of Variance: "Research" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.7193	.7501	
1-3 hours	87	4.0000	.6988	
3-5 hours	30	4.1667	.6989	
5-7 hours	16	4.3750	.9574	
> 7 hours	12	4.3333	.7785	
total	202	3.9950	.7629	.0035

The majority of users (66.9 %) have commented that they have posted bulletins or items on-line requesting information or seeking out an expert opinion on a new subject. One hundred and thirty-five of the respondents (67 %) indicated they have used the network to seek information in their day to day work. These information seekers (same 67 %) claim to do this "half the time", "often" or "always". Furthermore, it has been my experience that such requests are responded to by two to three people within 12 to 24 hours from the time a question is posted.

Sixty-four percent of the respondents agree that teleconferencing saves time on staff studies. 26.2% slightly agree. 7.4% neither agree or disagree, and only 4 people or 2% disagree. See table 15. If we look back at how the knowledge worker spends his or her time (figures 6 & 7), we can

conclude that the use of computer-based teleconferencing theoretically frees up hours of time from meetings and other activities. Consequently, this new found time may be focused on more thorough and complete staff studies.

Table 15: Teleconferencing has the potential to save time on staff studies.

Value Label	Value	Frequency	Valid Percent
Disagree	1	1	.5
Slightly Disagree	2	3	1.5
Neither	3	15	7.4
Slightly Agree	4	53	26.4
Agree	5	130	64.4
	9	1	missing
	Total	203	100

Mean = 4.525 Std Dev = .741 Valid Cases = 202

15.a. Analysis of Variance: "Save Staff Study Time" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	127	4.6142	.7132	
no	74	4.3784	.7711	
total	201	4.5274	.7420	.0294

15.b. Analysis of Variance: "Save Staff Study Time" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	56	4.2857	.8886	
1-3 hours	87	4.6322	.5308	
3-5 hours	30	4.6667	.7112	
5-7 hours	16	4.8125	.4031	
> 7 hours	12	4.0833	1.2401	
total	201	4.5224	.7421	.0034

One could hypothesize that asynchronous communications would greatly enhance the coordination process. By having many agencies review an action and sharing their inputs, the meaning of a new policy or decision could be tested. No longer is a staff action limited in its flow along a series of reviewers. Through computer-based teleconferencing and computer-mediated decision support software, consensus may be reached by way of concurrent review along a parallel network.

Nine out of ten (92.1%) of the respondents agree that their access to information has increased due to teleconferencing. See table 16. At worse case, teleconferencing represents but one more source of information.

Table 16: I have greater access to information (due to teleconferencing).

Value Label	Value	Frequency	Valid Percent
Disagree	1	1	.5
Slightly Disagree	2	1	.5
Neither	3	14	6.9
Slightly Agree	4	66	32.5
Agree	5	121	59.6
	Total	203	100

Mean = 4.502 Std Dev = .692 Valid Cases = 203

16.a. Analysis of Variance: "Greater Access" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	4.2807	.7963	
1-3 hours	87	4.5057	.5881	
3-5 hours	30	4.7333	.4498	
5-7 hours	16	4.9375	.2500	
> 7 hours	12	4.3333	1.2309	
total	202	4.5000	.6929	.0023

5. Teleconferencing and Effectiveness

In general, effectiveness and efficiency while on travel seem to be improved by teleconferencing. There are, however, 46 % who claim that teleconferencing has no effect on their effectiveness while on travel. Network users reported a slight decrease in the time needed to travel. And the majority of those surveyed reported an increase in temporary duty (TDY) effectiveness (51.8% showing an increase in business trip effectiveness, consistent with a 49.3% report of an increase in effectiveness while on travel).[50] See tables 17 and 18. The resultant savings from fewer trips and improved effectiveness while on these travels has not been

[50] Question #24 asked. "What effect has teleconferencing had on your effectiveness on business trips?" Question #30 asked: "What effect has teleconferencing has on your effectiveness while on travel?". My intent was to check if the respondent made better use of his travel time and to perhaps check on whether or not the staffer used teleconferencing capabilities while on travel. I'm not certain I achieved my objecti e. But as several officers reported that they now carry portable computers with them during TDY trips, I think that the use of teleconferencing while away from ones office is possible and helpful in checking on things while a 2-3 day seminar or meeting develops. The survey, unfortunately, did not clearly differentiate between the effectiveness of the travel and the effectiveness during travel. This could easily become a focus of further research.

accurately captured. Their are few in the Army who would argue that travel takes a lot of time away from commanders and staff.

Table 17: What effect has teleconferencing had on your effectiveness on business trips?

Value Label	Value	Frequency	Valid Percent
Significant Decrease	1	1	.5
Slight Decrease	2	3	1.5
No Effect	3	93	46.3
Slight Increase	4	55	27.4
Significant Increase	5	49	24.4
	9	2	missing
Total		203	100

Mean = 3.736 Std Dev = .863 Valid Cases = 201

17.a. Analysis of Variance: "Effectiveness on TDY" by "Owns a PC"

Group	Count	Mean	Std Dev	Probability
yes	126	3.8651	.8704	
no	74	3.5135	.8150	
total	200	3.7350	.8652	.0052

17.b. Analysis of Variance: "Effectiveness on TDY" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	56	3.6071	.8241	
1-3 hours	86	3.6512	.8083	
3-5 hours	30	4.0333	.7649	
5-7 hours	16	4.2500	.8563	
> 7 hours	12	3.5000	1.3143	
total	200	3.7350	.8652	.0149

Table 18: What effect has teleconferencing had on your effectiveness while on travel?

Value Label	Value	Frequency	Valid Percent
Significant Decrease	1	0	0
Slight Decrease	2	2	1.0
No Effect	3	101	49.8
Slight Increase	4	58	28.6
Significant Increase	5	42	20.7
Total		203	100

Mean = 3.690 Std Dev = .807 Valid Cases = 203

18.a. Analysis of Variance: "Effectiveness on Travel" by "Owns a PC"

Group	Count	Mean	Std Dev	Probability
yes	127	3.7953	.8483	
no	75	3.5067	.7047	
total	202	3.6881	.8084	.0139

18.b. Analysis of Variance: "Effectiveness on Travel" by "No# of Years Using a PC"

Group	Count	Mean	Std Dev	Probability
: 1 year	14	3.0000	.3922	
1-3 years	60	3.6833	.7917	
4-6 years	58	3.6207	.7452	
7 + years	71	3.8873	.8544	
total	203	3.6897	.8067	.0016

18.c. Analysis of Variance: "Effectiveness on Travel" by "Rank"

Group	Count	Mean	Std Dev	Probability
enlisted	22	3.6364	.8477	
jr officer	64	3.5313	.7340	
field grade	111	3.7748	.8167	
general/SES	2	3.0000	.0000	
contractor	3	5.0000	.0000	
total	202	3.6931	.8072	.0095

18.d. Analysis of Variance: "Effectiveness on Travel" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.5088	.7349	
1-3 hours	87	3.5977	.7542	
3-5 hours	30	3.9667	.8087	
5-7 hours	16	4.2500	.9309	
> 7 hours	12	3.8333	.9374	
total	202	3.6931	.8072	.0030

Meeting effectiveness shows a slight to significant increase by users of teleconferencing (42.6% reporting a slight improvement and 18.3% reporting a significant increase in effectiveness). See table 19. The rationale for the relationship between meeting effectiveness and rank may be linked to the concept of wider scope and broader interests. As more senior officials use computer-based teleconferencing, their decisions are aided by the now accessible wider circle of advisors. Yet another theory would be that this tool assists the systems leader in determining or predicting the second and third order effects of a decision. Quick turn around surveys and emotionally charged issues can be tested out via teleconferencing.

Table 19: What effect has teleconferencing had on your effectiveness in meetings?

Value Label	Value	Frequency	Valid Percent
Significant Decrease	1	0	0
Slight Decrease	2	2	1.0
No Effect	3	77	38.1
Slight Increase	4	86	42.6
Significant Increase	5	37	18.3
	9	1	missing
Total		203	100

Mean = 3.782 Std Dev = .748 Valid Cases = 202

19.a. Analysis of Variance: "Meeting Effectiveness" by "Owns PC"

Group	Count	Mean	Std Dev	Probability
yes	127	3.8898	.7583	
no	74	3.5946	.7007	
total	201	3.8853	.7496	.0068

19.b. Analysis of Variance: "Meeting Effectiveness" by "Rank"

Group	Count	Mean	Std Dev	Probability
enlisted	22	3.8182	.9069	
jr officer	63	3.7302	.6527	
field grade	111	3.7838	.7557	
general/SES	2	3.0000	.0000	
contractor	3	5.0000	.0000	
total	201	3.7811	.7496	.0318

19.c. Analysis of Variance: "Meeting Effectiveness" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	56	3.6607	.7453	
1-3 hours	87	3.6322	.6491	
3-5 hours	30	4.0667	.7397	
5-7 hours	16	4.2500	.9309	
> 7 hours	12	4.0833	.7930	
total	201	3.7811	.7496	.0012

One hundred and sixty-nine of the 203 surveyed (83.3%) claim teleconferencing has increased their over all effectiveness on the job. See table 20. A number of effects yet to be revealed follow. As for other modes of communication used by staffers within the Army, the survey shows that a majority of teleconference participants report a decrease in their use of the telephone (56.3% reporting a significant or a slight decrease, 35.7% reporting no effect, and only 16 people or 8% reporting an increase in the use of their telephones). Given the inefficiency inherent in "telephone tag" and inefficiencies due to "social protocols", asynchronous communications via teleconferencing seem to be a big plus. 53.5% report a decrease in the use of mail and mail like services (federal express, UPS, etc.). Teleconferencing provides a record of the correspondence freeing the staffer from having to take notes of the conversations. Twenty-three percent of the respondents report an increase in the time spent reading (66.3% reporting no effect, 22.8% reporting an increase, and 10.9% reporting they spent less time reading). Since the vast majority of teleconference users spend less than three hours on-line per week (28.1% using the network less than 1 hour per week and 42.9% using it for about 1-3 hours per week), this communications mode shows excellent dividends in time saved. All these factors combine in such a way as to improve the overall effectiveness of the user.

Table 20: What effect has teleconferencing had on your overall effectiveness on the job?

Value Label	Value	Frequency	Valid Percent
Significant Decrease	1	0	0
Slight Decrease	2	1	.5
No Effect	3	33	16.3
Slight Increase	4	114	56.2
Significant Increase	5	55	27.1
Total		203	100

Mean = 4.099 Std Dev = .668 Valid Cases = 203

20.a. Analysis of Variance: "Overall Job Effectiveness" by "Owns a PC"

Group	Count	Mean	Std Dev	Probability
yes	127	4.2205	.6536	
no	75	3.8933	.6488	
total	202	4.0990	.6692	.0007

20.b. Analysis of Variance: "Overall Job Effectiveness" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.8421	.6489	
1-3 hours	87	4.0690	.6249	
3-5 hours	30	4.4000	.5632	
5-7 hours	16	4.3750	.8062	
> 7 hours	12	4.4167	.6686	
total	202	4.0990	.6692	.0003

Improved command and staff procedures (73.8% agreeing, 15.3% having no opinion, and only 10.9% disagreeing) are being reported. See table 21. The formalization process seems to be reversed by the use of

teleconferencing. The relationship between the use of the Forum system and in improved procedures is key. The intent of the procedure can be checked via computer-based teleconferencing. As a consequence of middle layers of interpretation and compromise being removed, instructions and intent are more likely to be passed without interference.

Table 21: Over all I think these networks will improve command and staff procedures.

Value Label	Value	Frequency	Valid Percent
Disagree	1	10	4.9
Slightly Disagree	2	12	5.9
Neither	3	31	15.3
Slightly Agree	4	88	43.6
Agree	5	61	30.2
	9	1	missing
	Total	203	100

Mean = 3.881 Std Dev 1.063 Valid Cases = 202

21.a. Analysis of Variance: "Networks Will Improve Command and Staff Procedures" by "Forum Time"

Group	Count	Mean	Std Dev	Probability
< 1 hour	57	3.8596	.9149	
1-3 hours	86	3.6512	1.1859	
3-5 hours	30	4.1333	.8604	
5-7 hours	16	4.4375	.8921	
> 7 hours	12	4.2500	1.1382	
total	201	3.8806	1.0657	.0200

Those who use computer-based group networks, those who feel they are a part of the parallel organization, those who have bought into the

process of participating in the free flow of information within the Army --- these officers (both civilian and military) and senior non-commissioned officers will serve as the core of tomorrow's Army.

C. Summary of Results.

Looking at the modes from the independent variables, we can summarize by saying the typical teleconferencing user on the Army:Forumnet system is a field grade officer between 41-45 years of age working in an administrative position within one of the Army's integrating or coordinating headquarters. He has been using computers for a little more than seven years and most likely owns a personal computer as well as uses one at work. Our typical user spends between one to three hours per week on-line within the Army:Forumnet system.

By plotting the means from the dependent variables, a useful picture can be charted which summarizes how computer-based teleconferencing is impacting upon the Army. See figure 18.

Most users of the technology slightly agree that teleconferencing is changing the organizational structure. Most feel that teleconferencing will reduce the size of future staffs. Computer-based teleconferencing empowers those who use it. The system seems to be relatively user friendly and generally helps the user in his or her work.

There is slight to strong agreement that teleconferencing broadens the users' scope and interests, leads to more open channels of communications, and continued use of such technologies in the future is highly probable. Teleconferencing users agree that they can more easily coordinate staff actions both within there units and with those outside their offices. Research and information access are improved by teleconferencing.

Teleconferencing users report a slight decreases in time spent traveling. While on travel, increases in effectiveness and efficiency have resulted from computer-based teleconferencing use. Users report their meeting effectiveness and overall job effectiveness have increased. And finally, teleconferencing seems to be improving command and staff relationships and functions within the Army.

Summary of Results: Dependent Variables

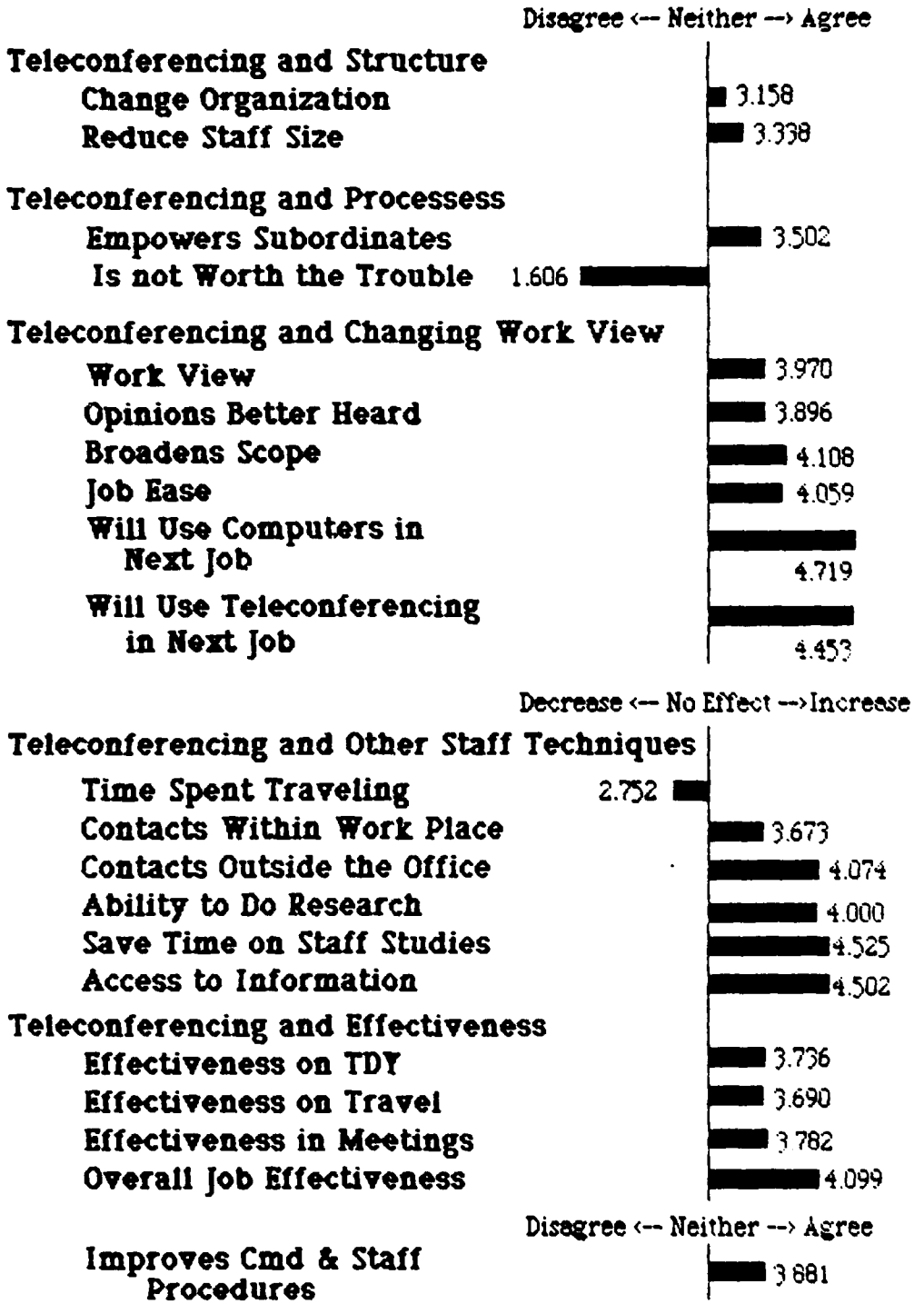

Figure 18

X. Discussion and Conclusions

A. Discussion

Computer-based teleconferencing is changing the organizational structure and processes within the U.S. Army. Teleconferencing is reshaping how staff personnel view their work within the context of an informated organization. Staff personnel use a variety of communications tools to conduct the day to day business of the Army. As more and more personnel learn of computer-based teleconferencing and computer-mediated decision support tools, they will become more effective as knowledge workers. The aggregate impact of teleconferencing results in a positive increase in staff effectiveness and efficiencies ultimately improving the Army's ability to prepare for (and ultimately fight) the next war.

1. Changes in Structure

Teleconferencing is changing the organizational structure of the U.S. Army albeit ever so slightly. Although a significantly large percentage (29.2 %) indicated they were undecided as to the existence of a change cause by teleconferencing, personal computer owners were more likely to report on a change than non-owners. Network users indicated that teleconferencing may lead to a potential reduction in the size of staffs. Thirty percent neither agreed nor disagreed to such a potential reduction. Personal computer owners were more likely than non-owners to agree with a potential

reduction. This split between owners and non-owners is key. Personal computer owners are more likely to have committed to the technology than non-owners. We can theorize that by buying into the technology, one finds ways to use these smart machines so as to realize a return on ones investment. A non-owner may use a personal computer at work but may not have accepted the technology as completely as another staffer who has committed their own money toward purchasing a home computer.

Users report that within the U.S. Army, teleconferencing seems to be reducing the complexity of staff functions and streamlining command and staff relationships. Due to the ease in which a network user can collect information, teleconferencing enables a staff officer to work with others without directly challenging the chain-of-command's authority. Formalization and centralization seem to be lessened by teleconferencing.

There was no differentiation between users by rank in regards to organizational change. It would seem that users of computer-based technology are empowered with decision making authority in accordance to their relative contribution rather than to their rank or position. If direct empowerment does not result, then improved access to decision makers indirectly empowers users.

Organizational change resulting from the use of teleconferencing will be toward a smaller, more decentralized staff. These changes seem to be dependent upon personal computer ownership. It is my opinion that these

trends will continue as more and more officers and civilians learn of computers and teleconferencing.

The two major impacts of teleconferencing on the U.S. Army's structure are as follows: (1) The parallel organization will co-exist with the formal chain-of-command and with the informal "old boy network" making each function more smoothly than either had before the introduction of teleconferencing. (2) Future Army staff size may be reduced as experts are linked via teleconferencing; thereby, facilitating their continual contributions to their specialty areas of expertise in spite of reassignment or promotion.

2. Changes in Processes

Computer-based teleconferencing is changing the organizational processes by empowering subordinates. More respondents felt this to be true than had agreed on the impact of teleconferencing on the Army's structural change. Generally, there was only slight agreement on empowerment due to teleconferencing. I would theorize that empowerment is more closely tied to command climate or the culture of the organization than to teleconferencing per se. Roughly one fifth of the users disagreed, one fifth had no opinion, and the remainder (58 %) felt networks empowered subordinates. Interestingly, there was no evidence that differences in rank or age affected respondent choices.

It is important to note that empowerment and the time spent on-line using the Forumnet system show a statistically significant relationship. Users who regularly spend between five to seven hours per week on-line seem to benefit most from the sense of empowerment. Those spending greater amounts of time on-line (seven or more hours weekly) are not as likely to agree than those who average about an hour each day. Perhaps new users and/or those who are administering networks involuntarily are spending these added hours with marginal benefits accrued. This is an area for future research.

Computer-mediated decision support technologies and telecommunications will significantly change the processes within the U.S. Army. Reductions in red tape, increased access to information, and enhanced staff studies due to the use of teleconferencing will contribute to how an adjunct staff complements existing, more traditional staffing procedures. Those personnel skilled in the use of computers will lead those who are unskilled or less skilled in their use. Computer literacy and telecommunications knowledge will increase in importance as more and more automated command, control, communications and intelligence networks are used.

Peacetime use of teleconferencing will prepare future leaders for wartime. Skills in information management, data base manipulation, and mass communications are learned while using teleconferencing. This use will improve war fighting capabilities both directly and indirectly. Preparation for war missions will directly benefit from teleconferencing as a more

thorough coordination results from it use. Indirect benefits will be accrued due to the axiom --- 'you will fight as you train". Teleconferencing should, if this axiom holds true, familiarize senior leaders in computer-based staffing techniques. Information overload is less likely to occur in users of teleconferencing than in non-users.

Respondents not only reported that teleconferencing was beneficial, but the use of parallel processes improves unity of command by sharing the commander's intent with as many as have signed on-line in the network. When many understand what it is the boss wants, all are empowered to execute their portion of the mission in support of the larger objective. Empowering subordinates cannot be over emphasized. "Transformative leadership [leadership which empowers and includes everyone] achieves significant change that reflects the community of interests of both the leaders and followers ... it frees up and pools the collective energies in pursuit of a common goal."[51] Teleconferencing assists the leader by allowing subordinates to share in the purpose or goal. The meaning of the message seems to be translated better through the use of computer-based group networks because of a sense of open access to information and decision criteria. Asynchronous communications means no energy is lost in the effort of coordinating meeting times and places.

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[51] Bennis, Warren and Burt Nanus. LEADERS, THE STRATEGIES FOR TAKING CHARGE (Harper & Row: New York, 1985) p 217

3. Changes in Work

The results chapter shows that teleconferencing has changed the users' work view for the better. Not only has teleconferencing lead to broader scope, more open channels of communication, a sense of job ease, and the likelihood of continued teleconferencing use in future assignments; but, also one finds a greater involvement or identity to the collective purpose as stated above. As more and more users of teleconferencing change from knowledge laborers to knowledge workers, they begin to identify more closely to the organizational goals. Workers work with rather than work on a product or process. This leads toward cohesion and innovation. Belonging to a larger concern has obvious synergistic effects. Teleconferencing adds to this synergism. Teleconferencing informates an organization.

Nearly one quarter of all respondents said they neither agreed nor disagreed that teleconferencing had changed their work view. A similar proportion chose "neither" on the question concerning opinions being heard via teleconferencing. My third hypothesis is that teleconferencing broadens the users' scope and interests. Here, just over a fifth of all respondents chose "neither". Such indifference to three measures of work view may be explained by the idea that some subnetworks are focused on specific work related tasks. These more formal networks tend to follow the normal chain of command. In such teleconferences, users have merely substituted teleconferencing technology for another, namely the formal communications

channel. A teleconference which is too restrictive can inhibit the formation of a parallel organization and insulate this unit or office from its environment or from interdependent sister elements.

There were no statistically significant relationships as functions of age or rank in regards to a changing work view. This finding is encouraging for it indicates that amongst those who responded, a generational difference is lacking. In all measures of a changing work view, the amount of time spent on-line was statistically significant. Those who tended to spend at least one hour daily using the Forumnet system reported the strongest positive change in how they viewed their work. For those who reported using teleconferencing for more than seven hours weekly a marginal decrease in benefit was found. Again, this marginal decrease is an area for future study.

Computer-based group networks are changing the way knowledge workers view their work. It seems these changes are for the better and that teleconferencing is informating command and staff relationships. The sum of these factors leading to a more satisfied Army employee or professional. Each of these alone is a positive factor in measuring organizational effectiveness, combined they make a pretty strong case in favor of operating within the parallel organization and using this staff technology. All these changes in work seem to be dependent on personal computer use and on the amount of time spent on-line in the Forumnet system.

4. Changes in Other Staff Techniques

Teleconferencing reduces travel and, therefore, is a cost saving tool. Reductions in the budget are also realized due to improved efficiencies while preparing for such business trips. Computer-based telecommunications may eliminate or greatly reduce the number of business meetings or conferences. Agenda items now are shared and discussed interactively through teleconferencing. Consensus building may be the result.

An interesting observation on teleconferencing and time spent traveling is that the two general officers (or senior executive service members) claimed no effect whereas the three contractors who responded all reported a significant decrease in the time they spent on business trips. Informal conversations on the network (by way of personal messages) and my curiosity uncovered that many times contractors use teleconferencing as their primary day-to-day connection with the government. After an initial face-to-face meeting and the awarding of a contract, follow on meetings and close liaisons are maintained electronically between contractors and their clients. This finding supports the concept of teleconferencing as a link supporting ad hoc relationships. Usually, the contractor communicates via teleconferencing for only as long as the contract is in effect. As for the senior military officials, their travel schedules were unaffected by teleconferencing. Conversations with generals aides indicate these senior executives must travel as much for protocol and appearances as for conducting business. In both these cases, namely the observations on

generals and contractors, there are only five total cases, too few to statistically prove such concepts. A study on executive time and information needs would reveal more about the potential impact of teleconferencing on senior executive effectiveness. This is a third possible area for future research.

If the quality of the decision can be improved due to the timely discussion of issues and the acceptance of a decision or policy is based on consensus, then teleconferencing should lead to an improvement in the quality of a decision. Teleconferencing has increased the number of contacts both at work and outside of the user's office or agency. These liaisons will not be maintained unless there is a benefit resultant from such collaboration. Teleconferencing improves on such collaborative efforts.

Personal computer ownership and time spent on-line tend to increase the total number of contacts a teleconferencing user maintains. Perhaps this can be explained if we think of such tools as an automated rolodex file. Computers and teleconferencing allow for rapid updating of addresses, phone numbers, lists of skills, and facilitates quick turn around requests for information.

Improvements in research, the time it takes to do staff studies, and in information access due to teleconferencing should lead to better staff actions. It would seem that the use of computer-based teleconferencing allows the user to save time. Time spent on those tasks where face to face interaction

is needed may be allowed due to the use of these networks. Time saved by teleconferencing may be applied to deeper thought or analysis. Even time saved by teleconferencing yet spent on leisure activities should benefit the future Army, if only therapeutically.

5. Changes in Job Effectiveness

In all measures of effectiveness, teleconferencing seems to have resulted in slight to moderate improvements. Forty to fifty percent of the respondents claim no effect due to teleconferencing. This is a sizeable proportion but nearly no one reported negative effects in efficiency or effectiveness due to teleconferencing. Therefore, networks do improve business trip effectiveness, effectiveness while in meetings, and the users over all job effectiveness albeit slightly. Furthermore, this new staff technology has improved command and staff procedures. Computer-based teleconferencing is definitely a net plus to improving organizational effectiveness.

These measures of effectiveness seem to be dependent on the amount of time spent on-line in the Forumnet system. Those who own personal computers also report greater effectiveness. This may be due to their ability to handle more information. Computers in general have increased our capacity to manipulate numbers and compile data (either in number or text form). In both cases, as a user of these tools becomes more familiar with the

technology, he or she becomes more efficient in the user of computer-based systems.

As over all effectiveness on the job increase and the work view changes for the better due to the use of teleconferencing, a force multiplying effect also seems to be taking hold. In chapter I we spoke of the Army's missions as being to fight and win battles or to prepare for battles. Troop units try to develop leaders who will take the initiative and outwit the enemy. Decentralized operations conducted within the over all commander's intent are key to future victory. Empowering subordinates is just as critical during peacetime staff functions as it is during the heat of battle. The remaining strong signals transmitted by our survey have empowerment as a common theme.

At the US Army War College in Carlisle Barracks, Pennsylvania, a group of lieutenant colonels and colonels is studying the application of teleconferencing as a senior executive decision support system. Called the Living Expert System (LEXSYS) this study project's focus is on cataloguing expertise and harnessing this experience and knowledge for use by three and four staff generals (or by their senior executive service civilian counterparts). The study group leader is assigned to the AWC's department of command, leadership and management. With this group of senior officers and those cadets mentioned above, the strengths of teleconferencing will no doubt shape tomorrow's staffs.

B. Conclusions --- A Look Toward Tomorrow's Army

In discussions within the Army:Forum system, it has been reported that each new class of cadets at the United States Military Academy (USMA) is issued personal computers at the start of the plebe year.[52] Additionally, the ROTC Cadet Command[53] has a computer literacy requirement for all candidates studying at the hundreds of universities and colleges across the United States. Recently, I spoke with a member of the USMA class of 1991. This sophomore reported that most of his homework assignments are aided in some way by personal computer use[54]. In addition to playing computer video games and scheduling extracurricular activities[55], today's West Pointers are coached along in their engineering homework via computer, they use their computers as word processors, they can conduct a library search from their rooms via the USMA network, and they can monitor their weekly

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[52] A "plebe" is a West Point freshman. The USMA is the minority producer of lieutenants in the US Army. But it is viewed by most as the developmental center for the Army's future officer corps. The Army Officer's Guide states that the values of the Military Academy are the values of the US Army. Therefore knowing all West Pointers are now using personal computers and have their own network upon which they run or schedule the brigade activities is a telltale sign of progress

[53] ROTC states for Reserve Officer Training Course. The Cadet Command produces the majority of all Army officers. Its pre-commissioning standards therefore determine a common denominator for the technical and tactical proficiency of a new second lieutenant

[54] Mr. Rob Hynes, USMA '91, had been home for the holidays during December 1988. His father, Dr. Tom Hynes, is a physicist and director of the Technical Integration & Management Division at the Army's Materials Technology Laboratory in Watertown, MA. Dr. and Mr. Hynes and I discussed cadet use of computers and networks during his visit home. These general observations have been confirmed by me in conversations with my own contemporaries (specifically with CPT Peter DeRobertis, Mathematics Department, and with CPT Chuck Powell, Behavioral Science & Leadership) assigned to the USMA as instructors.

[55] Each cadet company and regiment maintains an electronic bulletin board according to Mr. Hynes.

progress by calling up their grades which professors post frequently and electronically.

Tomorrow s commanders and staff may find each new officer arriving on post with a personal computer in their house hold goods. And since the vast majority of those who've taken the survey report they use a computer at work, it may soon be that all staff work is done with the aid of a computer.[56] As these officers and each new generation of cadets joins the officer corps, personal computers, file transfer protocols, local area networks, and teleconferencing will become common place.

Through the use of computer-based teleconferencing the U.S. Army should be able to capture and harness its knowledge capital. Each individual learns as he or she conducts their daily business. Teleconferencing responds to the organizational flow requirements within the Army in a way which is unique, for this technology is people based not hardware driven.

Information or data alone is merely raw material. Information must be transformed by human intelligence before it has value Computer-based teleconferencing enhances this value-added process. Teleconferencing links intelligence not just machines or information. By creatively linking the

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[56] Nearly every staff problem presented at the Combined Arms and Services Staff School (CAS3) in Fort Leavenworth has in it the opportunity to use a programmable calculator or personal computer. As each class rotates thru CAS3, more and more programs and applications are being shared within a number of user groups which tend to develop there.

existing talent the Army already possesses, it can increase its combat potential through better peacetime preparations using teleconferencing. Users of teleconferencing contribute to the collaborative efforts of staffs. Computer-based teleconferencing is both a technical and a social innovation. Teleconferencing's potential is greater than artificial intelligence technology for the Army. Teleconferencing is not limited by artificial intelligence algorithms or by the biases of the programmer. Computer-based teleconferencing is keyed to human potential rather than machine capacity

The users of teleconferencing represent a critical mass of the Army s next generation leaders. A majority of any organization is not always necessary to effect change. Many times, only a few skilled and knowledgeable leaders comprise enough mass to be deemed critical. Teleconferencing is one of the tools these change masters are employing today. Users of computer-based teleconferencing may shape the future Army into a learned, more adaptive, and more effective force.

Teleconferencing is a staff technology which measurably improves organizational effectiveness. And since peacetime preparation for the next battle is key to our readiness, teleconferencing becomes an indirect combat multiplier. Tomorrow's Army will rely on such staff technologies more and more as new personnel learn the needed skills. Tomorrow's leaders will depend on computer-based networks even more so than do the leaders of today. Today's knowledge workers will become tomorrow s leaders. Perhaps we should start today to shape tomorrow s staffs in a way that will

best prepare for and win future battles? Understanding the power found within the parallel organization may help. Teleconferencing is a staff technology which should be taught and used by all to apply this power.

APPENDIX 1 --- Survey

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This questionnaire is designed to measure how we as soldiers and civilians working within or for the US Army handle information. It focuses on computer-based teleconferencing but also addresses other communications or "staff technologies".

****

CHOOSE THE RESPONSE WHICH IS BEST FOR YOUR OWN SITUATION OR UNDERSTANDING OF THE QUESTION. THERE ARE NO "RIGHT" OR "WRONG" ANSWERS. THERE ARE 70 QUESTIONS. THIS QUESTIONNAIRE TAKES ABOUT 20-30 MINUTES TO COMPLETE. PLEASE ATTEMPT TO ANSWER ALL THE QUESTIONS. YOU MAY SKIP ANY QUESTION WHICH YOU DO NOT WISH TO ANSWER -- BUT THIS MAY RESULT IN AN INCOMPLETE ANALYSIS.

****

NOTE: YOUR INDIVIDUAL RESPONSES WILL BE KEPT STRICTLY CONFIDENTIAL!

****

1. I've had formal training on computers or a computer-based technology while assigned to my present organization.

   (1) YES (2) NO

2. I've taken formal training on a computer-based technology in a previous job.

   (1) YES (2) NO

3. Everything I've learned about computers I've learned on the job (OJT) or thru self-study.

   (1) YES (2) NO

4. I've been using computers for _____.

(1) Less than a year (2) 1-3 years (3) 4-6 years (4) 7+ years

5. Do you own a personal computer (PC)?

   (1) YES (2) NO

6. Is there a PC or a terminal in your office?

   (1) YES (2) NO

7. In my day-to-day work, I use _____.

(1) output from a computer operated by somebody else.
(2) a 'micro' computer (eg. IBM PC, Zenith, AppleII, MAC)
(3) a 'mini-' or 'super-mini' computer (eg. VAX, WANG, HP).
(4) a main frame or 'super' computer (eg. IBM, HONEYWELL, or CRAY).

8. I can write programs for the computer I use.

(1) YES (2) NO

CHOOSE A NUMBER FROM 1 (LOW) TO 5 (HIGH) WHICH INDICATES YOUR LEVEL OF AGREEMENT WITH THE FOLLOWING STATEMENTS.

1 = Disagree 2 = Slightly Disagree 3 = Neither Agree or Disagree 4 = Slightly Agree 5 = Agree

9. I find personal computing to be both beneficial and popular.	1	2	3	4	5
10. I find that everyone is using electronic mail.	1	2	3	4	5
11. I find Local area networks (LANs) to be universally available at a low cost.	1	2	3	4	5
12. I've used a hierarchy of networks to interconnect different levels of my organization's communications system.	1	2	3	4	5

CHOOSE A NUMBER FROM 1 (LOW) TO 5 (HIGH) WHICH INDICATES YOUR LEVEL OF AGREEMENT WITH THE FOLLOWING STATEMENTS.

1 = Disagree 2 = Slightly Disagree 3 = Neither Agree or Disagree 4 = Slightly Agree 5 = Agree

13. My boss finds personal computing to be both beneficial and popular.	1	2	3	4	5
14. My boss finds that everyone is using electronic mail.	1	2	3	4	5
15. My boss thinks Local area networks (LANs) are universally available at a low cost.	1	2	3	4	5

16. My boss uses a hierarchy of networks to interconnect different levels of the organization's communications system. 1 2 3 4 5

CHOOSE A NUMBER FROM 1 (LOW) TO 5 (HIGH) WHICH INDICATES YOUR LEVEL OF AGREEMENT WITH THE FOLLOWING STATEMENTS.

1 = Disagree 2 = Slightly Disagree 3 = Neither Agree or Disagree 4 = Slightly Agree 5 = Agree

17. My subordinates find personal computing to be both beneficial and popular. 1 2 3 4 5

18. My subordinates are using electonic mail. 1 2 3 4 5

19. My subordinates think Local area networks (LANs) are universally available at a low cost. 1 2 3 4 5

20. My subordinates use a hierarchy of networks to interconnect different levels of the organization's communications system. 1 2 3 4 5

CHOOSE A NUMBER FROM 1 (LOW) TO 5 (HIGH) WHICH INDICATES HOW COMPUTER-BASED TELECONFERENCING HAS AFFECTED YOUR USE OF OTHER COMMUNICATIONS SYSTEMS.

1 = Significant Decrease 2 = Slight Decrease 3 = NO Effect 4 = Slight Increase 5 = Significant Increase

What effect has the use of computer-based teleconferencing had on your use of.....

21. ... the telephone (for voice communications)? 1 2 3 4 5

22. ... mail services (US, FEDEX, or UPS) 1 2 3 4 5

What effect has teleconferencing had on.....

1 = Significant Decrease 2 = Slight Decrease 3 = NO Effect 4 = Slight Increase 5 = Significant Increase

23. ... the time you spend traveling? 1 2 3 4 5

24. ... your effectiveness on business trips? 1 2 3 4 5

25. ... the number of people with whom you consult within your work place? 1 2 3 4 5

26. ... the number of people you deal with outside of your unit, agency or firm? 1 2 3 4 5

27. ... the time you spend reading books, journals, or technical reports? 1 2 3 4 5

CHOOSE A NUMBER FROM 1 (LOW) TO 5 (HIGH) WHICH INDICATES HOW COMPUTER-BASED TELECONFERENCING HAS AFFECTED YOUR DUTY PERFORMANCE.

1 = Significant Decrease 2 = Slight Decrease 3 = NO Effect 4 = Slight Increase 5 = Significant Increase

What effect has teleconferencing had on.....

28. ... the number of assignments you've been given by your boss? 1 2 3 4 5

29. ... your effectiveness in meetings? 1 2 3 4 5

30. ... your effectiveness while on travel? 1 2 3 4 5

31. ... your ability to do research? 1 2 3 4 5

32. ... your over-all effectiveness on the job? 1 2 3 4 5

CHOOSE A NUMBER FROM 1 (LOW) TO 5 (HIGH) WHICH INDICATES YOUR LEVEL OF AGREEMENT WITH THE FOLLOWING STATEMENTS.

1 = Disagree 2 = Slightly Disagree 3 = Neither Agree or Disagree 4 = Slightly Agree 5 = Agree

33. Computer-based teleconferencing makes my job easier. 1 2 3 4 5

34. Teleconferencing has the potential to save time on staff studies. 1 2 3 4 5

35. Teleconferencing has the potential to reduce the size of staffs. 1 2 3 4 5

36.	Teleconferencing has the potential to reduce the time people spend commuting to and from work.	1	2	3	4	5
37.	I will use a computer in my next job.	1	2	3	4	5
38.	I will use teleconferencing in future assignments.	1	2	3	4	5
39.	Teleconferencing is changing the way I view my work.	1	2	3	4	5
40.	Through teleconferencing my opinions are better heard.	1	2	3	4	5
41.	There's too much information for me to digest and use effectively due to teleconferencing.	1	2	3	4	5
42.	Teleconferencing has helped me handle information efficiently.	1	2	3	4	5
43.	I have greater access to information.	1	2	3	4	5
44.	Teleconferencing has broadened my scope or interests.	1	2	3	4	5
45.	In the future, responsible positions will go to those with computer-based skills.	1	2	3	4	5
46.	In the future, power will be more concentrated in the hands of the technically competent.	1	2	3	4	5

HOW OFTEN DO YOU FIND YOURSELF.....

1 = NEVER 2 = SELDOM 3 = HALF THE TIME 4 = OFTEN 5 = ALWAY

47.	Talking to your co-workers about an item discussion from a teleconference.	1	2	3	4	5
48.	Seeking information from these networks for use in your day to day work.	1	2	3	4	5
49.	Merely reading the conference items without commenting.	1	2	3	4	5

50. Commenting on an item of interest. 1 2 3 4 5

51. Contributing as a subject matter expert on an item discussion. 1 2 3 4 5

52. Channeling information between others either on-line or at the office. 1 2 3 4 5

53. How much time do you spend on any of the networks in the Army:Forum system per week?

(1) less than 1 hour.
(2) about 1-3 hours.
(3) between 3-5 hours.
(4) between 5-7 hours.
(5) more than 7 hours.

54. Do you participate in any other network besides this one?

(1) YES (2) NO

CHOOSE A NUMBER FROM 1 (LOW) TO 5 (HIGH) WHICH INDICATES YOUR LEVEL OF AGREEMENT WITH THE FOLLOWING STATEMENTS.

1 = Disagree 2 = Slightly Disagree 3 = Neither Agree or Disagree 4 = Slightly Agree 5 = Agree

Over all I think these networks.....

55. ... will change the organizational structure of the Army. 1 2 3 4 5

56. ... will improve command & staff procedures. 1 2 3 4 5

57. ... must be under the control of the chain-of-command. 1 2 3 4 5

58. ... allow me to cut thru red tape. 1 2 3 4 5

59. ... are 'flattening the bureaucracy'. 1 2 3 4 5

60. ... empower subordinates by including them into the decision making process. 1 2 3 4 5

61. ... divide staff members into two groups: those with computer skills and those without. 1 2 3 4 5

62. ... are viewed as a threat to the chain of command's authority. 1 2 3 4 5

63. ... are more problems than they're worth. 1 2 3 4 5

64. Have you talked about your use of teleconferencing with your boss?

(1) YES (2) NO

65. Is the use of teleconferencing mentioned in your OER support form (DA form 67-8-1) or in your job performance standards?

(1) YES (2) NO

66. My grade/rank is _____.

(1) enlisted (specialist or sergeant) or GS 1-9.
(2) warrant officer, lieutenant, captain, or GS 10-12.
(3) major, lieutenant colonel, colonel or GS/GM 13-15+.
(4) general officer or SES.
(5) N/A -- I'm a contractor working for the government.

67. I'd catagorize my job/duties as being primarily _____.

(1) administrative. [I'm a staff officer or assistant to an executive but supervise no one.]

(2) technical. [I spend more than 50% of my time doing 'mental work', 'at the bench' doing science & engineering, or working with my hands.]

(3) managerial. [I've got at least three subordinates as direct reports.]

(4) executive. [I am a commander or director of my organization.]

(5) other. [I do something else.]

68. My sex is ..... (1) Male (2) Female

69. I'm _____ years old.

(1) 25 or younger (2) 25-30 (3) 31-35 (4) 36-40

(5) 41-45 (6) 46-50 (7) over 50.

The Army can be considered an open organizational system of three primary components.

70. To which do you belong?

(1) the combat subsystem (a TOE unit-of-the-line),

(2) production subsystem (base operations, research and development, and/or recruiting)

(3) integrating/coordination subsystem (the DA :staff or 'stovepipe' agency such as Health Services Command, the CID, or the Information Systems Command).

****

"Between now and the year 2000, the primary responsibilities and challenges of the [staff officer] will gradually shift away from managing systems toward managing information. The need for timely, accurate, complete, and integrated information is growing exponentially."

****

THANK YOU FOR YOU TIME. THE RESULTS OF THIS SURVEY WILL BE SHARED ON THE ARMY:FORUM SYSTEM AS SOON AS ALL DATA HAS BEEN ANALYZED. FOR MORE INFORMATION, SEND A MESSAGE TO JOHN LESKO OR CALL AV 955-5746.

****

BIBLIOGRAPHY

Andre, Rae. "The Scientist, The Artist, and The Evangelist" *NEW MANAGEMENT*, Spring 1985.

AMC NEWS, "Stone Says Procurement System Works", HQ, US Army Materiel Command, September 1988.

ARMY COMMAND AND MANAGEMENT: THEORY AND PRACTICE. A reference text for the Department of Command, Leadership, and Management, US Army War College, Carlisle Barracks, PA 17013-5050, 1985-1986 version.

Basadur, M.; Green, G.; and Green, S. "Training in Creative Problem Solving: Effects of Ideation and Problem Finding and Solving in an Industrial Research Organization". ORGANIZATIONAL BEHAVIOR AND HUMAN PERFORMANCE. Vol 30 (1982) 41-70.

Bennis, Warren and Burt Nanus. LEADERS: THE STRATEGIES FOR TAKING CHARGE (Harper & Row: New York, 1985).

Bruins, Derk. "Technology and the Military: The Impact of Technological Change on Social Structure in the United States Navy". As found in TECHNOLOGY, THE ECONOMY, AND SOCIETY: THE AMERICAN EXPERIENCE edited by Joel Colton and Stuart Bruchey (Columbia University Press: New York, 1987).

Blau, Peter M. and Marshall W. Meyer. "Theory and Development of Bureaucracy". As found in A STUDY OF ORGANIZATIONAL LEADERSHIP, edited by the Associates, Office of Military Leadership, United States Military Academy (Stackpole Books: Harrisburg, Pennsylvania, 1976).

Borgman, COL John D. and MAJ Alex Wojcicki. "The Challenge of Force Modernization" *ARMOR MAGAZINE*, Sep-Oct 1983.

Burns, James MacGregor. LEADERSHIP (Harper & Row: New York, 1979).

Calloway, LTC Cecil B. and MAJ Keith L. Kettler. "Leadership: A Multi-Dimensional Framework" EXCELNET CONCEPT PAPERS, Vol 3, May 86 - Oct 86, pp 69-75. US Army FORUM, HQDA, DACS-DMF, Washington, DC.

Campbell, David. If you don't know where you're going you'll probably end up somewhere else. (Argus Communications: Allen, Texas, 1974).

Campbell, David. Take the road to creativity and get off you dead end. (Center for Creative Leadership: Greensboro, NC, 1985).

Carley, Kathleen and Kira Wendt. "Electronic Mail and the Diffusion of Scientific Information: The Study of Soar and Its Dominant Users" Unpublished work. Carnegie Mellon University. Department of Social and Decision Sciences. Pittsburgh, PA. 6 July 1988.

Cornish, Edward, editor. CAREERS TOMORROW: THE OUTLOOK FOR WORK IN A CHANGING WORLD (World Future Society: Bethesda, MD, 1988).

Demora, Stephen. "Advanced Technology -- Can the US Army Handle It?" Item 100 on U.S. Army Forum Sub-Conference Army:TACTICS covering a discussion from October-December 1986.

Douglas, Susan J. "Technical Innovation and Organizational Change: The Navy's Adoption of Radio, 1899-1919". As found in MILITARY ENTERPRISE AND TECHNOLOGICAL CHANGE: PERSPECTIVES ON THE AMERICAN EXPERIENCE, edited by Merritt Roe Smith (The MIT Press: Cambridge, Massachusetts, 1985).

Drucker, Peter. "How to Measure White-Collar Productivity" *THE WALL STREET JOURNAL*, 26 Nov 85.

Fiedler, Fred. "The Contingency Model: New Directions for Leadership Utilization". As found in A STUDY OF ORGANIZATIONAL LEADERSHIP, edited by the Associates, Office of Military Leadership, United States Military Academy (Stackpole Books: Harrisburg, Pennsylvania, 1976).

Field Manual 22-103: LEADERSHIP AND COMMAND AT SENIOR LEVELS. HQ, Department of the Army, June 1987.

Field Manual 100-5: OPERATIONS. HQ, Department of the Army, Aug 1982.

Field Manual 101-5: STAFF ORGANIZATIONS AND OPERATIONS. HQ, Department of the Army, May 1984.

Friedman, Richard S. *et. al.* ADVANCED TECHNOLOGY WARFARE (Harmony Books: New York, 1985).

Fowler, Floyd J. SURVEY RESEARCH METHODS (Sage Publications: Beverly Hills, CA, 1984).

Gibson, James *et. al.* "The Communications Process". As found in A STUDY OF ORGANIZATIONAL LEADERSHIP, edited by the Associates, Office of Military Leadership, United States Military Academy (Stackpole Books: Harrisburg, Pennsylvania, 1976).

Hall, Richard H. ORGANIZATIONS: STRUCTURE AND PROCESS (Prentice-Hall Inc, Englewood Cliffs, New Jersey, 1982).

Herzberg, Frederick. "Maximizing Work and Minimizing Labor" *INDUSTRY WEEK*, 13 October 1980.

Hiltz, Starr Roxanne. "Impact of a Computerize Conferencing System upon Use of Other Communication Modes" A study partially supported by a grant from the National Science Foundation (MCS-77-27813).

Hiltz, Starr Roxanne and Murray Turoff. THE NETWORK NATION: HUMAN COMMUNICATION VIA COMPUTER (Addison-Wesley Inc: Reading, Massachusetts, 1978).

Hitt, William D. THE LEADER-MANAGER: GUIDELINES FOR ACTION (Battelle Press: Columbus, Ohio, 1988).

Johansen, Robert *et. al.* ELECTRONIC MEETINGS: TECHNICAL ALTERNATIVES AND SOCIAL CHOICES (Addison-Wesley Inc: Reading, Massachusetts, 1979).

Johnson, Ross H. and Paul R. Winn. QUANTITATIVE METHODS FOR MANAGEMENT (Houghton Mifflin: Boston, 1976).

Kanter, Rosabeth Moss. THE CHANGE MASTERS (A Touchstone Book: New York, 1984).

Kanter, Rosabeth Moss, *et. al.* "The Future of Workplace Alternatives" *MANAGEMENT REVIEW*, July 1986.

Kerr, Elaine B. and Starr Roxanne Hiltz. COMPUTER-MEDIATED COMMUNICATIONS SYSTEMS: STATUS AND EVALUATION (Academic Press: New York, 1982).

Kraemer, Kenneth L. and John Leslie King. "Computer-Based Systems for Cooperative Work & Group Decision Making" *ACM COMPUTING SURVEYS*, Vol 20 No.2, June 1988.

Kuehn, Thomas J. and Alan L. Porter, editors. SCIENCE, TECHNOLOGY, AND NATIONAL POLICY (Cornell University Press: Ithaca, NY, 1981).

Kuhn, Thomas S. THE STRUCTURE OF SCIENTIFIC REVOLUTIONS, 2nd ed. (University of Chicago Press, 1970).

Labaw, Patricia. ADVANCED QUESTIONNAIRE DESIGN (Abt Books: Cambridge, MA, 1980).

Luttwak, Edward N. THE PENTAGON AND THE ART OF WAR: THE QUESTION OF MILITARY REFORM (Simon and Schuster: New York, 1985).

Malone, COL Dandridge M.. "X=H" Task Force Delta Concept Paper available thru US ARMY FORUM, HQDA, DACS-DMF, Washington, DC.

Mechanic, David. "Sources of Power of Lower Participants in Complex Organizations". As found in A STUDY OF ORGANIZATIONAL LEADERSHIP, edited by the Associates, Office of Military Leadership, United States Military Academy (Stackpole Books: Harrisburg, Pennsylvania, 1976).

Meeks, Brock N. "An Overview of Conferencing Systems: A Guided Tour through COM, EIES, PARTI, NOTEPAD, and Other Systems" *BYTE*, December 1985.

Morrison, James L. "A Personal Experience with Computer Conferencing: Problems and Possibilities", presented as a paper at the Annual Meeting of the American Educational Research Association (Washington, D.C., 20-24 April 1987).

Mueller, Robert K. CORPORATE NETWORKING: BUILDING CHANNELS FOR INFORMATION AND INFLUENCE (Free Press: New York, 1986).

Norusis, Marija J. THE SPSSX GUIDE TO DATA ANALYSIS (SPSS Inc.: Chicago, 1986).

Ofner, J. Alan. "Middle Management: The Neglected Resource" *PERSONNEL JOURNAL*, December 1985.

Parnes, Robert. "Learning to Confer: The Interplay of Theory and Practice in Computer Conferencing". ADVERTEL Communication Systems, Inc. @ 1981, 82, 83, 85, 87 in The Organizer s Guide to Confer . See also in the FORUM notebook: "The Beginners Guide to CONFER", "The User s Guide to CONFER , and "The Reference Guide to CONFER".

Peters, Thomas J. and Robert H. Waterman, Jr. IN SEARCH OF EXCELLENCE: LESSONS FROM AMERICA'S BEST-RUN COMPANIES (Harper & Row: New York, 1982).

Porter, Lyman L. *et. al.* "Direct Effects of Groups on Member Behavior: Group Norms". As found in A STUDY OF ORGANIZATIONAL LEADERSHIP, edited by the Associates, Office of Military Leadership, United States Military Academy (Stackpole Books: Harrisburg, Pennsylvania, 1976).

SELECTED COMPUTER ARTICLES 86-87. National Defense University. DoD Computer Institute.

Senn, James A. INFORMATION SYSTEMS IN MANAGEMENT (Wadsworth Publishing Company: Belmont, California, 1982).

Simon, Jane Fitz. "Corporate Hierarchy Deemed Dead: Computers Change Rules" *THE BOSTON GLOBE*, 11 October 1988.

Steiner, Ivan D. GROUP PROCESS AND PRODUCTIVITY (Academic Press: New York, 1972).

Sutherland, Duncan B. "The Future of the *Office of the Future* *MANAGEMENT REVIEW*, July 1986.

Taylor, James C. and David G. Bowers. SURVEY OF ORGANIZATIONS (The University of Michigan: Ann Arbor, Michigan, 1974).

U.S. Army Forum Sub-Conference Army:LES. Proceedings of Army:LES. 18 Nov 86 thru 1 Aug 87.

Wheeler, Wayne and Louis Csoka. "Leader Behavior -- Theory and Study". As found in A STUDY OF ORGANIZATIONAL LEADERSHIP, edited by the Associates, Office of Military Leadership, United States Military Academy (Stackpole Books: Harrisburg, Pennsylvania, 1976).

Williamson, John N., editor. THE LEADER-MANAGER (John Wiley & Sons: New York, 1984).

Zand, Dale E. INFORMATION, ORGANIZATION, AND POWER: EFFECTIVE MANAGEMENT IN THE KNOWLEDGE SOCIETY (McGraw-Hill Book Co: New York, 1981).

Zorkoczy, Peter. INFORMATION TECHNOLOGY (Pitman Publishing Ltd: London, 1985).

Zuboff, Shoshana. IN THE AGE OF THE SMART MACHINE (Basic Book, Inc.: New York, 1988).

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