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DISSERTATION

WHAT IS THE IMPACT OF TELEPHONES AND SYNCHRONOUS COMPUTER-MEDIATED COLLABORATION ON THE WORK OF VIRTUAL TEAMS?

VOLUME ONE

CHAPTERS ONE AND TWO

Submitted by

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In partial fulfillment of the requirements

for the Degree of Doctor of Philosophy

Colorado State University

Ft. Collins, Colorado

Fall 1999

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COLORADO STATE UNIVERSITY

October 26, 1999

WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY JOEL D. OLSON ENTITLED WHAT IS THE IMPACT OF TELEPHONES AND SYNCHRONOUS COMPUTER-MEDIATED COLLABORATION ON THE WORK OF VIRTUAL TEAMS BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

Committee on Graduate Work

Advisor

Department Head

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ABSTRACT OF DISSERTATION

WHAT IS THE IMPACT OF TELEPHONES AND SYNCHRONOUS COMPUTER-MEDIATED COLLABORATION ON THE WORK OF VIRTUAL TEAMS?

This study endeavors to discover hypotheses related to effective virtual teams. A virtual team is defined as any team functioning at a distance of greater than fifty feet, which collaborate in accomplishing their purpose through electronic communication. It includes collaborative computer-mediated teams, but is not limited to them. The study uses a phenomenological heuristic case study.

Postmodern philosophy and postindustrial society are linked to changes in the marketplace and the development of virtual work environments.

A literature review identifies seven team domains (a) purpose, (b) roles, (c) leadership, (d) decision processes, (e) relationships and trust, (f) communication, and (g) effectiveness. These domains are used to frame the experience of a virtual team.

The study virtual team experienced telephone, face-to-face, and synchronous computer-mediated conferences. Data was collected using an electronic diary, electronic mail, and personal interviews. The questions focused on what was different between the face-to-face conference and the two electronic conferences.

Communication is effected most strongly. This effect impacts the remaining domains. Decision processes were narrower and featured conformity. Effectiveness was diminished with the reduction of social facilitation and increase in social loafing.

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Leadership was effected by the change in communication network from an all-channel network to a wheel network. Relationships and trust were effected by erosion of trust. Roles changed with the team's reduced ability to resolve difference and execute detailed action. Purpose became more task oriented.

Technology is identified as a new team domain. Fear, previous electronic experience, and personal values are elements of the technology domain. Factors involved in team member satisfaction are related to personality, isolation, and team membership.

McGrath's work taxonomy (McGrath, 1984, McGrath & Hollingshead, 1993) is used as a template for the agenda in all three conferences. Tasks related to generating, choosing, negotiating, and execution are addressed. Daft's colleagues (Daft & Lengle, 1986; Trevino, et al. 1987) suggestion that the "information richness" of the communication medium determines task effectiveness is substantiated. Hiltz (Hiltz, et al. 1978), Kiesler (Kiesler, et al.1984), Gersick's (Gersick, 1988) punctuated equilibrium, Fulk's (Fulk, et al. 1990) subjective emphasis, and Hesse's (Hesse, et al. 1990) temporal effects are all substantiated.

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CHAPTER ONE

The Problem and the Question

Introduction

> For everything there is a season, and a time for every matter under heaven: a time to be born, and a time to die; a time to plant, and a time to pluck up what is planted; a time to kill, and a time to heal; a time to break down, and a time to build up; a time to weep, and a time to laugh; a time to mourn, and a time to dance; a time to throw away stones, and a time to gather stones together; a time to embrace, and a time to refrain from embracing; a time to seek, and a time to lose; a thumb to keep, and a time to throw away; a time to tear, and a time to sew; a time to keep silence, and a time to speak; a time to love, and a time to hate; a time for war, and a time for peace. Ecclesiastes 3: 1-8 (Revised Standard Version).

Ecclesiastes, written about 200 BC (Douglas, 1998), asks questions related to the meaning of life. Life is perceived as a riddle, for which the Preacher tries to find the answer. The Preacher looks at wisdom, pleasure, work, power, riches, religion, and other sources to find the answer. The Preacher finds them all wanting. "What has been is what will be, and what has been done is what will done; there is nothing new under the sun" Ecclesiastes 1: 9 (Revised Standard Version). Eventually the Preacher suggests the solution to the riddle (Guthrie, et al. 1970).

The Preacher suggests that only change is changeless, the one constant in the universe is change, that change can be bewildering and profoundly disturbing. The

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Preacher suggests that rather than resisting change, it is wiser to accept change and adjust to it. Wisdom is about discerning the season, the times, and determining the appropriate response. "God has made everything beautiful in its time. He has also set eternity in the hearts of men; yet they cannot fathom what God has done from beginning to end" Ecclesiastes 3: 11 (Revised Standard Version). All times are equal if they are emptied of their context and content; however, we have no sense of such empty time. Time always carries context and content. Every time of life comes to us with context and content, with opportunity and challenge. Wisdom is about interpreting time's context and content (Guthrie, et al. 1970).

People are creatures of time who transcend time. Human transcendence of time comes from our ability to see the past, present, and future from the perspective of an observer. People are simultaneously captured by time as participants, but also transcend time as observers. People transcend time by bringing meaning to time. Yes, times are changing. What is the nature of that change? What is the best response to that change? Only people have the liberty to evaluate change and become its active partners. Wisdom is about interpreting time's context and content.

Context for Work

Postmodern Society

There are two current changes shaping contemporary work environments. One is philosophic, the other economic. We are moving philosophically from a modern to a post-modern society while we move economically from an industrial society to a post-industrial one. Both of these changes affect contemporary work environments. One important aspect of contemporary work environments affected by these changes is team

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behavior. Contemporary teams placed in postmodern and postindustrial work environments will be different from teams in earlier work environments. One clear difference is the introduction of virtual teams and virtual work. Contemporary virtuality is supported by both the societal philosophic and economic changes of postmodernism and post industrialism.

There has not been much study on the intersection of teams and their behavior with this new postmodern, postindustrial work environment. This study intended to trace the development and impact of both postmodernism and post industrialism on contemporary work environments. How are contemporary work environments different from previous work environments? The study focused on the impact of contemporary work environments on teams and how to improve the effectiveness of teams in contemporary work environments.

This chapter outlines the problem presented by changing philosophic and economic systems on contemporary work environments. Are contemporary work environments really different than earlier work environments? If so, what are the major distinctions? The chapter concludes with specific research questions intended to bring wisdom and direction to these changes.

Society seems to be engaged in a cultural shift similar to the birth of modernity from the medieval era. We are in the midst of a transformation from the modern to the postmodern era (Allen, 1989). It is difficult to forecast what the future era will be (McFague, 1982). Still, there are signs that significant change is taking place in our philosophical culture.

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Postmodernity is used by so many people to focus on so many different facets of culture and intellectual life that its meaning is quite fuzzy. Postmodern was first used in the 1930s to describe a historical (Rose, 1992) and artistic transition (Van Gelder, 1991) already present. However, postmodernism was not widely observed until the 1970s. It first surfaced in the world of architecture. The term postmodernity was used in reference to architecture as architects moved away from simple, unadorned, impersonal boxes of concrete, glass, and steel to complex shapes and forms drawing from the past without any regard to their original purpose or function. Examples would be contemporary use of gargoyles, classical columns, and rose windows (Sire, 1976). When the French sociologist Lyotard used the term postmodern to signal a shift in culture, the term became a key word in cultural analysis (Lyotard, 1984).

Lyotard defined postmodern as incredulity towards meta-narratives (1984). No longer is there a single story , or one larger meta-narrative, that holds Western culture together. With postmodernity, no story can have any more validity than another. Postmodernity lacks philosophical clarity because it is more sociological in origin. It reflects the sociologists interest in how people relate, not in metaphysics or epistemology (Sire, 1976).

The term postmodernism implies an effort to move beyond modernism. Postmodernism pursues the rejection of the modern mind with its reliance on human reason and objective truth. Thus, to fully understand postmodernity, it is first necessary to comprehend it in the context of modernity. It is the modern world that postmodernism is responding to (Grenz, 1996).

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In the pre-modern period, epistemology was based on divine revelation and human reason resulting in objective truth. Truth was understood to be absolute and objective, distinct from the knower. Truth was gained by the linking of God's revelation with human reason. Some historians have suggested that the Enlightenment was the beginning of the modern era; however, the Renaissance was the real birth of the modern era. It was the Renaissance that replaced God by putting people at the center of what was ultimately real. Francis Bacon visualized people controlling nature through the discovery of nature's secrets (Grenz, 1996). The Enlightenment built on the Renaissance lifting the individual person to the center of the world (Grenz, et al. 1992). Descartes used his doubt, the thinking self is the basic truth that doubt must accept, to support the philosophical modern era. Descartes defined human nature as a cognitive substance and the human person as an independent rational being. Subsequently, Newton contributed the scientific mechanism for modernity describing the physical world as a consistent machine that could be understood. Descarte described modern people as autonomous and rational discerning a mechanical Newtonian world. Modernists eliminated divine revelation as a basis of epistemology and replaced it with human reasoning.

This dual emphasis of individual reason from Descarte and a mechanistic world from Newton led to exponential growth of knowledge. Habermas called this the Enlightenment Project (1992). People were focused on discerning the secrets of the universe so that nature could be utilized to benefit people and create a better world. This eventually led to the modern emphasis to manage life through the use of technology (Van Gelder, 1991).

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The foundation of this enlightenment project was epistemology. The modern mind carried the assumption that knowledge is certain, objective and good (Kee, 1990). The basis of this knowing was human reason.

This foundation set up the enlightenment project to look for methods that would demonstrate the truth of ideas and theories (Luecke, 1990). The enlightenment process subjected reality to the microscope of reason. It had complete confidence in the rational ability of people to know (Hedwig, 1990).

Further, enlightened people assumed that knowledge is also objective. The modernist would claim that knowledge was not subjective or passionate. They viewed the world as observers instead of participants (Westphal, 1990). This resulted in the fragmentation of knowing into separate disciplines giving special status to specialists. The specialist became an expert in a limited field of knowledge (Peters, 1985).

Modernists also assumed that knowledge was intrinsically good. It was axiomatic that discovery was always good. This resulted in a view that was completely optimistic. Progress was ensured, science and education would free us from our natural and social bondage (Grenz, 1996).

This optimism with its focus on reason led to an increasing sense of human freedom. Any philosophy that limited reason, experience, and autonomy was viewed with suspicion. Modern people idealized the autonomous self as a self-determining subject that lived outside any culture, tradition or group (Griffin, 1989).

Although Friedrich Nietzche (1844-1900) was one of the first to question modernity, the central assault was not initiated until the 1960s. The challenge came on two fronts. The United States was strongly influenced by the existentialism of Camus

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and Sarte. This resulted in the erosion of confidence in human reason, science, progress, and objective truth. It taught that individuals subjectively know truth. Truth was completely relative and individually constructed.

Today's postmodernism is related. It also asserts the subjective relative nature of truth, but the standard of truth construction is no longer the individual. Postmodernity constructs a subjective relative truth socially. The purpose of scholarship, politics, art, philosophy, and religion is not to seek moral absolutes. Instead their purpose is to empower groups to find their own voice and sets of values and symbols (Solomon, 1988). The catalyst was deconstruction in literary theory which soon initiated a new philosophic movement (Grenz, 1996)

Philosophic postmodernism and deconstruction are connected to literary stucturalism. Structuralists asserted that language is a social construct that is expressed as literary documents, or texts, as individuals attempt to bring meaning to their meaninglessness. Thus, literature supplies a taxonomy for organizing and comprehending experiences of reality. It is assumed that all groups and cultures have the same structure (Reese, 1980).

Postmodernists, or deconstructionists, deny structuralism. They insisted that meaning is found not in the text, but only as the interpreter dialogues with the text (Gadamer, 1984). Thus, any text will have multiple meanings dependent on the reader. The meaning is dependent on the context of the one who reads it, dialogues with it. The text will have as many meanings as it has readers.

Postmodern philosophers carried this perspective to the world as a whole. In the same way that text is read differently by various readers, all of reality will also be read

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differently by each knowing self that dialogues with it. The result is that there is no singular world meaning, no unity of knowledge, no transcendent core (Grenz, 1996).

Jacques Derrida (1976) insisted on the abandonment of both onto-theology, the attempt to present ontological descriptions of reality, and the metaphysics of presence, the notion that transcendency is present in reality. Reality does not contain anything transcendent. As a result, knowing is a process where the perspective of the self interprets reality.

Michael Foucault (1980) added an element of morality to Derrida. Foucault maintained that every interpretation of reality is an assertion of power. To name something is to have power over something. Naming thus does violence to what is named. Social institutions engage in violence as they force their interpretation on reality. This stands in contrast to Francis Bacon who sought knowledge in order to gain power over nature. Foucault insisted that every claim to knowledge is an act of power and does violence to the reality it interprets.

Richard Rorty (1979) dropped the notion of truth all together. Truth was not related to the mind, interpretation, or nature. Truth was not to be found in any correspondence with objective reality or with any coherence of the assertions. Rorty suggested that we give up any search for truth and be content simply with the process. What matters is not truth, but conversations about truth.

Derrida, Foucault and Rorty supported the central assumption of postmodern philosophy that all is difference. The singularly united universe of the Enlightenment is gone. There is no quest for a unified view of objective reality. Postmodernity claims that the world has no centers, only difference (Grenz, 1996). In its most stark sense,

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postmodernism stands for the death of reason (Power, 1990). Eclecticism based on self reference is a key feature (Kumar, 1995).

In the postmodern world, knowledge is not understood to be intrinsically good. The Enlightenment optimism of inevitable progress is replaced with a gnawing pessimism. There is no sense that each day things are getting better. The new generation lacks hope that humanity will be able to solve the world's great problems, or that their economic context will be better than their parents. Life on earth is perceived as being fragile. The emphasis is on collaboration rather than conquest (Grenz, 1996).

Postmodernists reject rationality as the primary way of knowing. Human intellect is dethroned as the final court of truth. Other avenues of knowing are also valued: intuition, emotions and social systems (Grenz, 1996).

Knowledge is not understood as being objective. Unlike the Enlightenment, postmodernists assert that the universe is not mechanistic. It features historical context, relationships and personal experience. The world is not perceived as being out there to be discovered. Reality is relative, indeterminate and participatory (Grenz, 1996).

The modern understanding of objectivity related to knowledge is also rejected. A knower is not disconnected, dispassionate and autonomous. Scientists are historically and culturally conditioned and carry that bias into their interpretation of reality. As a result, our knowledge is always incomplete (Grenz, 1996).

Postmodern people function in a context of a community base for understanding truth. They assert that any truth that is accepted is a function of the community in which the observer lives. Further, this relativity extends beyond mere perception to the ontology of truth itself. There is no absolute truth, only relative communities (Grenz, 1996).

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Thus, postmodernists have abandoned the Enlightenment Project. There is no search for truth that is universal, supracultural and timeless. Focus is instead given to truths for specific communities. Truth is connected to the assumptions of the community that facilitates the harmony of the community one participates in (Grenz, 1996).

Berman (1983) provided the most spirited rebuttal to postmodernism. Berman asserts that modernists find themselves in an environment filled with the promise of adventure, power, joy, growth and transformation. Simultaneously, modernists live in an environment that has the potential for the destruction of all that is known. Modernists have no choice other than to live with this paradox. It is the real world. Berman then suggests that postmodernists are irrelevant. Postmodernists are a side-show. The main event in the world is still modernity and will remain so. Many areas of the world are just beginning to experience modernity.

Habermas (1981) and Wellmer (1991) believed that modernity was an unfinished project. It still has potential. Bauman (1987) and Huyssen (1992) did not regard postmodernity as a new historical stage. Rather it is a new vantage point from which modernity can be examined to determine its performance and remaining potential. Similarly, Heller (1990) maintained that if the term postmodernity has any meaning, it must refer not to a new era, but rather to the further unfolding of modernity. Post-modern is not what follows modernity, but the unfolding of modernity. Jencks (1989) and Hassan (1985) believed that a new era has dawned that is discontinuous with the modern era.

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Post-industrial Society

Many people believe that the Western world is in the middle of a significant change. In the 60s and 70s Daniel Bell (1973) proposed a new view of contemporary society that he called the post-industrial society. Peter Drucker (1969) and Alvin Toffler (1970) popularized this theory of post-industrialism. The authors suggested that the West prepare itself for a possible uncomfortable transition to a new society. A society as different from the industrial society as the industrial society was different from the agrarian society.

The greatest connection with the former industrial society was the rise of the information society. The industrial society had made theoretical knowledge its most valued commodity. The new society has built on that value, and is named the information society. The new society is all about methods of acquiring, processing, and distributing information (Bell, 1973).

Alvin Toffler (1990) believed that humanity is undergoing a major transition. They describe this transition in terms of waves. He understood there to be four Ages with three waves of transition. The first wave was the transition from the Nomadic Age to the Agricultural Age about 20,000 to 10,000 years ago. This was a significant shift from the previous Nomadic Age. Farming and herding gradually eclipsed hunting and gathering. Population grew and cities developed as people settled down. The Industrial Age, eighteenth to early twentieth centuries, experienced the transition of farms to factories as the primary economic machine. Populations dramatically increased and became increasingly urban. The Information Age is growing out of the Industrial Age. We are

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currently in the turbulence of that change. Economies are becoming increasingly information-based, electronically connected, and globally interdependent.

Belbin (1993) also described human civilization in terms of ages. Belbin stated that there have been three ages: Pre-Industrial, Industrial and Post-Industrial. Distinctions of each stage are related to criteria for assigning work and methods for assigning work. The criteria for assigning work in the pre-industrial age were by categories of age, sex, tribe, and class. The method for assigning word was by visual inspection. The criteria for assigning work in the industrial age was by qualifications of trade skill, experience and education. The method for assigning work was by certification and selection panels. The criteria for assigning work in the post-industrial age are by the person, their team roles and personal orientation. The method of assigning work is by computer match and interview. Belbin asserts that we are presently in transition between the industrial and post-industrial ages.

Lipnack and Stamps (1994) built on Toffler's work. Lipnack and Stamps asserted that each of these great ages has also initiated new social configurations. Nomads were gathered around small groups. Agricultural settings were gathered around hierarchies. Industrialism led to the widespread use of bureaucracies. Our present information age has an emblematic organization also: boundary-spanning networks.

Each age builds on the social organization of the preceding age. This can be clearly seen with the small group of family. When hierarchy developed, people continued to meet in small groups. When bureaucracy emerged, people continued to meet in small groups and be positioned hierarchically. Industry depends on hierarchical organization.

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Networks also build on its predecessors. It relies on small groups, levels of hierarchy and specialization of bureaucracy (Lipnack & Stamps, 1997).

While the organizational principles of previous ages are built on in the contemporary age, the previous organization will also face some modification. For example, family is present in each age, but is different in each era. In our present information age with its network organizational paradigm, hierarchy and bureaucracy are changing. Leadership in hierarchies looks more participatory and shared. Bureaucracies are more decentralized (Lipnack & Stamps, 1997).

Lipnack and Stamps (1997) also stated that not only are there four ages, four varieties of organization related to those four ages, but there are also four ages of small groups related to the four ages. The first groups were strongly task-oriented camp groups of the Nomadic Era. The second groups were more specialized and stratified. There was clear definition of roles and power. In the Industrial Era, groups reflected the machinery of industry. Small groups were interchangeable and aggregated into larger processes in order to produce predictable results. In the Information Era, as work becomes increasingly distributed and decentralized, organizations will become increasingly dependent on many disconnected groups. The technological ability to share information and to facilitate communication will provide an environment conducive for the development of virtual teams. Online affinity groups already demonstrate the emergence of virtual social groups, virtual communities (Rheingold, 1993).

Wheatley (1992) described the change in terms of physical science. Organizational forms are connected to a world view derived from the natural sciences. Past organizations were based on Newtonian images of the universe. Management is the process of

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breaking things into parts and reconstructing them, influence is the direct result of force exerted from one person to another, and planning is based on a world that is predictable (Bygrave, 1989).

Contemporary science is based on quantum physics, not Newton. Organizations in an age of quantum physics will look different than organizations in a Newtonian world. The new physics holds that there is no objective reality. Relationship is the key determiner of what is observed. It is the relationship between the observer and subatomic particles that determine reality (Capra, 1983). Particles come into being and are observed only in relationship to something else. They do not exist as independent entities. Matter can be waves and particles. Protons can be neutrons and pions. The universe is connected and cannot be understood as separate entities (Zohar, 1990).

Strauss and Howe (Strauss, et al. 1997) referred to this change in sociological terms based on a cyclic view of time and the dynamics of generations. Over the past five centuries, Anglo-American society has entered a new era, a new turning, every two decades. These turnings are featured by significant changes in how people feel about themselves and their contexts. Turnings come in sets of four. Each cycle of four turnings spans about the length of one human life. The four turnings are growth or spring, maturation or summer, entropy or fall, and destruction or winter. The fourth turning provides the most discontinuity. It signals the end of an old cycle and the beginning of a new.

Strauss and Howe (1997) suggested that we are on the brink of the fourth turning. It will be a time of winter, destruction and great discontinuity. They suggest that the fourth turning will occur 2005 to 2025.

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Knowledge Work

Some writers distinguish work in the Information Age from the Industrial Age as being knowledge work instead of physical work. Drucker (1993) was among the first to use the term knowledge work. His definition was "any work that requires mental power rather than physical power." Pava (1983) included deliberation between knowledge workers to his understanding of knowledge work. McDermott (1995) provided a more comprehensive definition: "Knowledge work involves analyzing information and applying specialized expertise to solve problems, generate ideas, teach others, or create new products and services." Knowledge work is difficult to define, because of its invisible nature. It occurs in the mind of the knowledge worker.

Fisher and Fisher (1998) distinguished five characteristics of knowledge work to help differentiate it from physical work:

1. The core task for knowledge work is normally thinking, for physical work it is normally doing something.

2. The critical skills for knowledge work is mental, for physical work it is physical skills.

3. The work process for knowledge work is concurrent and nonlinear, processing and creating, for physical work it is linear, assembling and repairing.

4. The work outcome for knowledge work is the production of information, for physical work it is a product.

5. The knowledge used for knowledge work is created knowledge, for physical work it is applied knowledge

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Fisher and Fisher (1998) suggested that we are in a new season of knowledge work. This new work environment varies significantly from the former physical work environment. Knowledge work is "activity that frequently produces new knowledge. Its core task is thinking, its outcome is information, it is typically nonlinear in nature, and it requires mental skills to perform successfully" (Fisher & Fisher, 1998).

Fisher and Fisher (1998) also differentiated between former physical teams and contemporary knowledge teams. Knowledge teams' primary work is more mental than physical. Knowledge teams are composed of multiple specialists rather than generalists. Team representatives on knowledge teams are often from several different organizations. The composition of knowledge teams changes depending on the task. The membership changes. Knowledge teams are not repetitive; they do not generally do the same job twice.

Work Trends

Fisher and Fisher (1998) outlined six future work trends for the twenty-first century. The first trend is the automation of physical work. "Routine work is becoming automated; increasingly, all the work that remains is knowledge work" (Mohrman, et al. 1995). Computers and other machines are becoming inexpensive enough to replace humans in repetitive, mundane tasks. Computers are forwarding robotics and labor-saving machines. Technology is automating physical work across all developed countries. As a result, there will be few purely physical work jobs in the future. Knowledge work will be the only work remaining. Physical work will become more avocational than vocational.

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The second trend is the elimination of traditional jobs and work structures. Traditional work structures like jobs, hierarchies and bureaucracies will disappear. "Jobs will be increasingly project-based. You will do your job for 18 months, and then you'll move on to another one" (Verespej, 1996).

Titles differentiating employee and manager will be increasingly unhelpful. Leadership will be determined by projects instead of position. Technology will allow people to work without bureaucracies (Fisher & Fisher, 1998). "Workers will have at their fingertips the data they need to make instant decisions without consulting three levels of management" (Verespej, 1996).

Jobs will no longer be a relevant term. Hiring will be based on skills and knowledge related to specific projects, not for a specific job opening (Fisher & Fisher, 1998). Individual workers will need to take responsibility for their own employability. The issue will change from employment to employability.

The third trend is empowered knowledge workers. Knowledge workers will be empowered to manage their own work. The role and function of managers will change. Instead of authorizing and directing, managers will coach and inform. Their primary work will be on their own leadership teams instead of directing the work of other teams. In the future, a career will be made up of a portfolio of interesting projects instead of a ladder of titles (Fisher & Fisher, 1998).

The fourth trend is that knowledge work teams will be the predominant way to organize work. Today's projects are too complex for any individual. Effective technical expertise does not reside in any individual. Contemporary product development teams require participants from multiple specialties (Fisher & Fisher, 1998).

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The fifth trend is workplace flexibility. "Companies today see that there is value and that people can be more productive when they work at home" (Verespej, 1996). This does not mean that there will be no need for gathered teams. Weerhaeuser found that some knowledge teams do not function well unless there are regular face-to-face meetings and informal problem-solving (Fisher & Fisher, 1998). One survey in 1987 showed that 56 percent of the workers surveyed would continue to go to the office every day even if they could work at home, 36 percent said they would split their time, and only 7 percent said they would work exclusively at home (Halal, 1996).

The last trend is that there will be more virtual knowledge teams. Knowledge work team membership will be increasingly unstable. Work will not be done in one office with the same team. A lifetime career with one company will be rare. In 1994, contingent knowledge workers made up one-third of the American workforce. This group is projected to be almost half of the workforce by the year 2000 (Halal, 1996). Almost 20 percent of all professionals, lawyers, physicians and executives, currently work as temps (Fisher & Fisher, 1998).

As a result, there is a changed business paradigm. The new paradigm features innovation as well as downsizing, restructuring, and job loss (Uchitelle, et al. 1996). The job loss has centered on white-collar workers. One study indicated that between 1985 and 1995 almost 14 million white-collar jobs were lost (Uchitelle, et al. 1996). Re-engineering experts predict that in the next ten years three-fourths of all middle manager jobs will disappear (Bridges, 1994).

Some experts believe that restructuring is a dead end practice because it only focuses on getting costs out, not adding value (Tapscott, 1996; Hamel, et al. 1994).

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Downsizing is becoming a dangerous habit. For some organizations it is the management strategy of the 1990s. It is a form of anorexia. The subject loses weight past the point of health. The result is the loss of healthy tissue, sickness, and even death (Wallace, 1994).

The result is decreased commitment of employees to their organizations producing a current all time low (O'Reilly, 1994). These trends have shocked and discouraged once loyal employees. Some have opted out by taking early retirement. Others are jumping from one company to the next, always trying to stay one step ahead of unemployment. Others find themselves unemployed. The irony of organizations hiring skilled people as they release them is hard to understand (Wallace, et al. 1996).

Work Processes

Cleland (1998) discussed different work processes. Past work processes were serial. New work processes are concurrent. A new feature in the work environment is the emphasis on concurrent work processes. Concurrent engineering is a systematic approach to the integrated, simultaneous engineering design of products and such associated organizational process as manufacturing, procurement, finance, testing, and after-sales services for the delivery of maximum value to customers. Port (1990) believes that concurrent work processes will be a cultural upheaval.

Concurrent work processes are being driven by the following challenges facing contemporary organizations (Cleland, 1998).

1. Between 50 and 80 percent of the cost of manufacturing a product is determined during the design phase.

2. The total cost of a product is locked in at the end of the design phase of the product development effort.

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3. Well-designed products that were efficiently manufactured may not sell well.

4. Product life cycles are getting shorter.

5. Simplicity in the design of a product is becoming a key factor in how well the product creates value for the customer.

6. Efficiency and effectiveness in the manufacture of a product does not make up for poor product design or a marketing strategy.

7. Overcomplicated designs can cause delays and lead to problems in manufacturing the products and may lead to costly engineering changes.

Cleland (1998) pointed to several benefits of concurrent engineering.

1. Reduction of engineering change orders of up to 50 percent.

2. Reduction of product development time between 40 to 50 percent.

3. Significant scrap and rework reduction by as much as 75 percent.

4. Manufacturing cost reduction between 30 and 40 percent.

5. Higher quality and lower design costs.

6. Fewer design errors.

7. Reduction and even elimination of the need for formal design reviews since the product-process development teams provide for an ongoing design review.

8. Enhanced communication between designers, managers, and professionals in the supporting processes.

9. Simplification of design, which reduces the number of parts to be manufactured, creates simplicity in fixing requirements, and allows for east of assembly.

10. Reduction in the number of surprises during the design process.

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11. Greater employee involvement on the concurrent engineering teams, leading to enhanced development of their knowledge, skills, and attitudes.

Chrysler used concurrent engineering to develop their Neon product. The Neon team involved 600 engineers, 289 suppliers, and assembly-line workers to meet the goal of developing a new product in forty-two months. Concurrent engineering for Neon avoided Chrysler's traditional weakness of slow product development (Woodruff, et al. 1993).

It is important to keep in mind that the redesign of virtual work does not simply set out to automate, or even informate, existing or traditional work processes and patterns. Virtual work is a whole new way of doing work. This can be seen by contrasting the characteristics of virtual processes with conventional ones, see Table 1.

Virtual Organizations

The term virtual means something that is potentially real or appears real. It also implies enhancement. The term virtual organization is used to describe a situation where people or facilities that are not part of a corporation are linked to it as though they were. Resources from different companies may have been assembled so that they work together, through electronic links, to achieve a well-defined goal. Virtual organizations are usually short-lived, product-focused, flexible, and based on competencies rather than historical relationships. Virtual organizations use telecommunications and computing technologies for enhanced effects. Virtual organizations are gathered around virtual projects which are systems of complementary competencies in people designed to carry out complex, collaborative, simultaneous, electronic work.

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Stephenson (1995) defined virtual groups in terms of position. A virtual group is a mobile strategic position within an existing organization. McDonald (1995) defined virtual organizations as bringing together talented people for a limited time to produce something new and innovative. Crandall and Wallace (1997) asserted that virtual teams can be both temporary and permanent. Stamps (Lipnack & Stamps, 1997), in an interview with Pape (1997), defined a virtual team in terms of distance. Virtual teams are any team that needs to work together whose members are more than fifty feet apart. Jarvenpaa et al. (1998) described virtual teams in terms of boundaries. A virtual team is a boundaryless network organizational form where a temporary team is assembled on an as-needed basis until the task is completed. Margulies (1997) described virtual organizations in terms of mental paradigms. A virtual organization is primarily conceptual. It represents a new way of thinking about working, compensation, perks, status, socialization, teamwork, management, and leadership.

Senge et al. (1994) outlined some key organizational changes necessary for today. Earlier in this century key ingredients for organizational successes were efficient manufacturing, effective mass marketing, rapid adoption of technology, and financial acumen. Senge suggested that what is needed today is the distribution of power, the ability to think in terms of systems, the ability to communicate and converse and the promotion of voluntary followership. The work context has changed.

Lawrence and Lorsch (1967) successfully anticipated one of the greatest problems of knowledge teams. They observed the need of organizations to be both differentiated and integrated simultaneously. The ability of virtual teams to be simultaneously differentiated and integrated is the primary difference between successful and

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unsuccessful virtual teams. Today's marketplace demands that organizations be differentiated. Organizations must be in a position to keep up with the increasingly complex nature of business environments. Business is getting increasingly niche-oriented. Much of today's work is oriented around differentiation and specialization. Doctors, lawyers, engineers, technicians all develop very specific specializations in order to remain current with rapidly advancing knowledge and technology. The emphasis is on delegation.

Integration is also necessary. Organizational systems, common goals, communications systems, and other processes meld the differentiated specialists together to work in one direction toward a common goal. Beyond delegation is integration. Unless integration happens, delegation will result in failure.

Handy (1989) advocated a Shamrock pattern of organization. The parts are separate, but belong to the whole. One leaflet represents professional workers, one the part-time labor force and one the contractors who are outside the organization but are essential to the organization. Handy described the shamrock as being indicative of the present and coming future. Traditional organizational paradigms are out-moded. The gigantism of past organizations is being replaced by an organizational paradigm of smaller organizations. This is seen in Handy's small leaflets instead of large compound leaves.

Porter (1990) used honeycombs to describe this shift in organizations. There is a proliferation of units that appear to be autonomous, but in reality are connected. The cells are in proximity and call for a different kind of leadership. Leadership must help the cells to remain connected, but has a more limited role than previous styles of

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organizational leadership. The leader is not solo. The leader helps the division of labor and functional interdependence of the cells to be successful as a hive.

Table 1

Comparison of Traditional and Virtual Work Processes

Traditional Processes	Virtual Processes
Co-located resources	Distributed resources linked electronically
Concurrent Serial work	Parallel work
Periodic communication	Continuous communication
Face-to-face interaction	Electronic interaction
Physical objects	Electronically generated objects
Information distribution	Information access
Information on paper	Electronic information
Sharing completed work	Continuous sharing of incomplete work
Knowledge/information hoarding	Knowledge/information sharing
Upper management decisions	Point-of-work decisions
Downstream focus	Whole process focus
Members from the same organization	Members from different organizations
Members selected by certification	Members selected on basis of competence
Roles defined per job title	Roles defined by situation
Hope for trust	Require trust
Work process rigid	Work process flexible
Position authority	Knowledge authority
Persuade through power	Persuade through influence
Stable work environment	Changing work environment
Members work together—together	Members work together—apart
Assert your perspective	Negotiate—make tradeoffs

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Belbin (1993) promoted a new Trapezium organization as a way of describing the changing work environment. The traditional hierarchy is a pyramid with a small reporting span and personal accountability. The Trapezium features a wide reporting span and team accountability. At the peak of the pyramid in a traditional organization is the CEO. The top of the trapezium is the mission vested in a balanced team of strategic managers supported by operational managers. The trapezium is less centralized and more oriented toward autonomous work groups and relationships. The organization is kept intentionally very flat to simplify communication and management.

Global Economy

Economic, ecological, and technological forces have coalesced in the 1990s to create an entirely new work environment. These forces have developed a new form of competition that is defined as a global economy. It is driven by information instead of product, by time instead of space (Tapscott, 1996).

May et al.(1997) reported the breadth of the change within organizations. In a recent survey of 2,000 companies in the United Kingdom by Management Accounting and Ernst and Young, over 90 of the 400 respondents indicated that their companies were undergoing significant change. The major catalysts were changing patterns of customer demand, increases in customer bargaining power and pressure on costs (Ashworth, et al. 1996).

Geber (1995) also suggested that the global nature of marketplaces has changed the work environment. It is critical for today's organizations to get their products ready as quickly as possible and to the global marketplace. In the process organizations must access the best minds they can, regardless of where they might be. Huey and Sookdeo

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(1994) points out that global competition wrecked stable markets. Information technology created *ad hoc* networks of power within organizations. Lightning-fast, innovative entrepreneurs blasted slow corporate giants. Middle managers and company loyalty disappeared. Suddenly the workforce and customers were those of color who didn't all speak English.

Geber (1995) went on to include the stability of today's workforce as a variable. Many employees are not willing to re-locate. Gone is the day when employees would be willing to move for a promotion. The destabilization of the American family and value re-orientation has affected the workforce.

These market changes can be seen in how organizations are structuring themselves. In 1995, AT&T had 12,000 of what it calls road warriors, employees who work in the field and check into a central office. This number is up from 5,000 road warriors in 1993. Of the company's 250,000 employees, one in four has an actual work-at-home agreement with the company (Cleary, 1995). By the year 2020 some experts estimate that 30 percent of the total workforce will be working in virtual offices (Yawn, 1996). Studies indicate a growth of 10 percent annually until the end of this decade in the number of people with virtual office arrangements (Kugelmass, 1995; Greengard, 1994). AT&T conducted a study that indicated 60 million employees work outside of a traditional office (Fitzpatrick, 1995). Another study indicated that of the 36 million people working out of their homes in the United States about 8.8 million are telecommuters. They are one of the fastest growing segment of workers in the United States (Cleary, 1995). In 1985 there were fewer than one million employees who teleworked away from the office at least eight hours a week during normal business hours (Callentine, 1995). By 1995, the

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number of teleworkers had grown more than eightfold to about 8.4 million (Henkoff, 1995). Although the precise numbers vary, it is clear that there has been a significant shift in business environment.

Legislation has also changed the work environment. Companies are being affected by the Environmental Protection Agency's Clean Air Standards. Virtual offices allow companies to reduce the number of commuters driving back and forth from the work site (Fitzpatrick, 1995). The EPA has ruled in some counties that the larger companies will need to reduce their automotive commuting by 25 percent over the next two years (Cleary, 1995).

Popcorn (1991) took a much more commercial approach. Popcorn's focus was primarily the market and was targeted towards business; however, for our context, Popcorn made it clear that she believes that we are in the midst of a significant change. She highlights sixteen changes in our society and suggests that if you click on four of these variables your probability for business success will increase significantly (Popcorn, 1996). See Table 2.

Finally, the development of groupware and technology has shaped the work environment (Geber, 1995). Technology allows people to work anywhere (Cleary, 1995).

Virtual Work

This change in work environments can be seen more clearly when the former work environment is compared with the latter. Duretta (1995) contrasted traditional work and virtual work in terms of communication. The communication task is no longer to be a channel for management's messages, or even to support reciprocal communication up

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and down. The new task is learning how to process information in such a way that the right people receive it at the right time. It is finding the most efficient path to discharge energy.

Durutta (1995) described six polar distinctions to contrast traditional and virtual work.

1. The first is Partners versus Parents/Children. For decades, management ran the company and made all the decisions. Workers were only told what to do, how to do it, and by when. In the virtual organization, management, and employees are partners. There is no longer any differentiation of them and us. Through profit sharing and incentives based on performance, everyone has an equal stake.

2. The second is Employability versus Employment. Until recently, generations of people have expected to be with one company until their retirement. With employers coming and going faster than ever before, and job demands fluctuating, that security is gone. In exchange for employment guarantees, companies today offer employability. The development and training of employees to ensure that they will always be able to find work alternatives.

3. The third is Flatter versus Multi-Layered Organization. Today's marketplace calls for dynamic quick precise response. Large, multi-layered organizations cannot respond to the timetable of global competition. Organizations are simplifying their organizational charts. They are reorienting their employees to think in terms of teams and tasks rather than titles, position and roles.

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Table 2

F. Popcorn's Sixteen Societal Changes

Societal Changes	Description
Cocooning	The stay-at-home trend, to build soft and cozy nests to protect ourselves from the unpredictable outside world.
Clanning	The inclination to join up with groups of like kinds.
Fantasy Adventure	As a break from modern tensions, we actively seek excitement in basically risk-free adventures like travel, food, or virtual reality.
Pleasure Revenge	Being tired of rules and regulations, we want to cut loose and indulge in forbidden fruits.
Small Indulgences	Stressed out from increasing expenses, we find ways to reward ourselves with affordable luxuries.
Anchoring	We reach back to our spiritual roots to take the comfort of the past into the future
Egonomics	In reaction to sterile environments we are looking for ways to make personal statements.
Femalethink	A trend that encourages us to shift from the traditional goal-oriented, hierarchical models to more caring, sharing, and familial ones.
Mancipation	Men are encouraged to become more individualist and less professional
99 Lives	We have multiple roles in order to cope with busy high tech lives.
Cashing Out	Working people are questioning career and are opting for more fulfillment in simpler living.
Being Alive	A focus on health that can add years to life and give us a better quality of life.
Down-Aging	Nostalgia for our childhood introduces gaiety into our serious adult lives.
Vigilante Consumer	Frustrated consumers manipulate the marketplace through pressure, protest, and politics
Icon Toppling	We question and reject our monuments of business and government.
Save Our Society	In order to protect our endangered planet, we rediscover a social conscience.

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4. The fourth is Performance versus Length of Service. Traditional companies emphasized the importance of workers being punctual and putting in their eight hours daily. Compensation was based on length of service before performance. Today, top performance is critical, regardless of how senior an employee is. Instead of focusing on service anniversaries, the need is to focus on performance celebrations.

5. The fifth is Diversity versus Uniformity. Manufacturing has been about the mass production of widgets. In order for that mass production to work, all the widgets have to be the same. This uniformity and assembly-line thinking ushered in the industrial age. Today machines do mass production. Workers need to make quick decisions that are innovative and creative. An emphasis on uniformity will limit creativity.

6. The sixth is Whole Life versus Work Life. Formerly, employers perceived their employees uni-dimensionally. They were nine-to-five beings without spouses, children and other responsibilities or interests. Today's employers still expect the same work productivity, but are willing to balance higher demands with an appreciation for personal life. There is more flexibility with work hours, benefits and childcare. Employees are no longer viewed as cost units, but are understood to be resources.

Huey and Sookdeo (1994) framed the difference in work environments in terms of communication and leadership. Qualitative skills were valued in leaders. The ability to solve problems alone, be aggressive, energetic, and self-confident was critical. Leaders were expected to be heroic. Virtual leaders say no to their egos and recognize that they need others. Instead of developing skills of independence, they develop skills of collaboration. They will not try to solve problems alone. They are post-heroic leaders. Further, post-heroic leaders recognize the value of communication. They will not allow

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their potentially intimidating gifts allow them to be cut off from communication and information. They know that they don't have the ability to make decisions in a vacuum. Communications skills are valued and honed.

Work Design

O'Connell (1996) referred to Grenier et al.(1995) and suggested that there was a difference in work design between traditional and virtual work environments. Virtual work must be arranged around electronic access to information. The issue is not sequential flow and plan. Rather, people must be allowed to see the whole flow of the project as it develops, so that they can contribute to it as it is appropriate. Virtual operations rely on concurrent work design not a serial design. Decisions are moved down from senior management to the people directly engaged in the work.

Virtual Trust

Jarvenpaa et al. (1998) addressed the differences in trust between traditional and virtual work contexts. Trust is critical in both work contexts; however, in virtual contexts where individuals are physically distant, interact primarily electronically and rarely see each other, trust is even more critical. Trust is pivotal in not allowing geographic distance to lead to relational and psychological distance. Trust is the glue for virtual teams, but the virtual context itself works against it (O'Hara-Devereaux, et al. 1994). Unfortunately, technology does not do much to build relationships and trust. A virtual context reduces the effectiveness of typical social control efforts like direct supervision. Other variables known to contribute to social control, such as geographic proximity, congruent backgrounds, and experience, are also absent. The result is that the virtual

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context can actually impede the development of trust (Handy, 1995). Teams require face-to-face time, the very thing that virtual work eliminates (Handy, 1995).

Trust can be examined from a rational perspective that centers on self-interest (Kramer, et al. 1996). Increases in trust affect relationships, because individuals have reduced motivation to behave protectively in anticipation of the reduced opportunistic behavior of others (Kramer, et al. 1996). Within the rational perspective, some approach trust as an individual personality difference (Frost, et al. 1978), others approach trust as an issue of institutions (Sitkin, et al. 1993; Lewis, et al. 1985), others use a cross-cultural perspective (Farris, et al. 1973). The most widely used approach is interpersonal relations (Deutch, 1958; Mayer, et al. 1995). Succinctly, trust is based on the expectation that others will behave as expected (Jarvenpaa, et al. 1998).

Mayer, Davis and Schooman defined trust.

> The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer, et al. 1995).

Dyadic trust springs from attributes of both the trustor and the trustee (Mayer, et al. 1995). The trustee attributes are ability, benevolence and predictability or integrity. See Figure 1. Ability is the group of skills that allow the trustee to be perceived as competent in an area. Benevolence refers to the degree to which a trustee is believed to have interpersonal care and concern, the perception that the trustee will do more good for the trustor than a selfish concern for personal profit. Predictability or integrity refers to the

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practice of principles the trustor believes makes the trustee more dependable (Jarvenpaa, et al. 1998).

Propensity to trust is the primary trustor attribute. It is a personality trait related to how trusting an individual should be. It is assumed to be a constant independent of relationship or context. The trustor's cultural, social, and developmental experiences and personality type all influence trust (Mayer, et al. 1995). Research has indicated that trustee attributes produce more variance in interpersonal trust levels than the trustor's attribute of propensity (Scott, 1980).

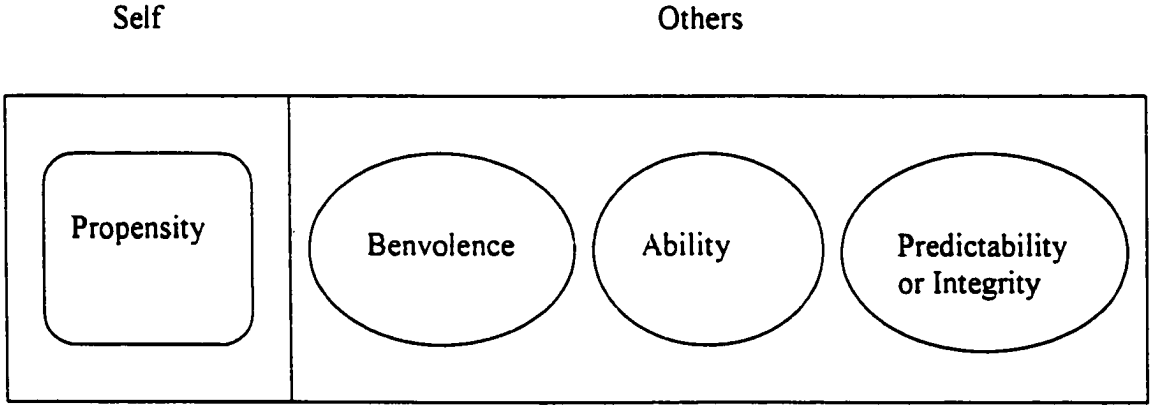

Figure 1. Required Elements for Trust (Jarvenpaa, et al. 1998).

Trust within a group is much more complicated. There are more trustees and trustors all with variance on their trust attributes. Cummings and Bromiley (1996) defined collective trust as,

> A common belief among a group of individuals that another individual or group makes good-faith efforts to behave in accordance with any commitments; is honest in whatever negotiations preceded such commitment and; does not take excessive advantage of another even when the opportunity is available" (Cummings & Bromily, 1996).

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In traditional face-to-face group contexts, time is necessary for trust to develop. Cummings and Bromiley (1996) stated that affective, cognitive, and behavior are elements of collective trust. McAllister (1995) discovered that cognitively based trust factors are a precursor to developing affectively based trust. Mayer et al. (1995) suggested that relationships that are just beginning rely more on integrity than benevolence for trust, because evaluating benevolence takes information and time.

Jarvenpaa et al. (1998) conducted a team trust study on virtual teams. It was expected that integrity and ability would be strong predictors of trust because of the virtual environment's barriers to developing relationships.

Zack (1993) asserted that the degree of psychological intimacy between group members would be a direct function of the richness of the shared communication. Markus' findings supported Zack (Markus, 1994). Markus found that lean electronic mail in situations where there are existing relationship can be quite rich; however, if those relationships are restricted to electronic communication for long periods of time, the relationships grow stale. For individuals who do not share a congruent personal history, electronic communication is more impersonal and work related. As a result, trust in virtual environments is more related to ability and integrity and less to benevolence.

With groups that function face-to-face, Mayer suggested that over time, benevolence would increase (Mayer, et al. 1995). Interactions will disclose the benevolence of others. Walther (1995) found that geographically scattered and culturally diverse group members relying on electronic communication and not able to physically meet communicated with more care and experienced higher levels of intimacy than did groups that functioned in physical proximity to each other. Walther (1992) did not find

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any difference between electronically mediated teams and physically proximate teams related to task emphasis. As a result, Walther (Walther, 1992, 1994, 1995, 1996, 1997) suggested a theory for groups limited to electronic communication. The hyperpersonalization theory stated that the limited amount of individuating information, signals that promote awareness of similarities and differences, e.g., ethnicity and gender, available electronically results in individuals assuming similarity. As a result, individuals disclose signals about themselves that reinforce similarity. This over-attribution of similarity projects perceptions of care enhancing virtual relationships. Jarvenpaa et al. (1998) suggested that virtual teams, as a result of this over-attribution of similarity, will have a stronger reliance on perception's of each other's benevolence than physically proximate teams.

After examining six teams, Jarvenpaa (Jarvenpaa, et al. 1998) suggested ten characteristics of high-trust virtual teams: Proactive Organization, Task versus Procedural Orientation, Positive Tone, Rotating Leadership, Task Goal Clarity, Role Division and Specificity, Time Management, Nature of Feedback, Frequency and Pattern of Interaction, and Swift Trust. High-trust virtual teams were characterized by being proactive. There was high individual initiative, volunteerism, and execution. The members dealt decisively by confrontation with members who were not contributing.

The high trust teams were very task oriented. The communication was almost exclusively related to the task. There was very little social interaction. The emphasis on task was coupled with empathy. The members discussed each other's tasks and results in a supportive fashion.

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The high trust teams were very positive. The team members expressed excitement and surrounded each other with compliments, encouragement and positive feedback. There were planned celebrations along the way. Disagreement among the members was handled gently, so that it was barely perceptible.

The high trust teams had rotating leadership. Each member demonstrated leadership sometime during the project. There was no formally chosen leader. As needs arose, members volunteered to fill them. Members were leaders in their own areas of expertise and ability.

The high trust teams talked about the goals more that the low trust teams. When there was ambiguity, members took leadership to clarify.

The high trust teams featured role division and specificity. Division of tasks did not lead to complete independence. Roles were used to reduce team interdependence to moderate levels as compared to the low trust teams where roles were used to eliminate interdependence. Roles emerged as members completed projects. Tasks were not assigned to specific roles, rather roles were decided after individuals took initiative and executed well.

High trust teams kept to a timeline. Assignment schedules were set, milestones established, and members helped each other monitor deadlines. Time zones were utilized to manage the global clock to reduce the time when no work was being done on the project. Information would be gathered in Europe while team members were sleeping in the United States.

High trust teams provided generous amounts of feedback. The feedback was related to improving the quality of each other's work. The feedback was sometimes

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editorial, organizing or contributing. Low trust teams did not offer feedback even when asked.

High trust teams interacted frequently. Overall, high trust teams had four times more communication than the low trust teams. They notified each other of absences and location. Low trust teams kept asking if anyone was out there.

The work environment has significantly changed. The global market, changed workforce, legislation, and technology have impact the work environment. This has resulted in a new way of working identified as virtual work. Leadership, roles, membership, communication, relationships, work design, and trust in virtual work environments are different than the same elements in traditional work environments.

Virtual Offices

Crandall and Wallace (1997) identified three successive stages in the development of the virtual workplace. Telecommuting is the initial stage and involves the placement of individual employees in remote locations. Hundreds of major organizations have developed telecommuting programs in the last ten years. It involves dispersed contexts in which employees can work for their organization and communicate electronically through regular telephone lines, facsimile lines and PC links. The objective in this stage is to increase the flexibility of the workplace and save costs related to time, commuting and offices.

In the initial telecommuting stage some or all of the job is moved away from the office to the home. A new office is set up at this alternate site with enough telecommunications and other office equipment to get the job done. A telecommuter can also maintain a traditional office and generally works from home one to three days a

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week (Nilles, 1994). Telecommuting in the late 1970s and early 1980s was generally limited to data entry and programming jobs. However, telecommuting has recently expanded into almost all kinds of jobs performed by information workers (Filipczak, 1992).

The initial telecommuting stage has limited benefits. It does not connect to strategic business interests or improve responsiveness to customers. Telecommuting does not address issues of speed and strong execution for customers. It is primarily about dispersing employees throughout an electronic network (Crandall& Wallace, 1997).

As Crandall and Wallace (1997) have noted, until the early 1990s almost all telework arrangements consisted of telecommuting programs designed to accommodate the personal and/or family needs of individual employees. Telecommuting was seen as a concession. It was not strategic. Some common rationales for telecommuting included (a) enabling a parent caring for an infant or toddler to have the option of working from home (Nilles, 1994), (b) to allow a valuable employee the option of taking a new job without physically relocating (Gordon, et al. 1986), and (c) to accommodate a person with disabilities that affected his or her ability to work in or get to the office (Chamberlain, 1992).

The front-line model is the second stage. The front-line model involves placing sales and service locations in the field where they can be closer to the customer. It connects the tools of the telecommuting model directly to strategic business concerns. The organization will move its sales and service personnel out of the office individually and into groups to work in dispersed locations. Connections to the physical office are lessened in order to gain stronger connections to customers. Implementing this model is

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more difficult than the telecommuting model. Employees and managers need to perceive their customers as their respective bosses (Crandall & Wallace, 1997).

The front-line model is similar to what Callentine called the 'virtual office' (1995). Instead of telework being a concession, telework is perceived as being strategic. Workers are provided with highly portable telecommunications equipment to promote flexibility in work location. This portable equipment may include a laptop computer with a built-in modem and fax, a cellular phone, and an alphanumeric pager (Greengard, 1994). Most of the equipment fits inside a briefcase and can be easily transported. Unlike traditional telecommuting that typically uses the home as a fixed alternative work site, mobile telework facilitates work to be anytime or anyplace (Galinsky, et al. 1993). Employees may choose to work whenever and from whatever venue might best meet business needs (Illingworth, 1994).

The cyber-link model is the third stage and has the greatest level of virtalness an organization can achieve. This model features collaborative work between the organization with customers and groups from vendor organizations to the production of goods and services. Teams of employees and customers collaborate in a dynamic virtual context. They are linked virtually, electronically, sharing ideas and information, sometimes without face-to-face meetings, until the business objective has been accomplished. The model also features outsourcing work that does not support the organization's strategic goals.

Postmodernity's Influence On Virtuality

Baudrillard (1983) linked the end of modernity to the postindustrial postmodern era and its technology. Unlike the modern era with its emphasis on production, the

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postmodern era emphasizes simulations, or what is unreal. In the postmodern era there is no contrast between real and unreal. The real is not all that exists. The unreal also exists through the medium of technology. Technology creates a new form of 'electronic reality' which lacks any objective reality to support it. Baudrillard called this the ecstasy of communication (1988). The world becomes purely simulation. Baudrillard called this situation the *hyperreal.* In hyperreality, it is not possible to differentiate the imaginary from the real. The world consists of images not reality; American examples are Disneyland and Las Vegas. Fantasy worlds that are more real than reality. According to Baudrillard, a central feature of the postmodern era is virtuality.

Several other postmodern trends can be seen in the environment. The great promise of the computer is to place global information in the hands of individuals. In the past, this individualism was contained by families (Aries, 1973). Technology further promotes individualism as it liberates individuals from work sites. Even in the home, technology allows individuals to live independently of each other.

Increased individualism and isolation runs counter to the promised technological global village (McLuhan, 1967) or virtual community (Rheingold, 1994). What community is there when people only interact electronically? Isolated individuals travel the information highway. There is a marked reduction in the public involvement of individuals (Mulgan, 1994; Putnam, 1994). The information-based technological society strongly supports privatized living. Individuals compensate for their loss of control over their social environments with the global technological citizenship.

Another environmental impact can be seen in architecture and urban planning. Jobs and people are moving out of the cities. New high tech companies are relocating in

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small communities, preferably with a major university. Modern architecture reverses the earlier trends of high rise offices and apartments in favor of small-scale designs featuring links to neighborhoods and a concern to cultivate specific cultures (Kumar, 1995).

Knowledge can now be dispersed. The result is that work can be distributed and decentralized. Individuals at home can gather information necessary for work and can once again become the center of workers lives. Family activities lost in the industrial era can be reintegrated to the family. This can be seen in the dramatic rise of telecommuting (Yawn, 1996).

Sony Corporation has a new operational strategy: global localization. The entire world's cultures are marketed. The world is looted for all the variety it can produce. African art and music, Indian rugs and Thai food are transplanted the world over. The local is no longer local (Kumar, 1995).

Postmodernity has forwarded the value to be flexible. Truth is flexible. Reality is flexible. Work must also reflect the value of flexibility (Handy, 1996).

Postmodernity is reflected in expectancy theory. Expectancy theory goes beyond principles of transcendency and rationality in understanding the motivation of workers. It introduces a subjective perspective to motivation. Workers are not treated, or understood, to be passive objects of motivational strategies. Expectancy theory is based on the individual instead of management. It argues that motivation is the result of a desired outcome and the expectation that the outcome will occur. Vroom (1964) stated that such behavior is subjectively rational and directed towards securing desired outcomes. The motivation will be for desired goals, not prescribed goals. In this way the theory is individualized and resistant to modernist management. It leaves room for

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individuals to behave in ways that could be organizationally dysfunctional and irrational from the perspective of management. The issue is not rationality; the issue becomes primarily subjective, What do the workers want? (Carter, et al. 1993).

A final environmental impact of postmodernism is the relationship of power to social dependence. Power is no longer located in individual managers or leaders. It is not vested in the organization or its captains. Hierarchical structures of organization must be abandoned. Power is a function of social interdependence. Power happens as individuals gather together through a process of social supplementation. As groups learn to supplement each other, they are empowered (Hassard, 1993).

Postmodernity has shaped organizations, workers and work groups. While there has been some research related to the impact of postmodernity on organizations, not much has been done on the impact of postmodernity on groups and teams.

Problem Statement

Research over the years has substantiated that different work environments may call for work processes which are best completed through team rather than individual effort. The literature also suggests that different team efforts call for different team approaches. Within the historical and contemporary work environment, the question of what constitutes the dynamics and characteristics of a successful team has received significant review and discussion.

We are moving towards a new work environment, which shuns traditional systems and organizational structures for ones that decentralize both the functional as well as the systems aspects of human and organizational behavior. This enterprise environment is one, which is being commonly called the virtual work environment.

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Several questions are called to discussion as management considers virtual organizations. Among them is the question of how we will manage and facilitate the optimal performance of team-based efforts. To better address this management challenge, new information is needed about the team processes, dynamics and structure; in other words, what will efficient and effective teams look like in this new work environment?

While we continue to discover the domains that are essential for successful teams in traditional work environments, it is imperative we take this knowledge and begin to suggest corollary team characteristics that must be present to insure optimal team performance in the new enterprise structure.

The challenge for this study will be to take what research suggests regarding which salient domains of team characteristics, when present, contribute to successful team performance in traditional environments and suggest what salient domains of team characteristics, if present, will support successful team development and behavior in virtual work environments.

Research Questions

The research will be guided by these research questions.

1. What domains of characteristics of successful teams in traditional work environments must be present to insure success in the virtual work environment?

2. What domains of characteristics that are not currently found in successful teams must exist in order to insure successful team performance in the virtual work environment?

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Contribution

The study will contribute to the field of organizational behavior by discussing (a) whether there is a difference between domains of virtual and traditional teams, (b) whether the development of domains is different for virtual and traditional teams, and (c) whether the support of domains is different for virtual and traditional teams.

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CHAPTER TWO

Literature Search

Introduction

Dreams have always had meaning to the Ojibwa people. One of the old Ojibwa traditions was to hang a dream catcher in their home. Dream catchers were made of willow bent into a circle. Webbing, like a spider web, filled the center leaving one small hole at the very center. At the base of the circle, feathers were connected to dangle and float in the night air.

The Ojibwa believed that the night air was filled with dreams, both good and bad. When the dream catcher was hung, it moved freely in the night air catching dreams as they floated by. The good dreams knew the way and slipped through the center hole then slid down the soft feathers so gently that many times the sleeper did not know that they were dreaming. The bad dreams did not know the way. They got entangled in the webbing and withered with the first light of the new day.

Dream catchers were hung on cradle boards to ensure good dreams for the infants. Other sizes were hung in lodges to ensure that the whole community would have good dreams. Dream catchers were utilized to capitalize on dreams. To ensure that the community would both have access to dreams and be able to focus on the right ones. Dreams were important to the Ojibwa people. (Dearborn, 1995)

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Dream catchers are an apt metaphor for teams. Like dream catchers, teams need both dreams and a web of connecting variables. The dynamic interplay in the web of variables determines the outcome of the team's dream. Team theory, like the dream catcher, consists of a web of inter-disciplinary study. Team theory involves the disciplines of psychology, sociology, social psychology, anthropology, political science, and organizational behavior. Team theory also includes variables related to philosophical environments, work environments and domains. Each is connected to the other and will influence which dreams reach the center of the web and become a good dream for that community.

Team Disciplines

Teams are an inter-disciplinary study. The disciplines of study also interact as a team. Teams cannot be fully understood until all these disciplines find their specific niche and role. Teams include six disciplines.

1. Psychology is the science that seeks to measure, explain, and sometimes change the behavior of humans. Psychologists concern themselves with studying and attempting to understand individual behavior. Contributions from psychology in organizational behavior have included learning, motivation, personality, training, individual decision making, leadership effectiveness, job satisfaction, performance appraisal, attitude measurement, job design, and work stress (Forsyth, 1999).

2. Unlike psychology's individual emphasis, sociology studies the social system in which individuals fill their roles. While psychologists focus on the individual, sociologists study the social system in which individuals fill their roles. Sociology studies people in relation to their fellow human beings. Sociologists focus on groups.

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Sociology has made one of its greatest contributions to organizational behavior through the study of group behavior in organizations, particularly formal and complex organizations. Sociology has provided input with group dynamics, design of work teams, communication, status, power, conflict, formal organizational theory, structure, bureaucracy, organizational change, and organizational (Robbins, 1997).

3. Social psychology blends concepts from psychology and sociology. It focuses on the influence of people on one another. One of the major areas receiving considerable investigation by social psychologists has been change, how to implement it and how to reduce barriers to its acceptance. Social psychologists have made significant contributions in measuring and changing attitudes, communication patterns, the ways in which group activities can satisfy individual needs, and group decision making. Social psychology focuses on groups (Robbins, 1997).

4. Anthropology is the study of societies to learn about human beings and their activities. The work of anthropologists studying cultures and environments has helped to explain differences in fundamental values, attitudes, and behavior between people in different countries and within organizations. It focuses on organizational systems (Forsyth, 1999).

5. Political science is the study of the behavior of individuals and groups within a political environment. Specific topics of concern to political scientists include structuring conflict, allocation of power, and how people manipulate power for individual self-interest. It focuses on organizational systems (Forsyth, 1999).

6. Organizational behavior is an applied human science built on contributions from these behavioral disciplines. It is concerned with people skills related to explaining,

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predicting, and controlling human behavior. It connects theory to practice (Robbins, 1997).

The effect postmodernism and virtual environments have on the application of psychology, sociology, social psychology, anthropology, and political science on the organization behavior of teams will be explored in this dissertation. These are parts of the web that determine team performance.

Small Group Research

Before looking at each of the web elements, disciplines, environments, and domains, it would be wise to address the question, Why should we take another look at teams? In the last 60 years there has been limitless inquiry related to teams and groups.

Research interest in groups varies over time (Jones, 1985; Steiner, 1974). Group research is more difficult and confounding than individual research. Group research takes more time, involves more subjects and includes uncontrolled interaction among subjects. There is a current active interest in groups. New attention is being directed towards social loafing (Harkins, et al. 1989), minority influence (Moscovici, 1980; Nemeth, 1986; Tanford, et al. 1984) and group productivity (Diehl, et al. 1987; Pritchard, et al. 1988).

There has been a subtle change in group research. Group research in the 1940s and 1950s focused on one prototype of group. Groups in these studies interacted over a broad band of opportunities, had prolonged periods of time to meet together, and understood themselves to be a group. Sherif et al. (1961) studied camp groups meeting together over time. Lewin et al. (1939) looked at the impact of leadership styles in groups meeting for 18 weeks that were undergoing various patterns of leadership change. Festinger et al.

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(1950) examined the interactions between families in a housing project. Tuckman (1965) attempted to build a model of group development. See Figure 2.

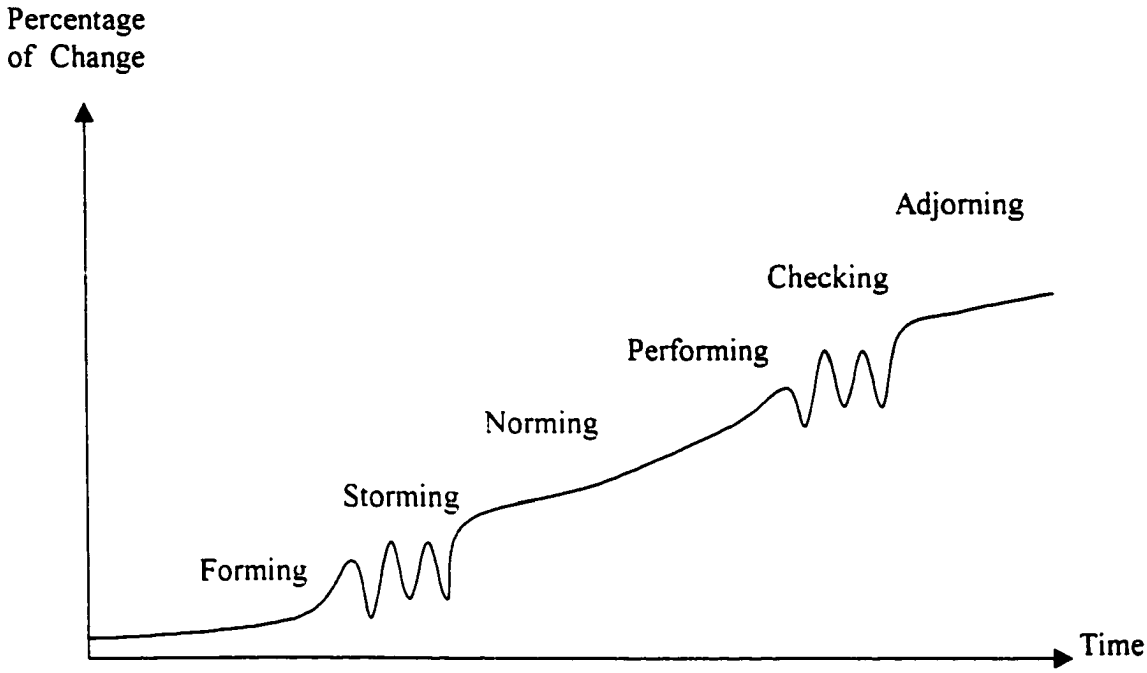

Figure 2. Tuckman Group Development Model (Tuckman, 1965).

In the 1980s, research focused on another kind of group. This group was made up of strangers meeting together for short time periods. The members did not have any sense of belonging to the group. There was not much opportunity for interaction between members. Subjects were asked to pretend that they were in a group. Tajfel (1970) called his groups minimal group paradigms to clarify that the subjects were randomly assigned to groups where they did not know anyone. There was a shift from groups being perceived as groups, having ample time to interact, and a prolonged period of time to develop as a group to groups being conceived as cognitive schemas that existed only in the minds of the subjects.

The new approach was economical and increased reliability and validity; however, Festinger (1980) warned that the new approach could lead to barren research. Precision

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of measurement and experimental control were utilized to discover new knowledge, but could also lead to colorless research.

Although context is a critical issue in group research, there have not been many studies directed at examining context in a systematic way. The issue of context has been addressed developmentally. Groups develop, and change, over time in a linear fashion. These changes have a strong effect on group behavior, productivity, process and relationships within the group (Bennis, et al. 1956; Borgatta, et al. 1953; Dunphy, 1968).

The most thorough study of group development was given by Tuckman (Tuckman, 1965; Tuckman, et al. 1977). Tuckman reviewed 50 studies and concluded that groups develop predictably over time. He identified this development in terms of five stages: Forming, Storming, Norming, Performing, and Adjourning. See Figure 2. Tuckman's work opened the door for more research on a model of group development, but it was not pursued. That was partly due to the fact that Tuckman's studies were based on therapy groups, laboratory groups of limited duration and training groups (Worchel, et al. 1992).

Later Moreland and Levine (1982, 1988) looked at development and change in groups. Their focus was with the development of group members, not the development of the group. Moreland and Levine suggested that group members go through a linear predictable developmental process. The stages of membership are: Prospective Member, New Member, Full Member, Marginal Member, and Ex-Member. At each stage, the member focuses on different elements of the group.

In a related field, Levinger (1980) studied temporal variables in the development of close relationships. Levinger developed a five stage sequence: Initial Attraction, Building a Relationship, Continuation, Deterioration, and Ending.

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Levinger (1980) and Moreland and Levine (1982, 1988) addressed groups where the membership was already determined. Payton and Blakey (1971) focused on groups without determined membership. Their focus was on how groups begin. Their study centered on revolution. The new group's formation was related to a desire to overthrow an existing ruling group and replace the former group's values.

Earlier Hopper (1950) proposed that revolutions were also developmental. Revolutions have a preliminary stage, a popular stage, a formal stage, a reign of terror stage and an institutional stage. There has been little research on the phenomena of virtuality and its impact on teams.

What is a group? What is a team? What is the difference between a group and a team? Are there different types of teams? What does a successful team look like? These terms are defined here for this study.

Group Definition

What is a group? Because of the numbers of properties possessed by groups, it is difficult to formulate a definition of a group that encompasses the full variety of groups in society and still provides a clear distinction between those social entities which are groups and those entities that are not. Additionally, the number of disciplines examining groups, psychology, social psychology, anthropology, political science, and organizational behavior each look through a different window. Each gives its own perspective. There is no one discipline that looks exclusively at group behavior.

There is no generally accepted definition of a group. Different researchers give different definitions of a group based on their personal discipline and interest. There are sociological and psychological definitions. Instead of immediately offering a definition, it

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seems more appropriate to present a range of definitions, and synthesize them to develop a broad definition of a group.

Brodbeck (1958) defined groups in terms of interdependence.

> A group is an aggregate of individuals standing in certain descriptive, observable, relations to each other. The kinds of relations exemplified will, of course, depend on, or determine, the kind of group, whether it be a family, an audience, a committee, a labor union.

Certain features of this definition should be noted. The elements of a group are individuals; the membership of a group is a set of people, but it is not true that any arbitrary collection of people, such as all students whose last names begin with a given letter, constitute a group. For a set of people to qualify as a group, they must be related to one another in some definite way.

Lewin (1948) developed this interdependence point of view further.

> Similarity between persons merely permits their classification, their subsumption under the same abstract concept, whereas belonging to the same group means concrete, dynamic interrelations among persons. A husband, a wife, and a baby are less similar to each other, in spite of their being a strong natural group, than the baby is to other babies, or the husband to other men, or the wife to other women. Strong and well-organized groups, far from being fully homogeneous, are bound to contain a variety of different sub-groups and individuals. It is not similarity or dissimilarity that decides whether two individuals belong to the same or different groups, but social interaction or other types of interdependence. A group is best defined as a dynamic whole based on interdependence rather than on similarity.

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Lewin (1948) defined groups as a class of social entities having in common the property of interdependence among their constituent members. Groups can differ greatly in the nature and magnitude of interdependence among the members. Even an audience at a concert is a group, albeit a weak and transitory one. The audience has a degree of interdependence.

Sociologists view groups primarily in terms of group characteristics. One such view is:

> ...an organized system of two or more individuals who are interrelated so that the system performs some function, has a standard set of real relationships among its members, and has a set of norms that regulate the function of the group and each of its members (McDavid, et al. 1968).

This sociological definition emphasized some of the important characteristics of groups such as roles and norms.

Psychologists view groups in terms of motivation. A group that fails to aid its members in satisfying their needs will have a difficult time remaining a viable group. Employees who are not satisfying their needs in a particular group will search for other groups to aid in important need satisfactions. This motivational interpretation defined a group as: "...a collection of individuals whose existence as a collection is rewarding to the individuals" (Bass, 1960).

Homans defined groups in terms of interaction (1950). He made interaction the sole criterion for the existence of a group. Further, interaction provided the operational means for deciding whether two people are members of the group.

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> A group is defined by the interaction of its members. If we say that individuals A. B, C, D, E,....form a group, this will mean that at least the following circumstances hold. Within a given period of time A interacts more with B, C, D, E,.....than he does with M, N, L, O, P,.....whom we choose to consider outsiders or members of other groups. B also interacts more often with A, B, C, E,...than he does with outsiders, and so on for the other members of the group. It is possible just by counting interactions to map out a group quantitatively distinct from others Homans, 1950).

Bales' (1950) definition was based on the perceptions of group members. It proposed that members must perceive their relationships to others to be considered a group.

> A small group is defined as any number of persons engaged in interaction with one another in a single face-to-face meeting or series of such meetings, in which each member receives some impression or perception of each other member distinct enough so that he can, either at the time or in later questioning, give some reaction to each of the others as an individual person, even though it may be only to recall that the other was present (Bales, 1950).

This more restrictive definition points out that members of the group must perceive the existence of each member as well as the existence of a group. Bales' concern that there should be restraint in generalizing findings to every social entity is also expressed.

When a collection of people constitutes a group, one or more of the following statements will characterize them (a) they engage in frequent interaction, (b) they perceive themselves as members, (c) they are perceived by others as belonging to the

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group, (d) they have a collective perception of their unity, (e) they share norms concerning matters of common interest, (f) they participate in a system of interlocking roles, (g) they find the group to be rewarding, (h) they pursue promotively interdependent goals, and (i) they tend to act in a unitary manner toward the environment.

Team Definition

How is a team different from a group? For some researchers there is little difference, for others there is a great difference. Katzenback et al. (1994) pointed out that the word team itself is overused and lacks clarity, typically because it tends to be used interchangeably with the word group. One dictionary's definition of a group is, "when the persons or things in question are considered as one or as acting as one" (American Heritage Dictionary, 1976). Another dictionary defined a team as a noun, "a number of persons associated together in work or activity", or an adjective, "of or performed by a team", or a verb, "to form a team" (Webster's New Collegiate Dictionary, 1975). These simple definitions provide a clue to the complexity of defining and discerning teams. Team can be a noun, adjective, or a verb. It is something, a characteristic of something, and an action of something. According to these definitions, several strangers meeting in the student union would not be a group. They would have no history, expectations, or guidelines for their behavior. They would not consider themselves as one. However, when does this collection of people become a group? When do they become a team?

By the mid 1980s, the standard model of small groups demanded a search in anthropology, sociology, organizational psychology, and management. There was a growing consensus that groups were a system that could be studied separately by each discipline. There was no unified study (Lipnack & Stamps, 1997).

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In the 1990s, a search for literature on groups and teams yields a coherent field of research. There is a clearer model of group characteristics today. The definitions of the 1980s have been tested for a decade. A 1996 summary of current research quotes a respected researcher's 1984 literature review positively: "Virtually all definitions of the term small group include three attributes: two or more individuals, interaction among group members, and interdependence among them in some way: (Guzzo and Salas, 1995). This results in a crisp small group definition of individuals interacting interdependently (Lipnack & Stamps, 1997). Unfortunately, there is not the same clarity with a definition of team.

But what is the difference between a group and a team? Researchers and practitioners have used a variety of yardsticks to determine the difference: Purpose, Leadership, Roles, Distribution, Empowerment, Perceptions, Relationships, Coordination, Informal-Formal, Social-Task, Membership, and some combinations.

Teams are different than groups because of the purposeful action of teams. The term refers to a collection of individuals who share a common purpose (Katzenbach & Smith, 1994). Intention is what differentiates a team from a group. A group is a collection of people, period. People who have blue eyes are a group because they are recognizable, but they would not be a team unless they got together for a common purpose, like to set up a foundation to study the contributions of blue eyed people (Fisher & Fisher, 1998).

Guzzo and Salas (1995) also defined teams in relationship to purpose, "Teams exist for some task-oriented purpose." Groups all have some degree of task, but task is the primary focus for teams (Lipnack & Stamps, 1997).

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Jensen and Chilberg (1991) defined groups in terms of task or social connection. "A social group exists primarily to provide emotional support and a sense of identity to its members. A task group is organized for a specific and limited purpose." It is true that task groups have a degree of social support and social groups have some decisions to make and some work; however, the primary distinction of a team group is the centrality of specific purpose.

Teams are different than groups because of their leadership. Cleland (1998) used leadership as the key criteria to sort groups and teams. Groups emphasize individual efforts, which are informally coordinated. Teams rely on individual efforts that are specifically integrated in a way to contribute directly to the goals of the team. Teams have shared authority and responsibility, all members share leadership, individuals and the team are accountable, and there is a high degree of self-direction. Groups have limited sharing of authority and responsibility, leadership rests with one or a few individuals, there is individual accountability and limited self-direction. Ray and Bronstein (1995) suggested that leadership was the central characteristic of teams by stating, "a true team must be self-directed." Groups are leader-focused and teams are self-led.

Teams are different than groups because of their roles. Belbin (1993) described the essence of a team being the reciprocal part each individual plays. Teams are often connected to sports and games. Each player in a game has a specific position and specific responsibilities. Skills are important, but even more important is the ability to work together.

In industry, although groups have a common task, they often lack clear roles, which limit their team effectiveness. Donnellon (1996) emphasized the distribution of work as

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being the distinguishing characteristic, "A group of people who are necessary to accomplish a task that requires the continuous integration of the expertise distributed among them" (Donnellon, 1996). Donnellon agreed that there are teams of people who have the same expertise; however, she argued that these collections are groups, not teams. Teams involved the conceptual and practical differences between individuals who have different or distributed expertise. Integrating these differences in expertise is the most important team task. Cooperation, collaboration, and personal sacrifice for the group characterize the emphasis on teamwork.

Fisher and Fisher (1998) defined teams in terms of empowerment, "Teams are nonauthoritarian work structures with shared responsibility for decision making, problem solving and organization design." Teams are based on a commitment paradigm, not a control paradigm (Walton, 1985). Team operations are designed to nurture commitment, not compliance (Fisher, 1989). This paradigm narrows the conversation about teams. Teams are not groups managed by authoritarian athletic coaches or drill instructors in the military. Only those groups that are built on a foundation of empowerment are teams. In control based groups, management gets compliance, there are authoritarian practices, management is solely responsible for managing, there is a reliance on policies and rules, and there is a hierarchical culture. In commitment based teams, leadership develops commitment, there are nonauthoritarian work structures, there is shared responsibility for decision making, problem solving, goal setting, results, and organizational design, and there is an empowered culture.

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Allport (1924) asserted that groups only existed in the minds of people. Groups were only shared perceptions of sets of values, ideas, thoughts and habits. He believed that you could not stumble over a group, because it was not primarily physical in nature.

Johnson and Johnson (1991a) conceptualized groups as being about relationships.

> A group is two or more individuals in face-to-face interaction, each aware of his or her membership in the group, each aware of the others who belong to the group and each aware of their positive interdependence as they strive to achieve mutual goals.

A collection becomes a group when relationships are established with the individuals in the collection.

Shonk (1982) and Plovnick et al. (1975) defined a team by coordination. "A team consists of two or more people who must coordinate their activities to accomplish a common task" (Plovnick, et al. 1975). Coordination must be required to accomplish the task in order to justify putting a team together. Wanting to coordinate because it would be good is not enough. If two individuals can do their job independently, they are not a team. They become a team when their work requires coordination and working together.

Robbins (1997) does not use the word team. Groups are two or more individuals coming together to achieve particular objectives; however, groups come in two varieties, informal and formal. Formal groups are connected to an organization's structure with designated work assignments, defined tasks and work groups. Informal groups are not organizationally determined. These groups develop in response to social need.

Robbins (1997) used synergism as the primary difference between groups and teams. A group interacts to share information and make decisions to enable each

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individual to fulfil responsibilities better. There is no need for the group to work jointly to get the task completed. Their performance is the sum of all the individual efforts. On the other hand, teams generate synergism through joint efforts. Their group performance is more than a sum of the individual efforts.

Foy (1994) also used synergism in her taxonomy. She made a distinction between teams, team work, and teamwork. Teams are related to groups, team work consists of tasks that teams do, and teamwork is synergism. Foy suggested that groups and teams are very similar; what makes them different is their behavior. Teams are synergistic and groups are not.

Membership also varies between teams and groups. Membership in teams is intentional and determined by the task. Individuals with critical skills, competencies, and experience are intentionally place on the team to maximize team performance. Groups are gathered for more social purposes. They are based on affinity of experience, interests, hobbies, and history. There is no assigned membership. The membership process is random (Sashkin, et al. 1994).

Ray and Bronstein (1995) introduced the concept of continuum to the taxonomy of teams and groups. His approach was to identify an index of nine variables including production, quality, goal setting and problem solving, personnel activities, training, planning and coordination, budgeting, responsibility for safety, and functional aspects, then to score them on a scale of one to five. One is leader-centered and five is self-directed. Ray recognized the continuum involved with groups and teams and used this instrument to clarify where the collection of individuals is on the continuum.

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Finally, some have a combined approach. They review the literature and compile a list of salient features of a team. Hensey (1992) took this approach, "A team may be defined as a group of people with different skills, and often with different tasks, who work together toward a common project, service, or goal with a meshing of functions and mutual support." Hensey took several of the distinctions already mentioned, purpose, roles, distribution, empowerment, relationships, and coordination, and folds them into one definition.

Ray and Bronstein's (1995) concept of continuum is useful to this research. Part of the taxonomy difficulty is related to continuum. Groups and teams share similar kinds of components. The difference is not so much in kind but in degree. The degree of purpose, leadership, roles, distribution, empowerment, relationships, coordination, membership and the social-task element looks one way in groups, another way in teams.

Additionally, Lipnack and Stamps's (1997) and Guzzo and Salas's (1995) taxonomy of individuals, interaction and interdependency are useful in grouping all the taxonomies. Interaction adequately describes the variables of leadership, empowerment, and relationships. Interdependently adequately addresses the variables of purpose, roles, coordination, synergism, and distribution.

Lipnack and Stamps (1997) and Guzzo and Salas (1995) miss the need for intention with teams. This dissertation defines a team as individuals interacting interdependently with intention.

Types of Teams

Teams are not all the same. The type of team will determine what success looks like. Teams can be understood a variety of ways. Team taxonomies are based on

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leadership, work tasks, nature of the problem being addressed, developmental stages, status, time, function, and purpose.

Ray and Bronstein (1995) developed a taxonomy of five types of work groups based on a continuum of leadership moving from traditional leader-focused work groups to self-led teams: Leader Centered/Leader Focused; Leader Centered/Function Focused; Leader Centered/Integrated Task Focused; Self-Led/Time; and Task Focused. The traditional work group, Leader Centered/Leader Focused, is very dependent on its leader. There is a manager responsible for goal setting, decision making, job assignments, performance appraisals, and personnel issues such as who serves as the work group leader. The work is divided into distinct units. No one sees the overall process or product except the manager. The leader was promoted to lead the work group because of job performance not group leading skills. If the work is so dependent on a single person, there is little hope that the group will become a team. Leader Centered/Leader Focused teams work well when the work is highly routine and unchanging in a low-wage, low-skill environment when production includes a predominance of simple manufacturing processes.

In the Leader Centered/Function Focused work group there is an appointed, or assigned, leader who assigns work, coordinates work, does performance appraisals, and makes many of the major decisions. This person leads the team, but does not exercise the day-to-day direction a more traditional manager, Leader Centered/Leader Focused, would. They are not as knowledge about the fields of the team members. This leader can be totally autocratic, or they can be involving and open. Again, the work group is subject to the leadership of an individual. Leader Centered/Function Focused groups work well

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when knowledge, creativity, and central control are valued. The leader of the group provides control through job assignments, performance, appraisal, and mentoring for junior members. Much of the success of the group depends on the skills of the leader instead of the creative ability of the group (Ray & Bronstein, 1995).

In a Leader Centered/Integrated Task work group, individuals are encouraged by management to make many of the decisions and are often expected to do the work of others in the group. Management may set goals, apportion resources, and do appraisals. Much more employee involvement is encouraged. There are group incentives. This type of group works well when the organization shows a high commitment to quality processes in every aspect of the business. Leader Centered/Integrated Task Focused groups do well in tightly engineered, assembly line environments in which individuals are empowered through quality circles or other involvement and problem-solving methods to improve the process and ensure high quality (Ray & Bronstein, 1995).

The fourth type of group is Self-led/Time and Task focused. This group is often found in project or task force environments. The group has a clearly defined charge or purpose and is time-limited. Its group members have defined functions, but boundaries are flexible. The group may have a formal leader, but the higher level of member cooperation and coordination can leave the leader sidelined. No one person can possibly be involved in all the team's activities. This is the first level of what Ray and Bronstein would call a team because it is self-directed. The group has an identity independent of the leader. Self-Led/Time and Task Focused groups work well when there is a critical planning task to be accomplished in a finite period of time. These groups have a limited life span. The leader looks more like a coach than a leader. A real sense of esprit de

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corps develops. They are often formed to break the rules of the organization for the good of the organization (Ray & Bronstein, 1995).

The final team in Ray's taxonomy is Self-Led/Task Focused teams. These teams have common, group determined goals, make most of the decisions about how to achieve the goal, and require little formal leadership. They are permanent and remain together for years with only routine membership changes. The larger system provides encouragement and rewards independent of the manager. Rewards are based on the group's performance, not individuals (Ray & Bronstein, 1995). The teams are not managed, controlled, or supervised. They are led by their mutual vision of the organization's purpose and its goals. The foundation of a team environment is the organizational system that supports the team. Teams require a fundamental system that supports their existence. To know if a team environment exists, check to see if there is a system in place which rewards and reinforces team goal setting and decision making with minimal management contact. Self-Led/Task Focused groups work well in a variety of environments. These groups are successful when a series of processes can be integrated, such as insurance applications and claims. The groups are known for their ability to respond rapidly to customer demands and changing market conditions. These teams will not succeed in poor political environments and in places where the work is not conducive to teamwork. If the methods of control and organization practiced by top management are hierarchical and highly traditional, these teams are ineffective (Ray & Bronstein, 1995).

George and Wilson (1997) also presented a classification of teams based on leadership. A model is presented with supervisor centered at on pole and team centered at the other pole. The area of supervisory responsibility decreases towards the team

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centered pole and the area of team responsibility decreases towards the supervisor centered pole. Between the poles are seven types of teams.

Robbins (1997) and Ainger et al. (1995) classified groups in terms of their status. Groups can be either formal or informal. Formal groups are defined by an organization. They include designated work assignments. In formal groups, behaviors are stipulated and directed towards organizational goals. Informal groups are alliances that are not structured or determined by organizations. Informal groups exist in work environments, but they form naturally in response to individual's needs for social contact (Robbins, 1997). Ainger et al. added that informal groups can also gather naturally around ideas and resources; they are not limited to social groups. Informal groups may be work related, but they are not structured or established by management (Ainger, et al. 1995). Higgs and Rowland (1992) also included formal-informal differentiation in their quadrant of types of groups.

Lipnack and Stamps (1997), Ainger (Ainger, et al. 1995) and Higgs and Roland (1992) classified groups in terms of time and space. Lipnack and Stamps (1997) treat time and space as a single interrelated idea. Distance, even short distances, take time to bridge. At greater distances across time zones, a day turns into night and interferes with peoples' ability to interact simultaneously even though simultaneous interaction is electronically possible. Higgs and Roland (1992) developed a quadrant of team types. Their axes are formal/informal and temporary/permanent. Unlike Lipnack and Stamps, Higgs' concern with types of groups is not issues of communication in relations to time and space. Instead, Higgs' concern is related to how long the group will exist. Some groups are temporary and some are permanent.

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Donnellon (1996) classified groups in terms of development. The taxonomy is not based on any developmental theory with defined stages of team development, but rather the environments that groups find themselves in:

1. There are collaborative teams that are characterized by identification with the team, a shared perception of interdependence, low power differentiation, social cohesion, collaborative conflict management tactics, and a win-win negotiation process.

2. Emergent teams are characterized by identification with the team and a moderate degree of interdependence, low to moderate power differences, moderate social distance, some use of collaborative tactics for managing conflicts and win-win negotiating.

3. Adversarial teams vary in the combination of identification and interdependence, but they are distinctive in their high use of power differences, social differences, conflict management tactics that are not collaborative and win-lose negotiation processes.

4. Nominal teams are groups who are teams in name only. They are characterized by functional identification, independence, low to moderate power differentiation, moderate social distance, and little evidence of conflict or negotiation. Functional identification, independence, high power differentiation, and social distance characterize doomed teams. In a situation where people feel no cohesion, no identification with each other, and no need to work together, the use of power to compel the team ensures that the team will defer to the powerful and result in meetings and actions that are made singularly, not by the team.

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McGrath's Task Circumplex (McGrath, 1984) also suggested a taxonomy for teams. The Circumplex is based the differentiation of work into four primary tasks: (a) Generating, including generating plans and generating ideas; (b) Choosing, including solving problems that have correct answers and deciding issues that lack answers; (c) Negotiating, including resolving conflicts of viewpoint and resolving conflicts of interest; and (d) Execution, including resolving conflicts of power and executing performance tasks. The Circumplex includes two axes: cognitive to behavioral and collaboration to conflict. Some of the four work tasks need more cognitive/behavioral contexts and other work tasks need a more behavioral/collaborative environment.

Although McGrath does not make this application, it follows that team taxonomy could be built on the Circumplex work taxonomy. There are generating teams, choosing teams, negotiating teams, and execution teams depending on what their primary work tasks are. See Figure 3.

Fisher and Fisher (1998) suggested a team classification built on scope. Fisher (Fisher, 1994) utilizes a 2 x 2 matrix to diagnose teams. One dimension is duration or how long the group will function together. The new dimension that Fisher adds is scope, whether the team will cross multiple organizational boundaries or not. The resulting four types of teams are natural work teams or ongoing single operation teams, cross-functional teams or ongoing multiple operation teams, small-project teams or temporary single operation teams, and special-purpose teams or temporary multiple operation teams.

Natural work teams are the collected individuals who form around normal work processes. They are the subsystems of an organization. Cross-functional teams are organizational units with an ongoing purpose that crosses multiple natural work teams.

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Small project teams are temporary collections of people who are formed to work on a particular task until it is complete. After the work is done, they disband. The task is usually confined to the limits of a single natural work group and does not require participation form everyone on the natural work team. Special purpose teams are another form of temporary organization that disbands when the task is completed. The scope of tasks is larger than those of a small-project team. The work crosses multiple natural work groups.

Robbins (1997) classified groups by function. The organizational chart determines a command group. It is composed of the subordinates who report to a given manager. A task group is also organizationally determined. It represents people working together to complete a job. It differs from the command group in that a hierarchical organizational chart does not define the task group's boundaries. An interest group gathers around an area of mutual interest at work. An interest group focuses on a specific objective of interest to the group; examples are groups gathered around changing vacation schedules or supporting a peer in a difficult personal situation.

Carr (1992) also approached team taxonomy from a functional perspective. Carr suggested that project teams be focused around products or services and customers. Individuals who do not normally need each other work together to accomplish a special project. The individuals perform their daily work separately, but also gather to focus problems related to group processes.

Clelland (1998) classified teams on the basis of their output. He articulated twelve output teams: reengineering teams, crisis management teams, product and process development teams, self-directed production teams, task forces and problem solving

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teams, benchmarking teams, facilities construction project teams, quality teams, general-purpose project teams, audit teams, plural executive teams, and new business development teams.

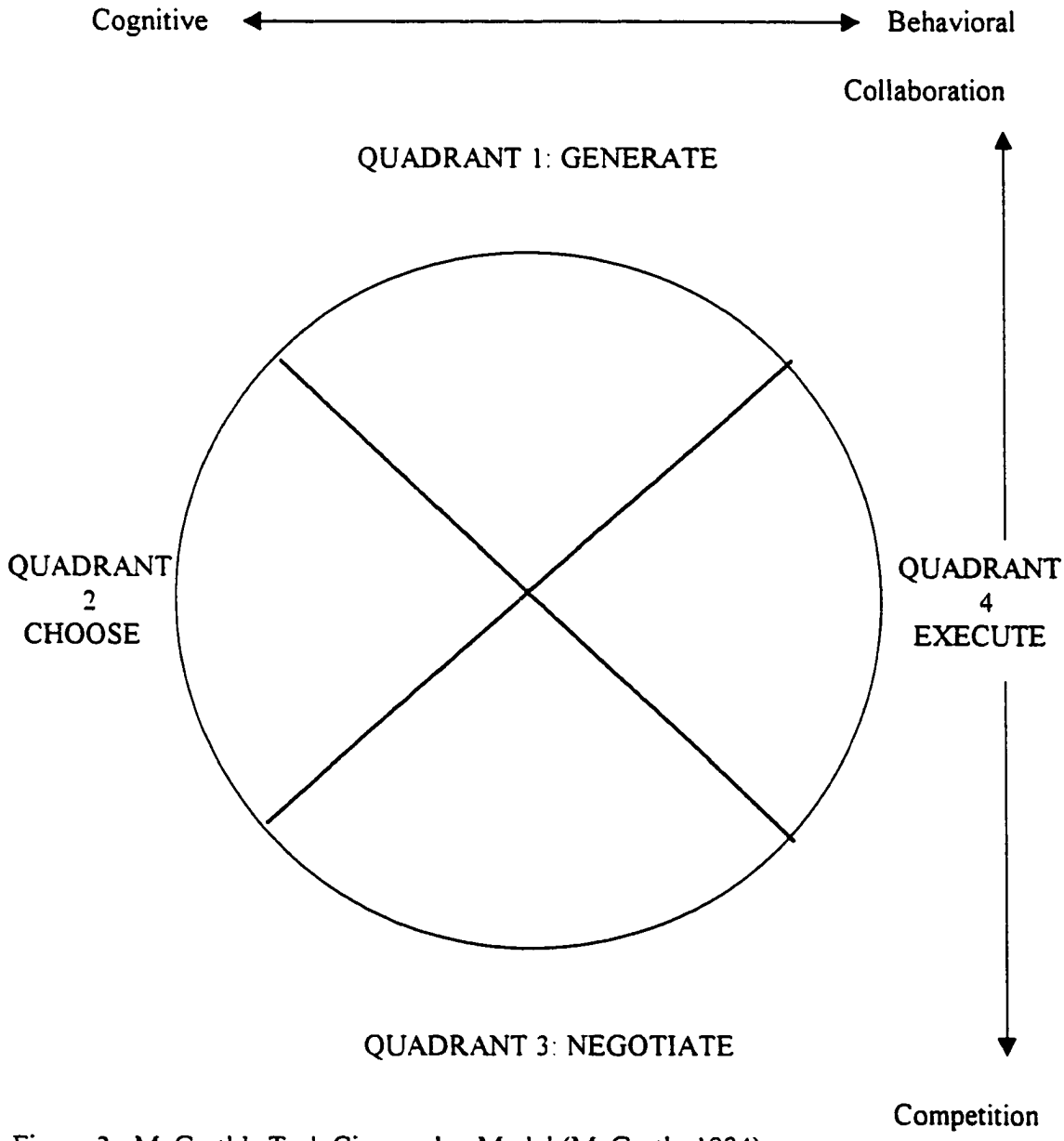

Figure 3. McGrath's Task Circumplex Model (McGrath, 1984)

George and Wilson (1997) used membership skills to shape team classification. Cross-Functional Quality Improvement Teams get together for a limited time to

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recommend solutions to quality problems, either within departments or between departments, and then disband. Functional Work Teams work together daily within a functional department to produce high-quality work. Leadership is either direct supervision or is shared with an external team leader. Multifunctional Empowered Teams are multiple departments that have been permanently combined or redesigned to eliminate bottlenecks and quality problems. This team shares leadership with the leader who provides coaching on tasks as needed. Virtual Teams are groups of people charged with reducing day-to-day bottlenecks and errors or reducing time for getting a product or service to market.

McIntosh-Fleming (1996) used membership for team classification. A cross-functional team is a team comprised of members representing various parts of the formal organization allowing the team to have multiple foci. An intact team is an existing work group that produces an identifiable product or service. McIntosh-Fleming also used objectives and measures as criteria for classifying groups. Some groups have a single task focus and others perform tasks within defined boundaries. Measures are also used to classify groups. Some groups achieve established tasks and milestones, others achieve established organizational goals.

Robbins (1997) also classified groups on the basis of objective. The three most common objective teams are: problem-solving teams, self-managed work teams, and cross-functional teams.

In problem solving teams, individuals give ideas on how to resolve a problem encountered in the work environment. Rarely does a problem-solving team have the

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authority to implement their solutions. They function primarily in an advisory capacity. A step beyond problem-solving teams is self-managed teams.

Self-managed teams often look for solutions, but have the authority to implement the solutions. Self-managed work teams take on the responsibilities of their former supervisors. These responsibilities typically include control over the pace of work, determining work assignments, organization of work, and implementation of inspection procedures. Self-managed teams often select their own members and the members evaluate each other's performance.

Cross-functional teams consist of members from a similar hierarchical level, but from different work areas, who come together to accomplish a task. Cross-functional teams are an effective means for allowing people from diverse areas within an organization, or organizations, to exchange information, develop new ideas, solve problems, and coordinate complex projects.

Virtual Teams

Carr (1992) outlined five key leadership functions: managing alignment, managing coordination, managing the decision process, managing continuous learning, and creating and maintaining trust. In the managing alignment function, although teams need independence, everything they do must be integrated with the needs and goals of the organization. Leadership ensures that the goals of the team further the goals of the organization. In the managing coordination function, teams must be able to work together. The efforts of different teams, as well as individual teams, must be coordinated. Resources must be distributed where they are needed. In the decision function, decisions are not passed down. The leader must manage a process where teams make their own

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decisions. Conflict and diversity must be turned to become an advantage. Related to learning, teams will face constant change. In order to keep up with that change, leaders must help teams learn continuously. The leader becomes a learning agent. In the trust function, high performance teams demand high levels of trust. Self-management only occurs where there is trust.

In the past, leaders managed workers. Today the need is for workers to manage themselves. Contemporary leaders manage environments where workers work.

Carr (1992) outlined seven basic management roles:

1. The supervisor is responsible for the performance and behavior of the team. The leader sets goals for the team and helps the team to focus on them. A supervisor tells the workers what to do, a leader calls out their willing support. Supervisors push workers.

2. Leaders draw workers.

3. A teacher oversees learning. It is not about training or telling. It is about helping them to learn.

4. A coach makes sure that the team applies what it has learned. As the team discovers how to learn on its own, the coach helps the theory to become applied.

5. A mentor takes the initiative to share expertise with the team and intervenes only as needed. The mentor is usually in the background.

6. A consultant is also in the background; however, a consultant only intervenes when asked.

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7. The final role is that of mediator. The mediator does not use force to manage alignment, but uses the process of mediation to ensure that the team is in alignment with the broader organization.

George and Wilson (1997) outlined five rotating points of a star related to team leadership: maintenance, communication, production, safety, and quality. Every three to five months these responsibilities are shifted within the group.

Lipnack and Stamps (1997) related leadership to authority and outlined four ages of authority. When new forms of organization emerge, new forms of authority and power also emerge. In the Nomadic Age, leaders had the ability to influence people, but generally not the authority to force people. Charisma and tradition ruled nomadic cultures. In the Agricultural Age, hierarchies developed. The elite at the apex of the hierarchy used force to defend resources, maintain social stability and control technology. In the Industrial Age, brute force gave way to law. Bureaucracies use law, rules, regulations, policies and procedures for authority. Power was based on the legal aspects of position. In the Virtual Age, purpose is the primary authority. In virtual teams power comes from information, expertise, and knowledge.

In the age of the individual, the source of authority was charisma, and the source of power was the person. In the age of the small group, the source of authority was tradition and the source of power was affiliation. In the age of hierarchy, the source of authority is ownership and the source of power is reward or punishment. In the age of bureaucracy, the source of authority was law and the source of power was position. In the age of networks, the source of authority is purpose and the source of power is knowledge (Lipnack & Stamps, 1997).

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Lipnack and Stamps (1997) pointed out that the only universal role discovered in decades of small group research is leadership. Leadership in virtual settings is pervasive. Virtual teams are leader-ful, not leader-less. Six basic leadership roles for virtual teams were presented: Coordinator, Designer, Disseminator, Tech-net Manager, Socio-Net Manager, and Executive Champion. When confronted with complexity, people tend to simplify by using one part of the whole to describe the whole. While virtual teams may have a single leader, or refer to a single leader for simplicity, most virtual teams will have mutiple leaders. In successful teams, leadership is shared (Parker, 1991).

Small groups generally have social leaders and task leaders. The measure of task leadership is productivity. The measure of social leadership is cohesion. In traditional leadership social leadership is reduced to a place in the structure and task leadership is reduced to one core expertise. A typical job title incorporates both the social and task leadership, e.g., the vice president of marketing (Lipnack & Stamps,1997).

This introduces the issue of rank, having it and using it as a challenge for virtual teams. Typical symbols of rank, office, clothing, and titles, cannot be seen on-line. Rank is needed to connect the virtual team to the organization, but can fossilize the virtual team. The answer is found in specialization. While rank is confusing, specialization is booming on virtual teams. Expertise will determine the individual's role on the virtual team (Lipnack & Stamps, 1997).

Fisher and Fisher (1998) outlined nine leadership questions that effective virtual teams must address.

1. What will the team leader do?
2. What will the team members do?

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3. Who is accountable for our success?
4. Who will manage that?
5. Who will make what decisions?
6. Who will solve what problems?
7. What decisions will we not be able to make?
8. Where do we go for help?
9. Who will solve intractable disagreements?

Wheatley (1992) used the notion of strange attractor to describe leadership in virtual teams. Order can come out of apparent disorder (Prigogine, 1984; Jantsch, 1980). Strange attractors come from chaos theory (Gleick, 1987). They are computer pictures of motions that trace the evolution of a system. Chaos theory stated that if we look at a system long enough and with the perspective of time, it always demonstrates orderliness. The most chaotic system never goes beyond certain boundaries (Cartwright, 1991), it stays contained within a shape that is called the system's strange attractor. Chaos always has a shape. Chaos is the final state in a system's movement away from order. The strange attractor is a basin of attraction that the system is magnetically drawn into, giving chaos a visible shape (Briggs, et al. 1989).

Wheatley suggested that organizations have a strange attractor that pulls all organizational behavior towards it. One such possible atttactor is meaning. Frankl (1959) suggested the pursuit of meaning as a possible strange attractor. Thus, virtual leadership, or leadership in chaotic contexts, will want to lead with meaning. This emphasis on meaning will gather teams.

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Huey and Sookdeo (1994) described virtual leadership as post-heroic leadership. Huey quotes Warren Bennis, "When competitive advantage comes from creating intellectual capital, from attracting and retaining knowledge workers, whips and chains are no longer an alternative, leaders must learn to change the nature of power and how it is used." Later Huey quotes Lawler,

> The effect of technology is just beginning to be felt. It enables individuals to think of themselves as self-contained small businesses. So the challenge to corporate leadership becomes, make me a case for why I should get excited about working for you.

Contemporary leaders will look less like heroic captains and more like candidates running for office. Their campaign will need to (a) develop, and articulate, what the company is trying to do, and (b) to create an environment where employees can figure out what needs to be done and then do it well. Traditional leadership relied on quantitative skills. Post-heroic leadership is based on communication skills.

Geber (1995) described contemporary leadership in terms of conscience. The virtual team leader serves as the conscience for the team. This leader works to resolve conflict and protect the integrity of the team and its purpose.

Young (1998) described the virtual team leader as the knowledge manager. The leader focuses on ensuring that information is gathered, communicated and debated on the virtual team.

Sekhri (1996) looked for virtual leaders to forsake management-by-walking-around as a primary means of leadership. The virtual environment lacks the physical environment to lead in a physical fashion. New vitual leaders are responsible for workers

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whom they seldom see and who live at great distances. There is no live coaching and feedback in virtual contexts.

Jarvenpaa et al. (1998) observed the process of rotating leadership in virtual teams. Teams with rotating leadership were high performing teams. The virtual teams in with static team leadership were consistently low performing. The teams with stationary leadership relied on the leader to do all the work, leading to low ownership and participation. Jarvenpaa identified trust as a key variable in leadership of virtual teams. Virtual teams with high levels of trust were more likely to rotate leadership than teams with low levels of trust.

Team Development

Theoretical Constructs

All teams go through a development process. Where a team is developmentally will also determine what success looks like. What are the different theories of team development, and what does success look like in each stage?

Hannula (1992) suggested that social psychologists have relied on two approaches to understand group dynamics. One approach focuses on the individual as the primary unit of analysis, and the other focuses on the group as the primary unit. Allport (1924) argued for the individualistic approach. Allport suggested that all group behaviors could be explained in terms of individual behavior. He asserted that any group behavior was the sum total of each individual's action taken separately. Some of Allport's work (1920) did not support his view. His study demonstrated that individuals in a group produced more arguments for a problem than individuals working alone. Allport responded by pointing out that although the quantity of the group work was higher, the quality of the

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individual work was higher. The work of McDougall (1920) was the best representation of the group approach to group dynamics. McDougall insisted that the group had an existence independent of the specific individuals found in it.

Hannula (1992) pointed out that forty years later Bonner (1959) wrote that neither the individual, nor the group has a separate existence. Each implies and functionally depends on the other. Lewin's (1951) field theory represented this position as he attempted to link the individualistic and the group approaches. Steiner (1974) noted later that Lewin's approach to group dynamics did not fully reflect the mutual interdependence of the individual and the group. Lewin attempted to reduce group behavior to the level of individual thought processes. Instead of arguing for either side, Steiner called for a complementary pluralism of approaches with a stronger emphasis on the mutual interdependence of individual and group. The goal of the research should not be to determine the one best approach to group dynamics, but instead it should be to integrate various approaches to enhance understanding of group phenomena.

Johnson and Johnson (1991a) pointed out the research of Emile Durkheim (1898) and its contribution to the group approach to the study of group dynamics. Durkheim posited that small groups were the building blocks of society and tried to demonstrate that a collective consciousness dominated the individual will in many situations.

Johnson and Johnson (1991a) also indicated another central research difference in group developmental theory. Developmental changes in groups have been described by well over 100 theories. Most of these theories have been either sequential-stage theories or recurring-phase theories (Hill, et al. 1973) and (Shambaugh, 1978). The best known sequential stage theory was developed by Tuckman (Tuckman, 1965; Tuckman, et al.

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1977) and involves the five stages of Forming, Storming, Norming, Performing, and Adjorning. See Figure 2.

Recurring Theorists

Recurring-phase theories specify the issues that repeatedly dominate group interaction. Bales (1965) stated that there had to be equilibrium between task-oriented work and emotional expressions in order for relationships to develop between group members. Bion (1961) stated that groups focus on the three basic themes of (a) dependency on the leaders, (b) pairing among members for emotional support, and (c) fight-flight reactions to a threat to the group.

Both theoretical approaches are useful in understanding group development. The sequential-stage and the recurring-phase theories are not contradictory. A group may move through various stages while dealing with recurring basic themes. These themes are dynamic and always changing, so they are never completely resolved and appear in later phases of the group's development.

Worchel et al. (1992) argued against Tajfel (1970) by asserting the importance of studying groups in their developmental context. Tajfel's minimal group paradigm leaves the true nature of group dynamics hidden. When total strangers are brought together for a short period as members of a group, the members have little or no sense of group history, development, or relationship. Results from these studies ignored the impact these features have on individual's behavior and group functioning. Worchel suggested that in addition to these minimal groups, social psychologists should examine long-term groups.

Asch (1952) compared groups to water. He argued that in order to understand the properties of water, it is important to know the characteristics of its elements, hydrogen

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and oxygen. This knowledge alone still is insufficient. The combination of hydrogen and oxygen must also be examined as a unique entity. Similarly, individual and group behavior must be studied to understand the nature of group dynamics (Worchel, et al. 1992).

George and Wilson (1997) also included an element of recurring group theory. The recurring issue is focus. At each phase, a critical issue is focus. The issue does not go away, it simply is answered differently in each phase. In the Preteam phase, the focus is on each individual. In the New Team phase, the focus shifts to the team and how to get along with each other. In the Mature Team phase, the focus is outside the team to larger organizational and business issues.

In the Preteam Phase there are two key focus questions.

1. What is happening to me?
2. How will my job change?

In the New Team Phase there are six key focus questions.

1. What is happening in the team?
2. How am I fitting into the team?
3. How do I like working with the other team members?
4. How are we going to work together?
5. How can we agree on things?
6. How can we handle these new responsibilities?

In the Mature Team Phase there are four key focus questions.

1. What is happening in the organization?
2. What other opportunities are out there?

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3. What is next for us?

4. How can we continue to advance?

Griffin (1982) reported the work of Knowles and Knowles (1972) on the development of groups. Knowles and Knowles (1972) identified three distinct phases: Flight, Fight and Unite. Flight refers to the members' reluctance to get down to the work of becoming a team. Fight describes the battles over different ideas and agendas. Unite is the final stage, when the opposing forces come together in resolution.

Poole (Poole, 1981, 1983a, 1983b) attempted to understand group development through the process of decision making. Poole stated that there are several different paths to successful group decision making depending on the complexity of the group's environment, how the group manages its task, and its social dimensions. Poole questioned linear development over time, but did not question the importance of social orientation, conflict management in the emergence of decisions Poole pointed out that a group may be at one place socially in terms of development, but in another phase altogether related to conflict. A group may be in the conflict stage in which members feel comfortable enough with each other to disagree, but have no conflict yet, because the task is unclear.

Katzenbach and Smith (1994) arranged linear team development around the central issue of team performance. The primary variables were team effectiveness and performance impact. The team performance curve illustrated that the performance of any small group is dependent on its basic approach and its effective implementation. Katzenbach's phases were: Pseudo-Team, Potential Team, Real Team, and High-Performing Team. Groups that call themselves teams, but are unwilling to take the risks

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of conflict, common purpose, goals and accountability are pseudo-teams. The success of the team, making it to the High-Performing Team Phase, is dependent not on team building, it is instead dependent on high performance.

Sequential Theorists

George and Wilson (1997) used three stages for group development: Preteam, New Team, and Mature Team. The Preteam Phase begins when an organization starts to consider teams. It ends when teams are formally chartered and have held their first meeting.

There are eight characteristics of the Preteam Phase.

1. Becoming aware of the need to change.

2. Completing a readiness assessment to determine your organization's cultural strengths and developmental areas.

3. Defining organizational values to drive behaviors toward a more empowered culture.

4. Responding to skeptics who are wary of the team concept.

5. Unsure about what your new role will be.

6. Reconfiguring roles and responsibilities at all levels so people have more decision making ability.

7. Redesigning departmental boundaries so teams can control errors or variances within their own boundaries.

8. Focusing on personal needs and role.

The New Team Phase begins with the first team meeting and ends about twelve to eighteen months later. In the beginning of this stage time is spent on developing a team

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purpose, goals, roles and responsibilities. By the end of this stage, everyone is working on projects for the team.

There are the eight characteristics of the New Team Phase.

1. Working together with members from different areas or departments.

2. Making more decisions as a team.

3. Developing team goals in alignment with your organization's vision and values.

4. Struggling not to revert to the comfort of our old role, especially during crisis.

5. Spending time with your former supervisor to gain more expertise.

6. Seeing attitudes and behaviors becoming aligned with the team concept.

7. Receiving more information about customer complaints, profitability and related business matters.

8. Focusing more of our teams' needs and roles than on our own needs and role.

A team in The Mature Team Phase will handle new responsibilities competently, solve interpersonal problems, work together willingly and maintain predictable levels of high performance. The team is well on its way.

There are seven characteristics of the Mature Team Phase.

1. Spending up to 80 percent of their time on strategic customer or product and service improvements.

2. Working with teams that handle their new responsibilities successfully.

3. Assuming more advanced responsibilities like budgeting, peer review and salary increases.

4. Watching your team produce at high levels.

5. Maintaining quality levels.

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6. Noticing that doubts about the team concept have practically disappeared.

7. Stretching to take on roles outside your department or facility.

Hensey (1992) identified four stages of group development: Collection, Group, Developing Team, and High-Performing Team. All potential teams start as a collection of people. The team starts with people being polite, guarded and exploring others in the collection.

As people discover more about each other, they enter the Group stage. Once people discover each other's personalities, values, skills and interests, they begin to trust each other and become less guarded. Some conflict can begin. Some pairing and subgroups can form. People will have identified with the group, but not with each other.

Leadership is essential in moving the group to Developing Team stage. The group recognizes the need for leadership and the advantages of being a team. Members start to see others as resources. Norms, goals, roles, practices and procedures begin to be developed.

Once the team has worked out problems, goals, issues and difficulties, the team is in a position to move to the High-Performing Team stage. Few teams make it this far because of the negotiation and conflict necessary to work through the preceding issues. Conflict continues, but it looks more like spirited problem solving. Differences are values. Loyalty to the team is high and caring for the members is evident.

Jensen and Chilberg (1991) outlined the research of Fisher (1970) who arranged group development around recurring group decision making. Fisher described a typical pattern of group development with periods of time devoted to orientation, conflict, emergence, and reinforcement.

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The orientation phase allows group members to reduce some of the uncertainties they carry towards each other by building some initial social dimensions. One of the initial issues the group will encounter is overcoming primary tension. Primary tension is the uneasiness that people experience when they first meet (Bormann, 1975). It is the ice that must be broken before group members start to feel comfortable with each other. Members avoid sharing what they really think about group goals, because they are not comfortable enough to take a stand on any issue. In most groups, the orientation phase lasts for the first couple of meetings. Effective groups develop a balance between socializing and developing a consensus on the nature of the task ahead of them.

Once group members feel comfortable together, they are ready to manage the conflict phase. In this phase, the members argue about the task, norms, roles, decision making and purpose. It is the critical phase that determines group success or failure. If the members fail to process difficulty, any future difficulty will be avoided. Effective groups spend a lot of time in the conflict phase trying to work out differences. In contrast to the primary tension of the initial phase, the conflict phase is characterized by secondary tension (Bormann, 1975). Secondary tensions are the feelings of uneasiness sparked by disagreements or critical evaluations of member's ideas. Effective teams learn not to squelch secondary tension, but to manage them. Disagreement is allowed, until it threatens relationships. Time is then given to allow the tension to subside.

The emergence phase is a transition from the heated exchanges of the conflict phase to the socialization of the first phase. Decisions are not announced to the group, but allowed to emerge slowly until consensus is built. Fisher discovered that some

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members will respond to the idea ambiguously for a while before offering their support. Ambiguous responses allow members time to change their minds while saving face.

The final stage is the reinforcement phase. This is when members celebrate their decision and commit themselves to working out the details of their plan. Motivation is high and the focus is the implementation of the decision.

Lipnack and Stamps (1997) reviewed the work of Tuckman. Tuckman's work (Tuckman, 1965; Tuckman, et al. 1977) continues to be fresh even after two decades. See Figure 2. The Tuckman Model has a strong theoretical basis. It is based on a growth model that has wide application in social and natural sciences. The Tuckman Model is based on a logistical growth curve. This "S" curve is so common in the sciences that Ludwig von Bertalanffy (1968) suggested that it was proof that there were mathematical principles and patterns that hold across diverse sciences.

Scholtes et al. (1996) also referenced the Tuckman Model. As teams mature, members eventually learn to cope with the pressures they face. The Tuckman Model addresses these fairly predictable stages.

When a team is forming, members cautiously explore each other and the boundaries of acceptable group behavior. This is a stage of transition from individual to member status and of testing the leader.

The Forming Stage has ten characteristics.

1. Excitement, anticipation and optimism.
2. Pride in being chosen for the team.
3. Initial tentative attachment to the team.
4. Suspicion, fear and anxiety about what lies ahead.

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5. Attempts to define the task and decide how it will be accomplished.

6. Attempts to determine acceptable team behavior and how to deal with team problems.

7. Decisions on what information is needed.

8. Lofty, abstract discussions of concepts and issues.

9. Discussion of the symptoms or problems not relevant to the task.

10. Complaints about the organization and barriers to the task.

Storming is the most difficult stage for the team. Members start to realize that the task is different and more difficult than they imagined. Members start to get impatient about the lack of process, but do not know what to do. They try to rely on their personal and professional experience, resisting any need for collaboration.

Storming includes seven characteristics.

1. Resistance to tasks and methods of work different from what each member is familiar with.

2. Sharp fluctuations in attitude about the team's possible success.

3. Arguing among members even when they agree on core issues.

4. Defensiveness and competition.

5. Questioning the leadership and membership of the team.

6. Establishing unrealistic goals and concern about excessive work.

7. Creation of a perceived pecking order, creating disunity, tension and jealousy.

Norming is a time of reconciliation. Members reconcile competing loyalties and responsibilities. They accept the team, team ground rules, their roles in the team and the

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individuality of fellow members. Emotional conflict is reduced as competitive relationships become more cooperative. Individual members realize that they are not going to fail and are able to start focusing on others in the team.

Norming includes seven characteristics.

1. A sense of team cohesion. A common spirit and goals.
2. Acceptance of the membership of the team.
3. Relief that things are going to work out.
4. An attempt to achieve harmony by avoiding conflict.
5. More friendliness, confiding in each other, more trust.
6. A new ability to express criticism constructively.
7. Establishing and maintaining team ground rules and boundaries (norms).

Performing occurs after the team has established its relationships and expectations and starts focusing on their task. They can begin diagnosing and solving problems, choosing and implementing changes. Team members have discovered, and accepted, each member's strengths and weaknesses, and learned their roles.

Performing has these five characteristics.

1. Members having insights into personal and group processes and better understanding of each other's strengths and weaknesses.
2. Satisfaction at the team's progress.
3. Close attachment to the team.
4. Constructive self-change.
5. Ability to prevent or work through group problems.

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Adjourning is the closure phase of the team. The team celebrates its successes and begins the process of saying good-bye to each other.

Keiper (1995) described a sequential development process with four stages: Start-Up, Shake-Up, Live-It-Up and Wrap-Up. It has been adapted from Long (1985).

Start up has five characteristics.

1. Can I find friends here?
2. What are the purposes of the group?
3. What is expected from me?
4. Hopeful anticipation.
5. Doubts and fears.

These are five characteristics of shake-up.

1. Can I be more honest?
2. How can I influence the group?
3. Will this group really work?
4. So-and-so really irritates me.
5. Anxiety, impatience, low enthusiasm.

These are the characteristics of live-it-up.

1. I like and trust this group.
2. I am committed.
3. These are my friends.
4. Let's go for it and do something.
5. Secure in relationships.
6. Freedom and enjoyment.

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7. Growing appreciation of diversity.

Wrap-up has four characteristics.

1. Was it worth it?
2. How have I grown?
3. What have I learned?
4. Joy, sadness and reflection.

McIntosh-Fleming (1996) also proposed a sequential developmental model. She suggested that when people gather in teams, their concerns, interests, and work activities follow a predictable cycle. An awareness of that cycle, leading to anticipating and preparing for each phase, can help teams become more effective. The cycle includes five phases gathered around a sequence of team member needs: Membership, Influence, Task, Norms, and Transition.

The first need people have is to feel accepted. They want to know why they are members of the team. The Membership phase is about gaining acceptance and knowing one's place in the team. Acceptance and role awareness are essential for individual constructive team participation.

Influence is the second need team members have. The Influence phase is about individual influence on the team. How can they have influence on the team? The basic motivation is wondering if members will listen to them. Uncertainty of influence can lead members to behave in ways that hinder the team's goals.

When people have been assured of their acceptance and believe that they will be taken seriously, they are ready to fully participate in the team's tasks. The Task phase is

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about task clarity. In order to participate effectively, people need to be clear about their tasks, be organized within the team and have methods to ensure feedback.

As members begin performing the team tasks, they also start to establish practices that become habitual. The Norm phase is about norms. These habitual practices become norms and guidelines for the team that govern team and individual behaviors.

Once the team tasks have been identified and completed, the work of the team transitions to a new phase. The Transition phase is about higher levels of work or new projects. The team then re-enters the development cycle working on issues of membership, influence, team tasks and group norms.

Ray and Bronstein (1995) described a mechanistic and a cybernetic group development process. Traditional organizations use a mechanistic model of group process. Team-based organizations use a cybernetic model. The mechanistic model assumes that people can be managed as inanimate objects. Tell people what to do and they will do it just the way you intended. Groups are like a machine, with parts designed to fulfill specific actions; people are placed in the mechanistic model to accomplish predictable tasks. If the expected result does not occur, there is an attempt to fix blame on a person in the group. If people do not behave properly in the group, they are perceived as broken and either repaired or replaced. The mechanistic model blocks the use of self-correcting feedback; it leaves the team only able to rely on its routine and unable to adapt.

The cybernetic model works better in environments that demand a feedback loop, environments where responsiveness to customers is primary. The main component of the cybernetic model is the feedback loop, which allows for self-correction. All organisms

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are cybernetic. They all have the ability to receive and act on information. The team process makes use of the cybernetic systems model to seek and use feedback for self-correction.

Scholtes et al. (1996) introduced a team development model with nine boxes gathered around the three primary tasks of purpose, partnership and process and the dimensions of organization, team and individual members. The purpose is the reason behind the work being done. For the organization, it is the mission; for the team, it is the charter and goals; for the individual members, it is their roles and responsibilities.

The second task of the model addressed partnership, or how people relate to each other. The organization has certain values and beliefs represented in the organizational culture. Teams have norms and communication patterns for how to work with each other. Individual team members have interpersonal skills.

The third task of the model addressed process, how people get the work done. The organization has systems of work and management reviews. Teams rely on procedures and methods. Individuals use their problem solving and planning skills. It is essential that the team understand the three tasks and how they are expressed in organizational, team and individual contexts. Team effectiveness will be related to how well everyone understands the alignment.

Worchel et al. (1992) looked at existing theories of group development and concluded that groups develop in predictable ways. These stages affect and are affected by individual, group and intergroup behavior; however, there is no indication that each stage takes a specific amount of time, or that movement between stages is determined by temporal factors.

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Although there has been lots of research resulting in models with rich description in a variety of environments, the scope of the studies were often vague, incomplete, incomparable and narrow. An example is the work of Tuckman (Tuckman, 1965; Tuckman, et al. 1977) which examined only isolated laboratory groups with predetermined membership. Moreland and Levine (1982, 1988) focused only on group development related to the development of the group members. As a result, Worchel decided to develop another model. This model would deal with the influence of group development on the individual, group and inter-group behaviors, group formation, and group development. Cases would be included where groups gained independence from a parent group. Instead of focusing on a few laboratory groups, Worchel chose to cast the net as widely as possible. The only limitation in choosing groups was that group membership was a matter of individual choice (Worchel, et al. 1992).

Worchel's model of group formation and development had six stages: Discontent, Precipitating Event, Group Identification, Group Productivity, Individuation, and Decay. A unique feature of the model is its cyclical nature with the sixth stage leading back to the first. Decay leads the group back to Discontent and the start of a new cycle.

The initial stage of Discontent is similar to Hopper's Preliminary Stage of Revolution (Hopper, 1950). Individuals who feel that their present group is not meeting their needs characterize this stage. They feel alienated, as if they do not belong or fit into any group. This estrangement threatens the individual's social identity. They may feel discouraged and hopeless. Participation declines and becomes very unequal. It can be for a short time or for a prolonged time. Its leadership and its response will determine the future of the group. If the leaders ignore the passiveness of the group, the phase will be

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lengthy. If the leadership attempts to consolidate its power, the Precipitating Event will be hurried (Worchel, et al. 1992).

Unlike the Stage of Discontent, the Precipitating Event has a clear beginning. It is difficult to predict what the event will be that will pull the members together. Whatever the event, it has these characteristics: it is clear and distinctive, it symbolizes issues that lead to dissatisfaction with the group, members' reaction to the event separates those who are loyal to the original group from those who are alienated from the group. Although the event may be repressive, it also gives alienated individuals hope that the situation can change. It galvanizes activity because it reduces feelings of despair (Worchel, et al. 1992).

The Group Identification stage begins the development of the new group. Groups without determined membership will move through the first two stages. Groups that have prescribed membership will begin with identification. This process of identification has significant effects on personal, group and inter-group behaviors (Linville & Jones, 1980). The group becomes very concerned with clarifying in-group and out-group boundaries. This leads the group to adopt clear and uncompromising positions on issues central to the group. Group norms are established and leadership is centralized. The group becomes closed to new members. Group members are discouraged from interacting with out-group members. Competition and conflict with out-groups is invited. Inter-group conflict fuels the differentiation between in and out-groups. The group may demand that members demonstrate their commitment to the group through personal sacrifice or initiation rites.

The group perceives itself as powerful, moral and legitimate. A context is created for a groupthink process that leads to poor decision making (Janis, 1972, 1982). The

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group members perceive homogeneity and an environment where they belong to each other (Simon & Brown, 1987). Members make public demonstrations of their loyalty. The group becomes central to the member's sense of personal identity. Skillful leaders can manufacture crises for the purpose of focusing members' attention on the group instead of themselves (Worchel, et al. 1992).

As the group establishes its identity, it focuses on group productivity. The first task is to identify group goals and tasks. Distinctions are made between members based on their ability to help the group achieve its goals. Leaders become task-oriented and pay less attention to the socio-emotional climate of the group. The group begins to selectively recruit new members based on their ability to further the group's goals. Interaction with other groups diminishes as members realize they need other groups to accomplish their goals. Failure is blamed on external group factors. Success is attributed to the group (Worchel, et al. 1992).

In the previous two stages, the focus had been on the group. During the Individuation stage, attention shifts to the individual group member. Members begin to negotiate with the group to expand tasks that help them meet personal goals. Subgroups form to work on new tasks. Members expect individual recognition. Equity norms are forwarded. Members base their satisfaction with the group on the basis of what they deserve from the group (Thibaut & Kelly, 1959). In response, the group may develop a system of rewards to recognize individual members. Individuals begin to compare themselves with others in the group. Members begin to explore other opportunities for membership and develop a standard for remaining in the group. Leadership becomes more diffuse and less central (Worchel, et al. 1992).

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During the final stage of Decay, the group begins to disintegrate. Members start to question the value of the group. They focus on the personal sacrifices instead of the advantages of group membership. Competition between members increases. The honesty and ability of the leadership is questioned. Distrust increases, and subgroups begin to struggle for power.

The Decay stage sets the conditions for the subsequent Stage of Discontent. In the Decay Stage, the members focus on the group. The intent is to take control of the group or its resources. The desire is to manipulate the group for their own ends. The Stage of Discontent begins as these efforts are unsuccessful, and members begin to perceive the situation as hopeless.

There is research to support the issues within the stages. O'Reilly and Chatman (1986) supported the Discontent Stage. Their study indicated that Internalization and Identification could predict prosocial behavior (O'Reilly, et al. 1986). Linville and Jones (1980) supported the out-group perspectives held by the group in the Identification Stage.

Virtual Team Development

Senge (1990) brought the perspective of feedback to group development. Senge described two complementary feedback loops found in every system. Slowing is the dampening, stabilizing, conserving tendency that keeps change in check. Growing is the building-on-itself, accumulating tendency that expands change. Thus, it is inevitable that in any team system there will be conflict related to slowing or growing. Slowing and growth are processes of going from one level of functioning to another. It is inevitable that stability be disrupted for change to occur.

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Lipnack and Stamps (1993) included Senge's systems of thinking related to complementary feedback loops to virtual team development. Their model includes five stages: Start-Up, Launch, Perform, Test, and Deliver. The initial start-up phase is a season of slowing. Slowing prevails as the idea for a team and its initial formation struggles to rise against resistance. The team's initiators generate interest, gather information and explore ideas. Any change of the status quo will encounter struggle.

Launch is a time of transition between slowing and growing. A critical mass of people and purposes coalesce and a storm begins to brew. The team must sharpen its purpose, clarify leadership, make plans, obtain resources and specify norms. During this phase the team determines a code for its life and sows seeds of success and failure. It takes longer than anyone expects, particularly for virtual teams.

Performing is a season of growing. This is when the team does the majority of its work. Results accumulate and the team makes progress toward the goals established in the launch phase. People meet and overcome obstacles. Group well being is high.

Test is a season of transition from growing to slowing. This is the challenge phase when the team must review its results. Time is running out and customers are demanding the goods. This trial is unexpected. Early planning and customer involvement can turn this phase into a success.

Deliver is the final slowing season. Deliver is the end, the adjourning phase. The team delivers its results, wraps up and celebrates its accomplishments. The dominant tendency here is slowing as the team seeks to stabilize at a new level after the development cycle ends.

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Crandall and Wallace (1997) proposed three successive stages of developmental models in virtual work environments. The first stage is the Telecommuting Model. It involves placing individual employees in remote locations where they can work for their company and communicate electronically. The objective is to increase the flexibility of the workplace and reduce the time and cost of commuting. It does not deal directly with strategic business issues and does not improve responsiveness to the customer. It is mainly about the distribution of employees throughout an electronic network.

The second is the Front-Line Model. The Front-Line Model involves placing sales and service locations in the field and close to the customer. The model blends virtual workplace characteristics, customer proximity and telecommunications equipment, with a proactive sales culture. Ties to the physical office are loosened and relationships with the customer are strengthened (Crandall & Wallace, 1997).

The Cyber-Link Model represents the highest level of virtualness an organization can achieve. The organization manages work collaboratively with the customers and with teams from producer and supplier organizations. Teams of employees and customers work together in a virtual environment. They are virtually linked, exchanging ideas and affirmation electronically (Crandall & Wallace, 1997).

Young (1998) applied the Tuckman Model to virtual teams. See Figure 2. Studies indicated that Forming and Norming are best achieved at the same time and in the same place, minimally using video conferencing. High-performing teams demand a context of good relationships and sufficient levels of trust. These are best achieved using traditional team-building methods for a couple of days with the team together. Research indicates

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that the last two stages, Norming and Performing, can be done remotely, supported by technology, provided the first two stages are complete.

Definition of Team Domains

The literature revealed thirty-two possible team domains. See Table 3. There is a fair amount of redundancy of terms in the literature. For example, some researchers use plan, others goals, others purpose when referring to essentially the same idea. Because the research indicates that what makes teams work is teamwork, collaboration was used as a gathering paradigm to sort the literature.

Team Resources provided a useful model (Team Resources, 1998). The thirty-two possible domains in the literature were gathered into seven domains by adapting the Team Resources model. See Table 4.

1. Purpose: The Reason for Collaboration.
2. Roles: Creates Interdependence and Demands Collaboration.
3. Leadership: The Structure for Collaboration.
4. Decision Processes: The Process for Collaboration.
5. Relationships and Trust: The Climate for Collaboration.
6. Communication: The Means for Collaboration.
7. Effectiveness and Responsibility: The Accountability of Collaboration.

Some of the thirty-two team domains in the literature are not clearly included in these seven team domains. Some of those team domains are grouped under Roles, Decision Processes, Relationships and Trust, and Effectiveness and Responsibility.

1. Roles includes norms, membership and team size.
2. Decision Processes includes meetings.

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3. Relationships and Trust includes conflict, status, and cohesion.

4. Effectiveness and Responsibility includes feedback and performance.

Purpose

LaFasto and Larson (1989) set out to determine what made teams of all kinds successful. When they had completed their work, only one requirement was clear "High performance teams have both a clear understanding of the goal to be achieved and a belief that the goal embodies a worthwhile or important result" (Larson, et al. 1989).

Lipnack and Stamps (1997) pointed out the ambiguity of terms related to team purpose. Researchers use the words purpose, goals, objectives, plans, vision, mission, tasks, charters, outcomes and results somewhat interchangeably; however, purpose always involves a movement from the abstract to the concrete. It moves from vision to mission, from goals to results. When purpose is arranged from the abstract to the concrete, it can be applied to any organization regardless of their specific semantic.

Vision is the source that generates the work. It is a compelling picture of an achievable and desirable future. It expresses the values and philosophy of the team. Mission is the simple statement of what the team does, its reason for being. It is more specific than the vision, but it is still abstract. It attempts to capture the core of the team concisely. Goals bridge the lofty vision and the practical results. They rearticulate the mission as a collection of attainable goals. Goals are most effective when they are focused and few. They provide motivation and the starting point for designing work processes. Goals lead to tasks that lead to results. Goals provide motivation, the results, the target, and the tasks the steps to get there (Lipnack & Stamps, 1997).

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The essence of a goal is that it is an ideal. It is a desired destination that people are willing to work toward. Goals are not intellectual, cold and calculated. Goals enlist the passion and emotion of team members. The more a goal elicits emotion, the more it becomes a vision. A vision is an ideal and unique image of the future. The vision clarifies the mission and goals of a team. The vision binds the team together through a shared emotional commitment (Johnson & Johnson, 1991a).

Johnson and Johnson (1991a) pointed out that teams exist for a reason. People join teams to achieve goals they cannot accomplish alone. Lipnack and Stamps (1997) described purpose as a campfire that a team gathers around. Purpose generates spark. It attracts and holds people. It warms and energizes people.

There is some disagreement about whether there are only collections of individual goals, or if there are overall team goals. Pepitone (1980) argued that group goals do exist. They can be identified and function as an important source of member interdependence. She states that group goals provide a sense of unity to a team, a unity that is beyond the individual goals of its members. Lewin (1944) observed that there are situations when team members seem to maximize team goals instead of their personal goals. Horwitz (1954) and Pepitone (1952) both concluded that individual team members can become motivated to have their team achieve its goal and are personally satisfied when the team does

Many other researchers believe that team goals are the collection of individual goals. People join teams because they perceive that their personal goals can be accomplished through membership in the team. The individual team member may not always know these goals, but they are present (Johnson & Johnson, 1991a).

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Table 3

Definitions of Thirty-Two Team Characteristics in the Literature

Characteristic	Description
Learning	A team whose intent is to ensure that team members learn specific subject matter, information, knowledge, skills, and procedures.
Membership	When an individual perceives that they are a part of the team.
Leadership	The process that leaders use to influence other team members.
Conflict	A process where one individual intentionally blocks another individual on the team from accomplishing their goals or pursuing their interests.
Decision Making	Outlining some agreement among team members regarding which curse of action is best for achieving the team's goals. It is the process that the team uses to identify problems and solutions in accomplishing the team's goals.
Communication	Message paths between individuals in a team given the conscious intent of affecting the receivers behavior.
Independence	When the outcomes of individuals are not affected by each others actions.
Interdependence	When the outcomes of individuals are affected by each other's actions.
Structure	How the team defines job tasks to formally divide, group, and coordinate the team's effort.
Diversity	The degree of heterogeneity in the team.
Purpose	A desired outcome, which the team members value and are working towards.
Relationships	The quality and nature of trust between team members.
Resources	The ability of a team to secure the information, budget, and tools it needs to accomplish its purpose.
Roles	A set of expectations defining appropriate behaviors associated a position within a team. The part played by a team member.
Status	The prestige grading, rank, or position within the team
Trust	The degree to which individual team members believe in the integrity, competence, consistency, loyalty, and openness of their fellow team members
Celebration	A part of a team's ending where the team members remember their team success.
Culture	The way of living developed and transmitted by a team consciously or unconsciously to other team members.
Norms	The rules or expectations that specify appropriate behavior in the team. The standards that team members use to regulate behavior.
Empowerment	The process of helping team members to feel strong, capable, safe, and committed.
Feedback	Evaluative, corrective, or encouraging messages given to team members about themselves, or the team's, performance.
Charter	An initiating document that outlines the purpose for a new team.
Decay	The final step in the life cycle of a team.
Technology	Anything that substitutes machinery for human labor. Relying on technique to increase efficiency.
Performance	The ability of the team to accomplish its goals.
Power	The capacity that one individual has to influence the behavior of another individual to do something that they would not do otherwise.
Connection	The degree to which the team is a part of its larger organization.
Cohesion	All the forces that cause individuals to maintain their membership specific groups. These include attraction and alignment of team and individual goals.
Commitment	To pledge, and do, a specific course of action.
Meetings	How to have effective meetings.
Work Design	How teams decide to structure their tasks to secure team goals.
Size	The number of individuals on the team.

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Table 4

Definition of Seven Team Domains

Team Domains	Characteristic	Definition
Purpose	The reason for collaboration.	A desired outcome which the team members value and are working towards.
Roles	Create interdependence and demands collaboration.	A set of expectations defining appropriate behaviors associated a position within a team. The part played by a team member. Includes norms, membership, and team size.
Leadership	The structure of collaboration.	The process that leaders use to influence other team members. The capacity that one individual has to influence the behavior of another individual to do something that they would not do otherwise.
Decision Processes	The process for collaboration.	Outlining some agreement among team members regarding which curse of action is best for achieving the team's goals. It is the process that the team uses to identify problems and solutions in accomplishing the team's goals.
Relationships and Trust	The climate for collaboration.	The quality and nature of trust between team members. The degree to which individual team members believe in the integrity, competence, consistency, loyalty, and openness of their fellow team members. Includes conflict, cohesion, and status.
Communication	The means for collaboration.	Message paths between individuals in a team given the conscious intent of affecting the receiver's behavior
Effectiveness and Responsibility	The performance of collaboration.	The ability of the team to accomplish its goals.

Jensen and Chilberg (1991) asserted that although teams have specific reasons for their existence, individuals bring many additional goals to the team. These goals can be cooperative, competitive, or individualistic (Deutsch, 1949; Johnson, et al. 1989). They may be positive, negative, or no interdependence among the goals of the individuals and the team. Collaboration is working together to secure shared goals. Individuals seek

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outcomes that are personally beneficial and beneficial to the team. In cooperative contexts, individuals perceive that they can attain their goals only if the other team members also do (Deutsch, 1962).

A competitive goal structure exists when there is a negative correlation between team members' goals and the team's goals. Negative correlation occurs when team members perceive that their personal goals are in opposition to both other team member goals and the team's goals. Their personal goals can only be accomplished if the team or its individual team members fails to attain their goals. Individuals will then work against each other to secure individual outcomes.

An individualistic goal structure exists when there is no correlation between individual and team goals. Team members perceive that pursuing their goal is unrelated to the goals of the team. Individuals will then work independently to attain personal goals unrelated to the team. Individuals seek outcomes that are personally beneficial and ignore as irrelevant the goals of the team.

There are a number of reasons why group goals are important. First, goals guide action and shape the efforts of team members. Roles and responsibilities are given on the basis of what needs to be done to attain the team's goals.

Second, the efficiency and usefulness of group procedures are evaluated on the basis of their relationship to goal accomplishment. Both the goals and path to attain the goals must be clear. Clear goals are not enough. There must also be clarity of plan.

Third, goals help the team deal with conflict. Goals provide the team with a framework for deciding which conflicting action is best (Johnson, et al. 1991a).

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Fourth, team goals direct and motivate members' behavior. Zander (1971, 1974, 1977), concluded that individuals are very concerned with team goals. When assembly-line workers were asked to rate the importance of personal success and their team's success, the workers strongly emphasized their team's goals. Considerable evidence supports goal setting theory (Child, 1981). The theory stated that intentions, expressed as goals, can be a major source of work motivation. Specific goals led to increased performance, and difficult goals, when accepted, resulted in higher performance than low goals. Tjosvold (Tjosvold, 1986; Tjosvold, et al. 1991) also reported that cooperative goals motivate team members.

Member's commitment to accomplishing team goals depends on eight factors (Johnson & Johnson, 1991a).

1. How desirable the goal seems to them.
2. How likely it seems that the group can accomplish the goal.
3. How challenging the goal is. A moderate risk of failure is more challenging than a high or low risk of failure.
4. Being able to tell when the goal has been accomplished.
5. The satisfaction or reward the member expects to feel or receive when the goal is achieved.
6. The ways in which the member will relate to other members in working toward the accomplishment of the goal. Some ways of relating to other members are more fun.
7. The extent to which members participated in setting the goals. This increase in motivation comes in part from the fact that participation produces a better matching of

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the team goals to the motives of members, which results in greater acceptance of the goals. It also provides a better understanding of the team actions needed to reach the goals and a better appreciation of how individual behavior contributes to the team effort.

8. The level of cohesiveness that exists within the team.

To be useful, goals must be clear. Ambiguity with goals can result in high levels of tension, joking, tangents, horseplay, and the failure to support good ideas. Wright (1979) demonstrated the importance of clear goals with executives at General Motors. Even top executives held pointless meetings on trivial topics when they confused their true goals of planning for the organization's future. Latham and Baldes (1975) used truck drivers to illustrate the impact of clear goals. When it was clear what the load limits were, the drivers carried the maximal load increasing their organization's profits significantly.

For individuals to perform well on a team, they must know what the team goals are, understand what actions need to be taken and when to attain them, know the criteria the team will use to measure attainment, and be aware of how their behavior contributes to the team. Accomplishment of goals and tasks demands coordinated and synchronous behavior. The clarity of the team goal and its accompanying actions are important if the team members are to accept the goal, to experience group belongingness, to be interested in goal related behavior, and to be willing to accept team influence (Johnson & Johnson, 1991a).

Operational goals are goals that require specific, clear, and identifiable steps. Nonoperational goals are abstract in that the specific steps required to achieve them are not clear. Long-range goals tend to be nonoperational and short-range goals operational (Johnson & Johnson, 1991a).

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There are several advantages to operational goals. First, operational goals improve communication on the team. A goal must be stated in a way that it clearly communicates what the team intends to do and how it can tell was accomplished. Second, operational goals help guide the team's planning. When a team is unclear regarding its goals, it will have difficulty planning and using its resources. Third, operational goals help teams to evaluate both the group process and the team outcome. By specifying its goals and criteria, the team can evaluate and provide a context for constructive feedback (Johnson & Johnson, 1991a).

Lewin and his associates (Lewin, et al. 1944) developed a theory of aspiration to understand team goal setting. Level of aspiration was their term for the compromise between ideal goals and more realistic expectations. Their theory suggests that individuals enter situations with an ideal outcome in mind, e.g., a specific score on an exam. Their subsequent level of aspiration is revised either up, or down, depending on what happens with their initial ideal outcome. If they are successful, the level of aspiration increases; if they fail, their subsequent level of aspiration decreases.

Zander (Zander, et al. 1963; Zander, 1971) observed that teams, like individuals, develop level of aspiration. In a series of studies with diverse populations, Zander demonstrated that teams set goals that are optomistic, and revise them as they receive feedback. Teams lower their aspirations after failure and increase them after success.

Research has shown that the effectiveness of team goals depends on eleven variables (Johnson & Johnson, 1991a).

1. The extent to which the goals are operationally defined, countable, and observable.

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2. The extent to which team members see the goals as being meaningful, relevant, realistic, acceptable, and attainable.

3. How cooperative the goal structure is and how cooperatively oriented the team members are.

4. The degree to which both team goals and individual members' goals can be achieved by the same tasks and activities.

5. The degree to which conflict exists among the team members about the teams' goals and the tasks the team must complete to achieve the goals.

6. The extent to which the goals are challenging and offer a moderate risk of failure.

7. The degree of coordination achieved among team members.

8. The availability of the resources needed for accomplishing the team's task and goals.

9. How specific the goals are, because specific goals indicate what needs to be done next.

10. How easily the goals can be modified and clarified.

11. How long a group has to attain its goals.

George and Wilson (1997) and McIntosh-Fleming (1996) frame purpose in terms of charter. One of the first actions of any team is to draft a charter. A charter is a formal typed document, accessible to everyone on the team. The key elements of a charter are purpose, responsibilities, completion, boundaries, ground rules, and meetings. The charter is intended to clarify roles, purpose, and keep the team focused on its purpose.

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Roles

Roles are the expected behavior patterns attributed to a particular position. The formal organization develops job descriptions, which define the activities of a particular position and how it relates to the positions in the organization; however, roles may not be set forth explicitly by the formal organization and yet be implicitly understood by group members. This is true for both formal groups and informal groups. Whether they are formally or informally established, status hierarchies and accompanying roles are integral parts of every organization.

Most individuals play many roles simultaneously. This is because individuals occupy many different positions in a variety of organizations. Each group may expect different things. This is the role set. It refers to those individuals who have expectations for the behavior of the individual in the particular role. The more the expectations, the more complex the role set. Thus, multiple roles refers to different roles while role sets refers to the different expectations associated with one role.

Different individuals can have different perceptions of the behavior associated with a given role. In an organizational setting, accuracy in role perception can have a definite impact on performance. This is further complicated in an organization, because there may be three different perceptions of the same role: that of the organization, the group, and the individual.

The organization role of an individual is the sum total of all the positions that individual holds in an organization. This would include the position in the chain of command, the amount of authority associated with the position, and the functions and duties of the position.

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The group role of an individual relates individuals to the various groups to which they belong. These may be formal and informal groups and the expectations may evolve over time and may or may not be congruent with the organization's perception of the role. In this respect, they are similar to group norms.

The individual role is the personal perception of their role. The perception will be greatly influenced by background and social class since they affect the individual's basic values and attitudes.

Norms

Norms are the standards that are shared by members of the team. They are expectations for the team as a whole. They help define who is inside, and who is outside the team. They define standards for acceptable behavior (Jensen & Chilberg, 1991). While roles differentiate members' privileges and duties from each other, norms integrate the actions of all the group members. Norms provide a basis for predicting the behavior of team members and serve as a basis for guiding individual behavior. Norms promote conformity to facilitate effective team interaction, performance, and harmony (Johnson & Johnson, 1991a). These can be prescriptive, how members should act, and proscriptive, how members should not act (Behling & Schriesheim, 1976).

Norms strongly influence member behavior (Zalenznik, et al. 1958). Male work groups established production norms that were followed by most members (Homans, 1950). When workers deviated too much from the norms, they were subjected to ridicule and other sanctions. If a worker produced too much they were called a speed king or a rate-buster; if they produced too little, they were a chiseler (Roethelisberger & Dickson, 1939). The more relevant the deviation to the purposes of the group, the greater the

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rejection of the deviant by the team (Festinger, 1950; Allen, 1965). The clearer the team goal and path are to the members, the stronger the pressures toward uniformity (Raven & Rietsema, 1957).

Additional research on group norms has indicated that norms cannot be imposed on teams. They emerge out of the social interaction of its members. They are social products (Sherif, 1936). Newcomb (1943) conducted a classical study to understand the relationship between individual values and group norms. Newcomb found that the norms of reference groups influenced individual values. The norms of groups that were outside the primary identification of the individual did not significantly affect individual values.

Norms have certain characteristics that are important to team members. First, norms are only formed with respect to things that have significance for the team. Not many teams care what their members eat and drink. Teams care about behavior that affects the accomplishment of the team's task and the sustainability of the team over time. Second, team members accept norms in various degrees. All members accept some norms, while other norms are only partially accepted. Third, norms may apply to every member, or they may apply to only some team members. Every member is expected to comply with the production norm, while only team leaders are expected to disagree verbally with a management directive. (Gibson, et al. 1997).

Johnson (1970) has presented a set of seven general guidelines for establishing and supporting group norms.

1. For members to accept group norms, they must recognize that they exist, so that the other members accept and follow them, and feel some internal commitment to them.

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2. Members will accept and internalize norms to the extent that they see them as helping accomplish the goals and tasks to which they are committed. It is helpful, therefore for a group, to clarify how conformity to a norm will help goal accomplishment.

3. Members will accept and internalize norms for which they feel a sense of ownership. Generally, members will support accept norms that they have helped set up.

4. Group members should enforce the norms on each other immediately after a violation. Enforcement should also be as consistent as possible.

5. Appropriate models and examples for conforming to the group norms should be present. Members should have the chance to practice the desired behaviors.

6. Cultural norms that prompt goal accomplishment and group maintenance and growth should be imported into the group.

7. Because norms exist only to help group effectiveness, they should be flexible so that at any time more appropriate norms can be substituted.

Generally speaking, the more relevant the individual's behavior to the accomplishment of the team's task and sustainability, the more pressure the individual will experience towards conformity. Conformity is defined as changes that result from group influence; it can be either positive or negative. Conformity includes both compliance, behavioral change without internal acceptance, and private acceptance involving changes in both attitudes and behavior (Johnson & Johnson, 1991a). Solomon Asch (1956) conducted classic conformity studies and found that many people go along with an incorrect team judgement even when they know it is false.

Four general classes of variables influence conformity to group norms (a) personality of group members, (b) the stimuli which evoke the response, (c) situational

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factors, and (d) intragroup relationships (Reitan & Shaw, 1964). Personality is the relatively stable set of characteristics, tendencies, and temperaments that have been formed by inheritance and by social, cultural, and environmental factors. Research on personality characteristics suggests that more intelligent individuals are less likely to conform than less intelligent individuals (Bass, et al. 1953), and that authoritarians conform more than nonauthoritarians (Nalder, 1959).

Stimulus factors include all the stimuli that are related to the norm to which the group member is conforming. The more ambiguous the stimulus, the greater the conformity to group norms. When people are unsure of a new idea, ambiguous stimulus, they will prefer the existing group norms (Gibson, et al. 1997).

Situational factors pertain to variables such as the size and structure of the group. Asch found that conformity to false answers about line sizes increased with group size up to size four and was constant thereafter. He also found that conformity was greater when there was unanimity (Asch, 1951).

The research on conformity suggested that conformity is a requirement of sustained team membership. The group often punishes the member who does not conform to important norms. One form of punishment is to isolate, or ignore, the deviant member. There are some positive and negative consequences of conformity. Conformity can result in the loss of individuality and the establishing of low levels of performance (Milgram, 1964).

Allen (1965) and Hollander and Willis (1967) differentiated between two dimensions of group conformity: conformity versus anticonformity, and independence versus dependence. The conformers and anticonformers were both influenced by group

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norms and behaved accordingly. The conformers followed the norm and the anticonformer did not. An independent person's behavior was not influenced by the group norm. Their behavior was not unduly influenced by the norm.

Membership

Another feature of teams is membership. The members of a team can either be selected or determined by the status quo. The membership of some teams is a given, the team has already formed and is functioning. When new teams are being formed, membership selection becomes an important element. Management, can make new selection by the existing team, by the new team member, or a combination of them. The selection process can be thought of as a triangle with the three points of management, team, and individual. The first step is to clarify how membership decisions are made. The task and environment of the team should determine how membership decisions are made.

When selection by either management or the existing team best supports the task and environment of the team, it is essential that the assignments are made to support the existing team roles (Jarvenpaa, et al. 1998). Scholtes (Scholtes, et al. 1996) pointed out that teams need to have the right human resources to do their work. The selectors will need to have clarity on what the job is, what the environment is and the distribution of the team membership over these variables. The selectors have the responsibility to make sure that all the needed skills are on board and that people have the time needed to accomplish the tasks given them by the team. If vital skills are lacking, new members should be recruited.

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Crandall and Wallace (1997) proposed a useful system of competencies for the selection process: foundation competencies, core competencies, support competencies, and outsourced competencies. Foundational competencies are competencies that team members must bring to the employer at their own time and expense. Such competencies could be basic math, reading, and problem solving as well as basic mechanical skills.

Core competencies are competencies that are required by the core business of the organization. Some core competencies could be customer service, information systems, warehousing and distribution. If these are cores for an organization, they will become core competencies. The company will offer training in these areas to their employees.

Support competencies are competencies that enable the core competencies, but are not central to the mission and strategy of the business. These are competencies related to the future employability of employees. As a result, the primary responsibility for these competencies rests with the employees. Support competencies are important enough for the organization to invest in, but the organization's primary investment needs to be in its core competencies.

Outsourced competencies are those that can be accomplished more effectively by others outside the organization. The training needs to be generic enough to ensure that a third-party agency can address the needs of the organization, e.g., benefits management and information systems operations.

Ray and Bronstein (1995) stated that a team's chances for success are increased if it is well chosen from the beginning; however, selection does not ensure the team's success. Selection is not a substitute for training. Too often management relies on selection

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instead of training. Selecting appropriate team members is only the first step. Those team members must then be trained and supported to ensure their performance.

McIntosh-Fletcher (1996) introduced identity as an issue in membership. In addition to the selection of the individual, the individual selects the team. People need to feel accepted. They want to know why they were selected for the team, that their uniqueness and diversity will be valued and appreciated by the team. Gaining acceptance and knowing one's place are pre-requisites to participating in the team's work and goals.

Moreland and Levine (1982, 1988) looked at the development of group members, not the development of the group. Moreland and Levine suggested that group members go through a linear predictable developmental process. The stages of membership are: Prospective Member, New Member, Full Member, Marginal Member and Ex-Member. At each stage, the member is focused on different elements of the group.

Levinger (1980) studied temporal variables in the development of close relationships and developed a five stage sequence. The five stages are: Initial Attraction, Building a Relationship, Continuation, Deterioration, and Ending.

Levinger (1980) and Moreland and Levine (1982, 1988) have addressed groups where the membership was already determined. Payton and Blakey (Payton, et al. 1971) focused on groups without determined membership. Their focus was on how groups begin focusing on the idea of revolution. The new group's formation is related to a desire to overthrow an existing ruling group and replace the former group's values. Hopper's (1950) was parallel and proposed that revolutions are also developmental. Revolutions have a preliminary stage, a popular stage, a formal stage, a reign of terror stage, and an institutional stage.

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Ray and Bronstein (1995) suggested that existing teams are effective in deciding who their team members should be. The Wolferman Corporation experienced a 15 percent decrease in seasonal employee turnover instead of their normative 300 percent when existing teams took over the interview and selection process from management. Teams will do a better job of finding and keeping other team members than any other selection process. A team that hires its own members will take a great deal more interest and pride in training the individual and ensuring their success (Ray & Bronstein, 1995).

Robbins (1997) suggested that because most team goals require a multitude of skills and knowledge, it would be reasonable to expect that heterogeneous team, teams made up of dissimilar individuals, would be more effective. Goodman, Ravlin and Argote (Goodman, et al. 1986) and Guzzo and Shea (1986) discovered that heterogeneous teams are more effective due to the diverse abilities and information the team has access to. When a team is increasingly heterogeneous in terms of gender, opinions, abilities, skills, and perspectives, there is increased probability that the group will have the characteristics necessary to accomplish its goals (Shaw, 1976). Shaw's work indicated that although the increased heterogeneity provides increased opportunity for conflict, heterogeneous teams still perform more effectively than homogeneous teams.

Robbins (1997) later raised the question whether racial or national membership differences have an effect on team performance. Watson, Kumar and Michealsen (1993) pointed out that these cultural and national differences do adversely affect team performance in the short term. Cultural diverse membership seems to be an asset on tasks that call for a variety of perspectives, but culturally heterogeneous teams have difficulty learning to work with each other and to solve problems. The good news is that

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these difficulties diminish over time. In about three months, a culturally heterogeneous team will have worked through these difficulties.

Worchel et al. (1992) reviewed some interesting work in the area of membership. Team members tend to perceive their own team as being more heterogeneous than other teams (Jones, et al. 1981; Park, et al. 1982). When a team was asked to describe members of their own team and members of other teams, the Subjects attribute more variability of traits to their team than to members of a different team within the organization. The Subjects also demonstrated a stronger tendency to generalize from a single team member to the whole team, if the team was not their own.

Worchel et al. (1992) reported Quattrone's work (1986) related to homogenous team perspective. Several explanations have been forwarded for the tendency to perceive other teams as more homogenous. Quattrone suggested that this is due to the greater exposure individuals have with their own team. Not only do they have more time with their team, but the time they have together is frequently of a higher quality than the time they have with other teams.

Size

A key function in team performance is the number of interactions required of the team to learn to work together and trust one another. It can take fifteen to thirty minutes of contact daily for six months for two people to understand each other's styles and expectations. This represents 65 hours over six months for two people to work together. During that time there will also be a number of setbacks and disappointments in the learning process. Adding a third person will take 195 hours to get the same contact time. With the addition of a fourth person, there is a significant statistical change. The amount

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of time required for four people to share the same amount of contact as the initial two increases to 390 hours. With five it becomes 650 hours (Ray & Bronstein, 1995).

This dynamic explains why smaller teams tend to mature faster than large teams, and why there seem to be optimal sizes for teams. The size of a team does affect the team's performance (Thomas, et al. 1963; Shaw, 1981; Hare, 1976). Teams with more than ten members require a good deal more time to mature. Research indicates that smaller teams are faster at completing tasks than larger ones; however, if the team is involved in problem solving, large groups consistently get better results than smaller teams. Large teams, with twelve or more, are good for gaining diverse input. If the team goal is fact-finding, large teams are better. On the other hand, if the task is more related to production, smaller teams of about seven are better.

A look at the structure of sports teams can be helpful on the topic of team size. In every major sport, there are no more than twelve persons playing simultaneously from one team. Those on the bench are often organized into smaller units of offense, defense, second line, etc.

An important finding related to the size of teams has been labeled social loafing (Johnson & Johnson, 1991a). Social loafing is the tendency for individuals to spend less effort when working together than when working individually. It directly challenges the synergy of teams. The productivity of a whole group is less than the sum of its individual members (Karau, et al. 1993a).

It is commonly believed that team spirit also spurs individuals and increases team productivity. Ringelmann compared the results of individual and group performance on a rope-pulling task (Kravitz, et al. 1986). Ringelmann's research indicated that team

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performance was lower than the sum of individual performance. Three people pulling exerted the same force as two and half pulling individually. Eight people pulling on a rope exerted the same force as four individuals. Other researchers have replicated these results (Shepperd, 1993; Karau, et al. 1993a).

Lipnack and Stamps (1997) framed their discussion of team size in the context of social evolution. During the Nomadic Age, groups were built around family units of four to seven. As camps began to develop, clusters of four to six families would gather. Johnson and Earle (Johnson, et al. 1987) identified these camp clusters as being a magic number of 25, five families of five individuals each. This magic number was extrapolated to contemporary contexts as being the number of people in most people's life-long network. Based on this social evolution, Lipnack and Stamps (1997) suggested that four to seven is the best size for a small team and twenty-five as the upper limit for teams.

Leadership

Leadership Theories

Leadership is a complex enough issue to merit dozens of studies related to leadership in traditional and virtual teams. In order to contextualize our conversation regarding traditional and virtual leadership, it is essential to map traditional leadership theory.

Leadership is the ability to influence a group toward the accomplishment of goals (Robbins, 1997). This leadership can be both informal and formal. Formal leadership is provided by managerial rank within an organization. An individual may assume a leadership role simply by filling a position given them by an organization; however, not all leaders are managers, and not all managers are leaders. Leaders focus on doing the

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right thing; managers focus on doing things right. Just because an organization provides rank and rights to a manager does not ensure that they will be able to lead effectively. Leadership that arises outside the formal structure of an organization is just as important as formal influence. Leaders can emerge from both within a group and by formal appointment (Robbins, 1997).

There have been four avenues to understanding what makes a leader effective. The first attempted to uncover universal personality traits that leaders possess. The second tried to explain leadership in terms of leadership behavior. The third looked at contingency models to explain the inadequacies of the two previous leadership theories in reconciling and bringing together the diversity of research findings. Recently, there has been a return to trait theory with an emphasis on understanding the traits held by charismatic leaders (Robbins, 1997).

The search for characteristics that would differentiate leaders from non-leaders was the first focus of psychologists studying leadership (Woods, 1913; Wiggam, 1931; Mann, 1959). Research efforts at delineating those characteristics were not conclusive. They were unable to identify a set of leadership traits that would always differentiate leaders from followers and effective leaders from ineffective ones. It was overly optimistic to assume that a set of consistent traits could be uniformly relevant to all leaders, whether they were in charge of the Hell's Angels or the Mormons (Johnson, et al. 1991a).

Attempts to categorize traits with a high probability of association with leadership have been more successful. Six traits that differentiate leaders from non-leaders are: drive and ambition, the desire to lead and influence others, honesty and integrity, self-

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confidence, intelligence, and deep technical knowledge related to their field (Kirkpatrick, et al. 1991).

The failure of the trait theorists led researchers to look at the behaviors of leaders. They wondered if there was something unique in the behavior of specific leaders. Trait research would have simplified the leadership selection process; however, if traits cannot be identified, it was hoped that behaviors could. Then organizations could train people to be leaders. The basic difference between the two theories is that trait theory is based on a genetic understanding of leadership and behavioral theory on a learned understanding of leadership (Robbins, 1997).

Robbins (1997) introduced two significant behavioral studies that were done at the Ohio State University and the University of Michigan. The Ohio State University studies indicated that the majority of leadership behavior described by subordinates could be summarized into initiating structure and consideration. Initiating structure refers to the extent to which a leader is likely to define and structure their role and the roles of their subordinates in order to accomplish a goal. Consideration is the extent to which a person is likely to have job relationships characterized by mutual trust, respect for subordinates' ideas and regard for their feelings. Their research found that leaders high in both initiating structures and consideration, a high-high leader, tended to achieve higher subordinate performance and satisfaction than high-low or low-low leaders. The high-high style however, did not always result in positive consequences (Stogdill & Fisher, 1951; Fisher, 1988).

Robbins (1997) also reviewed the University of Michigan studies that took place concurrently and had a similar research objective: to locate behavioral characteristics of

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leaders that appeared to be related to measures of performance effectiveness. The Michigan group also found two dimensions of leadership behavior: employee-orientation and production-orientation. Leaders who were employee-oriented emphasized interpersonal relations. The production-oriented leaders, in contrast, focused on the technical and task elements of the job. Their main concern was getting the work done and the group members were simply a means to that end. The study indicated that leaders with an employee-orientation were associated with greater group productivity and job satisfaction, while leaders with a production-orientation were associated with lower group productivity and satisfaction (Kahn, et al. 1960).

Blake and Mouton (1964) combined the Ohio and Michigan studies graphically into their proposed managerial grid. The grid was based on the styles of concerns for people and concerns for production from Ohio, or the employee-orientation and production-orientation from Michigan (Robbins, 1997). Unfortunately, the grid was better at conceptualizing leadership style than contributing to leadership effectiveness. There is not much evidence to support the conclusion that a high-high style is the most effective in all contexts (Nystrom, 1978; Larson, et al. 1976).

It became clear that there was more to predicting leadership success than the isolation of a few traits or preferred learned behaviors. The failure to gather consistent results led researchers to look at situational influences in leadership. The five dominant contingency theories are: Fiedler, Hershey and Blanchard, path-goal, leader-participation, and gender.

Fiedler (1967) developed the first comprehensive leadership contingency model. His model suggested that effective group performance was contingent on matching the

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leaders' style of interaction with their subordinates and the degree to which the leader had control of the situation. Fiedler developed the least-preferred co-worker (LPC) questionnaire that measures whether a person is task-oriented or relationship-oriented. He then isolated three situational variables that he believed could be manipulated to create the proper match with the behavioral orientation of the leader (a) leader-member relations or the degree of confidence, trust and respect the subordinates have in their leader, (b) task structure or the degree to which the job assignments of subordinates are structured or unstructured, and (c) positional power or the degree of influence a leader has over power variables such as hiring, firing, discipline, promotions and salary increases.

The Fiedler leadership model was related to trait theory, because the LPC inventory is a simple psychological test. Fiedler went beyond trait theory by isolating situations, relating his personality measure to his situational classification, and then predicting leadership effectiveness as a function of the two (Robbins, 1997). Fiedler believed that the leadership style determined by the LPC was innate, it could not be changed. Thus, to increase leadership effectiveness, it was essential to manipulate the situational factors (Fiedler, 1967). Overall, reviews of major studies taken to test the Fiedler model have been generally positive (Schriesheim, et al. 1994).

Hershey and Blanchard (1977) built their work on the Ohio State University studies. They concluded that most leadership activity could be organized into two behavioral dimensions: initiation of structure, task action, and consideration of group members, relationship behavior. They defined task action as the extent to which a leader engages in one-way communication by explaining what each follower is to do when,

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where and how. Relationship behavior is the extent to which a leader engages in two-way communication by providing emotional support and facilitating behaviors. This produces four quadrants of telling, selling, participating, and delegating.

Hershey and Blanchard's model assumed that any of the four dimensions of leadership may be effective, or ineffective, dependent on the situation. The dimension of leadership that was appropriate was dependent on the level of maturity of the group. Maturity is the capacity to set high but attainable goals, willingness and ability to take responsibility, and the education, or experience, of the members. Maturity is determined only in relation to the specific task being performed.

House (1971) developed the path-goal contingency leadership model. It was also developed on the Ohio State University research of initiating structure and consideration related to the expectancy motivational theory. The theory's essence was that it is the leaders' job to assist their followers in attaining their goals and to provide the direction and support necessary to ensure that their individual goals are in alignment with the organization's goals (Robbins, 1997).

A leader's behavior is acceptable to the subordinates to the degree that it is perceived as an immediate source of satisfaction or as a means of future satisfaction. A leader's action provides motivation to subordinates to the degree that it both makes subordinate need satisfaction contingent on effective performance and provides the support and rewards that are necessary for effective performance. House (1971) identified four leadership behaviors. The directive leader lets subordinates know what is expected from them and when. It was similar to the Ohio State dimension of initiating structure. The supportive leader is friendly and shows concern for the needs of

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subordinates. This parallels the Ohio State dimension of consideration. The participative leader consults with subordinates and uses their suggestions in decision making. The achievement-oriented leader sets challenging goals and expects subordinates to reach for them. House assumed that these leadership behaviors are flexible.

Path-goal theory suggested two types of situational variables that determined leader behavior outcome. Environmental variables, task structure, formal authority system, and work group, are outside the control of the leader. Factors in the second group are the personal characteristics of the subordinate, experience, locus of control and perceived ability. The theory then suggested that leader behaviors should match these contingency variables. The leader will be ineffective when their behavior is redundant with the environment or incongruent with subordinate characteristics (Robbins, 1997). The research to valid path-goal theory is positive. The evidence supports the underlying logic of the theory (Wofford, et al. 1993).

Vroom and Yetton (1973) developed a leader-participation model relating leadership behavior and participation in decision making. The model related leader behavior to task structure. The model provided a sequential set of rules that should be followed in determining the form and amount of participation in decision making as determined by situational type. The model was a decision tree using seven contingencies and five alternative leadership styles: Autocratic I, Autocratic II, Consultative I,Consultative II, and Group II (Johnson & Johnson, 1991a).

More recently Vroom and Jago (1988) have revised the model. The new model keeps the same five leadership styles ranging from the leader making the decision completely by themselves to sharing the problem with the group and developing

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consensus; however, the number of contingencies increased from seven to twelve (Robbins, 1997).

Gender has also been understood as a contingency variable. A review of the literature suggested that the similarities between male and female leadership styles outweigh the differences. Differences that do occur seem to indicate that women prefer a democratic leadership style, while men feel more comfortable with a directive style (Grant, 1988; Helgesen, 1990; Eagly, et al. 1990; 1991a, 1992).

Charismatic theory is a current form of trait leadership theory. It is based on transformational leadership. The trait, behavior and contingency leadership theories are based on transactional leadership, the motivation of subordinates in the direction of established goals by clarifying role and task requirements. Transformational leadership inspires subordinates to transcend their own self-interests for the good of the organization and has a profound and extraordinary effect on their followers (Robbins, 1997).

Conger and Kanungo (1988) identified five traits in charismatic leaders: self-confidence, a vision, strong convictions in that vision, extraordinary behavior, and image as a change agent. Two studies found that followers of charismatic leaders were more self-assured, felt more meaningful, experienced more support from their leader, worked longer hours, and had higher performance than followers of non-charismatic, but effective leaders (Waldman, et al. 1990; House, et al. 1988). Another study found that people working under charismatic leaders were more productive and satisfied than those working with transactional leaders (Howell, et al. 1989).

Leadership and power are related. Power refers to the ability that one person has to influence another to do something contrary to their will. This definition implies (a)

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potential that does not need to be exercised in order to be effective, (b) a dependent relationship, and (c) that the powerless has some discretion over their own behavior.

What are the differences between leadership and power? One difference is related to goals. Power does not require goal compatibility, leadership does. The second is related to research. Leadership research has focused primarily on style, not power. Leadership research asks how supportive a leader should be, how much decision making should be shared. In contrast, power research focuses on tactics for securing compliance. It involves groups and their use of power in controlling other groups (Robbins, 1997).

Johnson and Johnson (1991a) introduced the influence theory of leadership. An influence leader is a group member who exerts more influence on other members than they exert on them. Michener and Burt (1975) found that the compliance of members is higher when a leaders justifies their demands as being good for the group, has the power to punish members who do not follow, and has a legitimate right to make the demands. The success or failure of the group does not seem to affect a leader's ability to influence.

The influence approach to leadership suggested that there is a reciprocal relationship between leaders and followers in which there is a transaction. The leader and the followers both give something to and receive something from each other. Homans (1961) observed that influence over others is purchased at the price of allowing oneself to be influence by others. Leadership may be defined exclusively as influencing followers; however, influence theory points out that the followers also influence the leader.

Zander (1979) demonstrated that leaders tend both to talk more than followers and to receive more communication than followers. Other researchers (Bavelas, et al. 1965;

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Zdep, et al. 1967) suggested that when a person is reinforced and encouraged by other group members to engage in leadership behaviors, the person's proportion of talking time increases, as one's perceived leadership status increases. Pepinsky (Pepinski, et al. 1958) demonstrated that individuals who have previously exhibited few leadership behaviors were influenced to increase their leadership behavior when the group supported that behavior. Thus, the amount of participation and influence given by a leader affects members' perceptions of their personal leadership. The amount of encouragement and support by followers also affects a person's level of participation and perceived leaderships status in the group.

Viewing leadership as a reciprocal influence works against totalitarian leadership based on domination. Hitler defined leadership as the ability to move masses. Ho Chi Min stated that a good leader must learn to mold, shape, and change people as a woodworker must learn to use wood. Both views are largely incorrect. Leaders do not lead through coercion. Leaders and followers are both shaped by each other. The influence of leadership is directed towards persuading group members to cooperate in setting and achieving goals (Johnson & Johnson, 1991a).

Decision Processes

Processes

Shonk (1982) described group process in terms of how team members work together. Process dealt with how the team functions as it pursues its task. Shonk's (1982) process taxonomy revolves around decision making, communications, meetings, and leadership style. Decision making addressed who is responsible for decisions and how each team member participated in that decision. Communication processes determined

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what should be communicated within the team, to whom, by what method, when, and how frequently. Meeting processes addressed clear outcomes of meetings, the agenda, leadership of the meeting, how the meeting will be conducted, and who should attend the meeting. Leadership style of the leader impacted the other three processes. Authoritarian and participatory leaders make decisions, communicate, and lead meetings differently. The leadership process shaped all the other processes.

Ray and Bronstein (1995) understood process in contrast to task. Task was related to tangible physical products; process emphasized emotion and human relationships. Task dealt with the connections between machines; process dealt with the connections between team members.

Lipnack and Stamps (1997) defined teams as individuals interacting interdependently. Individuals were equated with people, interacting equated with links, and interdependently equated with purpose. A system model of inputs, processes, and outputs illustrated the connection between these three components. Processes were central in the system model and central in teams. The processes highlighted were shared leadership, tasks, and boundary crossing interactions.

Mohrman et al. (1995) described process in terms of integration. Processes referred to the practices and actions that the structural elements of teams integrated. These integrating functions were communication processes, decision making processes, and direction-setting processes. Teams cannot function effectively, if they do not have clear direction. Effective teams must have access to the information necessary to complete their tasks.

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One unique element of Mohrman's model (Mohrman, et al. 1995) was the use of goal setting as a team process. Direction setting processes established and communicated the direction of the organization. It defined a strategy, communicated it, and operationalized it at all organizational levels. It aligned goals vertically and laterally within the organization. Strategy was translated into goals at all levels. Mohrman et al. (1995) pointed out that organizations need easy and informal processes to allow for maximum contribution. At the same time, organizations must formalize the processes required to create a context where integration can occur.

Scholtes et al. (1996) outlined ten ingredients for a successful team. Five of those ten ingredients were related to process:

1. Successful teams have beneficial team behaviors. They use skills and practices that make discussions and meetings more effective.

2. Successful teams have well-defined decision-making procedures. They are aware of the different ways they reach decisions.

3. Successful teams have balanced participation. Each team member participates in discussions and decisions, shares commitment to the task, and contributes their skills. Successful teams have established ground rules. They have rules for what will and what will not be tolerated on the team.

4. Successful teams were aware of the group process. All team members know how the team works together.

McGrath (1984) understood process to be central in a group conceptual framework. The central feature of a group was its interaction, how its members behaved. There were three critical facets of that group process. First, members came to the group with

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individual characteristics and individual properties. They came with traits, characteristics, beliefs, temperament, gender, age, and other individual characteristics. Members enter groups with previous individual and group experience.

Second, there were properties of standing group structure. There may have been a pre-existing status hierarchy on the team. Aspects of group structure must be taken into account in predicting group processes.

Group process was also environmental. They occur in a specific place. There were environmental properties. Group processes on the assembly line, board meetings, sporting activities, management meetings, and church meetings were all strongly determined by their environment.

McGrath (1984) also described process in terms of a three stage model. The first process was a communication pattern stage. Communication consists of verbal and nonverbal behavior directed toward individual team members. Communication included the modes of communication, whether personal, written, or electronic. The focus was on the form of communication.

Process also included an interpersonal and personal pattern stage. Interpersonal patterns dealt with the task content of communication. Interpersonal and personal patterns deal with the relational content of communication. Every behavior includes an interpersonal and a personal relational pattern.

The third process stage was the interaction of the task performance and the relationship pattern. Processes conclude with impact. Impact was the outcome or consequence of the interaction for the team members, their relationships, their task performance, and their future communication.

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In Johnson's effective group model (Johnson & Johnson, 1991a), group processes were at the center of an effective group surrounded by positive interdependence. Processing promoted a sense of self-efficacy instead of helplessness and focused group members on positive behaviors. That efficacy was expressed both for the individuals of the team and the team itself. Self-efficacy was the expectation that personal effort will result in valued outcomes. This reinforced the task orientation of the team and diminished self-preoccupation and self-doubt. Group efficacy was the expectation that joint team effort would result in valued outcomes. The greater the sense of self and group efficacy promoted through group processing, the more productive and effective the team and its individual members.

Sarason and Potter (1983) found that increased processing led to people's increased awareness of their experience resulting in a greater awareness of their own role in securing that success. Turk and Sarason (1983) found that when individuals are anxious about their success, when they were told that they failed, their performance diminished. When individuals anxious about their success were told that they are successful, their performance tended to increase.

Johnson and Johnson (1991a) stated that processing was valuable for both team members and their teams. When teams began working together, they were very task oriented. Processing helped the new team to maintain effective work relationships. Processing also helped members develop the collaborative skills necessary to be an effective team. Processing allowed team members the opportunity to give positive reinforcement on the use of collaborative skills. Finally, processing helped members to remember to practice their collaborative skills consistently.

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Johnson and Johnson (1991b) suggested that team processing involved two major components. First, teams must invest time to reflect on how well they were working together; this could be ten minutes at the end of a meeting, or longer depending on the depth of reflection. Second, teams need procedures for discussing joint and individual performances. These procedures need clarity on what team skills were going to be assessed. Observers must be appointed and be prepared to intervene, as necessary. Team members assessed how they perform to the observer, and the observer reported to the group the information that is gathered. The team members then reflected and analyzed the effectiveness of their behavior by comparing it with what the team had reported. Team members who are collaborative are complimented. All team members publicly set goals for collaboration in the next team process session.

Carr (1992) outlined six core processes necessary for effective teams. All six processes must be utilized consistently and well:

1. There must be an individual need process. The team must ensure that all its members have their individual needs satisfied.

2. An effective team must have effective group interaction processes. Team members must be able to communicate with each other effectively to establish relationships and deal with conflict and difference.

3. Effective teams have managerial processes. The team must have its activities coordinated to ensure that each member gets the resources needed and the whole team is functioning well together.

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4. Leadership processes are needed for effective teams. Teams need to keep their focus and purpose clearly before them. These processes see that the team maintains its shared values and renews the team as needed.

5. Product processes are necessary to ensure that the team is on track with its purpose. Teams must remain on track with their core task.

6. Teams need environment processes. In order to be effective, teams need to be able to anticipate the future. Teams need to know what is coming next in order to ensure that they have the resources and market to be successful.

Other researchers focused team process on decision making. Decision making is the central process of any team. Gibson et al. (1997) stated that people behave as individuals and as members of groups within an organizational structure. There are a number of reasons why they communicate. The core reason for individuals and groups within organizations to communicate is to make decisions.

Simon (1960) suggested a widely accepted way of classifying decisions. He distinguished between programmed and nonprogrammed decisions. Programmed decisions are connected to repetitious situations. If a particular situation occurs often enough, a routine procedure is developed to address it. Decisions are programmed in that there is a procedure for making them.

Nonprogrammed decisions are decisions that are novel and unstructured. There is no established procedure for the situation because it does not occur frequently. These problems receive special treatment.

Little is known about the human process for making unprogrammed decisions (Agnew, et al. 1985). Managers use standard operating procedures to address

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programmed decisions; however, nonprogrammed decisions are made by general problem solving process, intuition, and creativity (Brookfield, 1987). Both formal and informal relationships are utilized (Stevensen, et al. 1991). Modern management techniques have not improved nonprogrammed decision making to the same extent they have improved programmed decisions (Agor, 1986)

Researchers have long noticed that jobs are different and that some are more interesting than others. Three task characteristic theories have been developed. Turner and Lawrence (1965) began the task characteristics approach. Turner and Lawrence developed a study to determine the effect of various jobs on employee satisfaction and absenteeism. They predicted that employees would prefer more complex and challenging tasks. Job complexity had six characteristics: variety, autonomy, responsibility, knowledge and skill, required social interaction, and optional social interaction. The higher a job scored with these characteristics, the more complex and desirable it was. The study verified their prediction. Turner and Lawrence demonstrated that employees did respond differently to different jobs. They provided a preliminary set of task attributes to assess various jobs and focused on the need to consider the influence of individual differences on employees' job reactions.

Hackman and Oldham (1976) developed a second task characteristic theory, the job characteristics model. According to this model, a job can be described in terms of five core dimensions. Skill variety is the degree to which the job requires different activities allowing the worker to use a variety of skills and talent. Task identity is the degree to which the job requires that a whole identifiable piece of work is completed. Task significance is the degree to which the job impacts the lives of people. Autonomy is the

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degree to which the job provides freedom. Feedback is the degree to which carrying out the job results in the employee getting direct and clear feedback on performance. Skill variety, task identity, and task significance are considered to be core job dimensions. Autonomy and feedback are described as being critical psychological states. When core job dimensions are linked to critical psychological states, employees have high internal motivation, high work performance, high work satisfaction, and low absenteeism (Hackman & Suttle, 1977).

Salancik and Pfeffer (1978) developed the third task characteristics theory, the information processing model. They observed that people view the same job differently. People respond to their jobs as they perceive them rather than objectively to the jobs themselves. This is the core of the social information processing model. The model suggests that employees develop attitudes and behaviors in response to given social cues. Employee motivation can be affected by the subtle actions of family, neighbors, fellow employees, and supervisors. If the job is described as lacking difficulty, challenge, and autonomy, employee satisfaction can be diminished.

There were three major options managers have utilized for redesigning jobs: job rotation, job enlargement, and job enrichment (Gibson, et al. 1997). If an employee is being affected by the routines of their job, the employee is rotated to another job at the same level. Job rotation reduces boredom and increases motivation by giving employees more diverse activities.

Job enlargement expands jobs horizontally. It refers to increasing the number and variety of tasks an employee has in order to increase diversity; for example, instead of sorting departmental mail; the employee may to sort it and physically deliver the mail.

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Job enlargement did not meet with enthusiasm (Campion, et al. 1993). People felt like their initial job was stretched into three jobs.

Job enrichment refers to the vertical expansion of jobs. It increases how much control employees have over planning, execution, and evaluation. This is most frequently accomplished by combining tasks, expanding jobs vertically, opening feedback channels, and by establishing client relationships within the organization.

McGrath (1984) pointed out that group task performance must be studied in context of the task. Tasks are not generic, they differ and will effect the performance of groups. All group task studies are done in the context of specific tasks. The selection of these tasks is often arbitrary and based on convenience. If tasks are a dominant variable in the performance of groups, it would be wise to broaden the field of inquiry to include a wide variety of tasks. Even more helpful would be a classification of tasks in order to be more intentional and inferential with group task performance research.

There have been about five substantial efforts to classify work tasks. Carter et al. (1950) went beyond the earlier simplistic work dichotomies of intellective and motor tasks, simple and complex tasks, and stimulus and response tasks. Carter and his colleagues categorized tasks into six types: clerical, discussion, intellectual construction, mechanical assembly, motor coordination, and reasoning. This taxonomy differentiates tasks on the basis of the kinds of activities that must be carried out in order to complete the task. The differences are based on performance processes involved in the tasks and the behavior requirements the task places on the individual or group.

Shaw (1973) carried out the first programmatic effort to describe the characteristics of group tasks in a systematic way (McGrath, 1984). He reviewed the tasks used in past

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published studies of small groups and surveyed a number of active small group researchers. He distilled six properties along which group tasks varied: intellective versus manipulative requirements, task difficulty, intrinsic interest, population familiarity, solution multiplicity versus specificity, and cooperation requirements. Intellective versus manipulative has to do with properties of the task. Task difficulty, intrinsic interest, and population familiarity have to do with relations between the task and the group that works on it. Difficulty, intrinsic interest and population familiarity is dependent on what group is to work on the group task. Solution multiplicity versus specificity is related to the ways the outcome of the task is scored. Solution multiplicity and specificity implies that there is one correct answer. Cooperation refers to what group members must do in relation to each other to get the task done.

Hackman (1976) approached task classification related to group performance differently. He restricted his focus of study to intellectual tasks with written products. He concentrated on developing a classification of products that result from performance of those tasks. He collected a large set of tasks, had groups make products by doing those tasks, and had judges make ratings of those products.

The results disclosed three types of tasks and six dimensions that could be used to evaluate the products of those tasks. The first task type was production. Production describes tasks that require groups to generate ideas. The second type of task was discussion, tasks that require groups to discuss ideas. The third type of task was problem solving, tasks that require groups to carry out a course of action.

Hackman's six product dimensions were: action orientation, length, originality, optimism, quality of presentation, and issue involvement. These dimensions were used to

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judge the written products resulting from the tasks in the study. The product was evaluated independently of who performed the task.

There is a long history of utilizing formal mathematical models of group productivity (Lorge, et al. 1958). This early work was largely focused on tasks described as a Eureka type. Eureka problems are where the answer is so compelling and intuitive that once someone offers an answer, the whole group immediately embraces it. Eureka problems worked with probabilities. Of special interest was the probability of a group solving the problem compared with the probability that the group would have one person who, if working alone, would have also gotten the right answer.

Steiner (1966, 1972) suggested a partial classification of tasks related to the earlier concerns of probability. Steiner differentiated between tasks that are divisible and those that are unitary. Unitary tasks have a single outcome or product for which the individual contributions of group members must be combined; an example would be a jury. Unitary tasks are disjunctive, conjunctive, and additive. Disjunctive tasks involve one member of the group doing the task, like the earlier Eureka problems. Conjunctive tasks demand all of the group members working simultaneously to be successful. Additive tasks are those where the contributions of group members are combined in a summation fashion to accomplish the task, see Table 5.

Steiner's divisible tasks recognized that some tasks require a group to split up into smaller sub-groups. Success is related to the cooperation, coordination, and collaboration between these sub-groups. Most tasks are this type.

Steiner's classification was helpful, because it directly linked productivity of groups to mathematical models, and it directly tied productivity of groups to a number of

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tasks that had been used in other studies. Both the mathematical models and the ability to compare group productivity with the same tasks allowed for inferences to be applied to other work groups.

Steiner noted that most groups do not perform to the level of their best member. He combined the abilities of individual group members in order to determine the group's potential productivity. Steiner argues that actual group productivity is below the group's potential productivity. Motivation process losses and coordination process losses are attributed to the difference between actual and potential productivity The loss is accumulative for groups related to size. As groups get larger, the gap between potential and actual potential increases. The losses related to motivation and coordination processes accumulate.

Laughlin (1980) suggested a classification of group tasks that addressed both the relationships between group members and the type of performance process utilized in accomplishing the task. The type of group engaged in the task was used to differentiate tasks. There are cooperative groups and competitive groups. Cooperative groups have both intellective tasks, in which there is one demonstrably correct answer, and decision tasks in which there is no one demonstrable correct answer. Decision tasks demand that the cooperative group discovers a group preference, but not necessarily the correct answer. The task is for the group to come to consensus (McGrath, 1984).

For competitive groups Laughlin (1980) developed a classification that had three components based on the complexity of the decision and the relationships between group members. There are two-choice tasks when the decision is between two options. A bargaining and negotiation task is characterized by conflict between group members.

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Coalition formation tasks are characterized by coalitions of group members involved in conflict (McGrath, 1984).

The Carter system, part of the Shaw classification, and one level of the Laughlin classification addressed what it is that the group members do, when they are involved in the group task. The Steiner system and some of Shaw's dimensions considered how individual group member's efforts are combined and how group performance is related to the abilities of the group members. The Hackman task types focused on the kind of performance process that is seen in the product related to the group's task instructions. Did the group generate ideas? Did they discuss options and make decisions? Did they problem-solve? The Hackman task types describe how well the group did the type of task they were assigned (McGrath, 1984).

McGrath (1984) attempted to integrate the past work of Shaw, Carter, Hackman, Steiner, and Laughlin. Main concepts were extracted from each, elaborated on, and then fit together into a new classification scheme called the Group Task Circumplex, see Figure 3. McGrath started with Hackman's three types of task: production, discussion, and problem solving. Hackman's task types were recast as four general work processes: Generate alternatives. Chose alternatives, Negotiote alternatives, and Execute alternatives. These four processes serve as the quadrants for the Task Circumplex Model.

Quadrant 1, Generate, is divided into generating ideas and generating plans. McGrath built this quadrant on the work of Hackman and his connection between problem-solving and production. Hackman's problem-solving type is related to the adjacent performance quadrant, Quadrant 4. Both carry an emphasis on action.

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Hackman's production type is the center for creativity tasks and is related to its adjacent quadrant, Quadrant 2. Both are concerned with cognitive matters.

Quadrant 2, Choose, is also divided into two types: intellective tasks and decision making tasks. The quadrant is built on the Laughlin's work. Intellective tasks require solving problems with a correct answer. That answer is clear and compelling to the group. Decision making tasks deal with problems for which there is no one clear answer. The group task is to find the preferred answer by consensus.

Quadrant 3, Negotiate, is an extension of Quadrant 2. Quadrant 3 is choosing when the team is competitive. The quadrant was also built on the classification of Laughlin that groups can be either cooperative or competitive. The relationship between group members has an effect on the task the group engages. Quadrant 2 refers to choice for cooperative teams; Quadrant 3 deals with choice for competitive teams. Choice in this case looks more like negotiation. Quadrant 2 is about solving problems; Quadrant 3 is about resolving problems.

Quadrant 3 has two types: resolving conflicts of viewpoint and resolving conflicts of interest. Resolving conflicts of viewpoint describe situations when members of the group do not just have individual preferences, but have systems of preferences that are in conflict with other group members. These systems may be subpopulations related to gender, age, ethnicity, religion, etc. Resolving conflicts of interest goes beyond systems of preferences to include issues of power, politics, and allocation of resources. Quadrant 3 uses Laughlin's notions of interpersonal and mixed motive tasks related to groups in conflict and two of Laughlin's mixed motive task classification of bargaining and coalitions formation

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Table 5

A Summary of Steiner's Typology of Tasks (Steiner, 1966, 1972)

Question	Answer	Task Type	Examples
Can the task be broken down into sub-components?	Subtasks can be identified	Divisible	Playing a football game, building a house,
	No Subtasks exist	Unitary	Pulling on a rope, reading a book, solving a math problem
Which is more important, quantity produced or quality of performance?	Quantity	Maximizing	Generating many ideas, lifting the greatest weight, scoring the most
	Quality	Optimizing	Generating the best idea, getting the right answer
How are individual inputs related to the group's product?	Individual inputs are added together.	Additive	Pulling a rope, stuffing envelopes, shoveling snow
	Group product is average of individual judgements.	Compensatory	Averaging individual's estimates on the number of beans in a jar
	Group selects the product from pool of individual member's judgements.	Disjunctive	Questions involving yes/no, either/or answers such as math problems and forced choice
	All group members must contribute to the product.	Conjunctive	Climbing a mountain, eating a meal
	Group can decide how individual inputs relate to group product.	Discretionary	Deciding to shovel snow together, opting to vote on the best math answer

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Quadrant 4 deals with physical behavior. It addresses the execution of manual and psychomotor tasks. McGrath took Hackman's work further here. Hackman's research was based on work limited to pencil and paper. McGrath takes Hackman's three task types further by adding a fourth, execute. McGrath adopts the Hackman model in order to include the majority of the work in the world, physical tasks. An execute task type is certainly necessary in any task classification that seeks to be complete.

In this quadrant McGrath does his own work of classifying tasks in terms of groups in conflict with other groups and groups that are in conflict with nature. In the former, pay-off for the group comes only if they defeat their competition. In the later, pay-off for the group comes if the group succeeds in relation to some objective or external standards.

Lipnack and Stamps (1997) built on McGrath's Task Circumplex in their discussion of work processes. Virtual teams are discussed in terms of purpose, people, and links. As a part of their purpose discussion, Lipnack and Stamps recommended that virtual teams have clarity related to the type of tasks in which the team is involved. Lipnack and Stamps include this clarity of tasks under purpose. Lipnack and Stamps also use the Circumplex as a framework to determine whether a virtual team is competitive or cooperative. The Circumplex is utilized to help groups evaluate their own levels of collaboration and appropriate group behavior.

Daft and Lengel (1984, 1986) and et al. (1987) conducted work in the area of work process related to the McGrath Circumplex. Daft and Lengel suggested that group tasks differ in how much information is necessary for the group to complete its task. This is described as *information richness*. Task groups differ in the amount of information richness they require. Information richness is the amount of information conveyed

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beyond a simple written text. Richness of information is how much the information contains surplus emotional, attitudinal, spiritual, and other meanings beyond the literal recognition of written text.

Richness of information is applied to the Circumplex tasks of generate, chose, negotiate, and execute. Tasks that involve groups in generating ideas , brainstorming, may not require rich information. All that is required is the transmission of specific ideas. Tasks that involve groups in negotiation, with the conflict it contains, will require information that is much richer. Necessary information includes more than simple facts. Emotions, values, attitudes, affect, expectations, and commitments are all essential. Daft and Lengel suggested that the need for information richness increases with movement through the Circumplex from Quadrant 1, generate, to Quadrant 4 ,execute.

Of particular interest to virtual team practitioners were Daft and Lengel's resulting recommendations related to communication mediums. Not all communication mediums carry the same degree of information richness. Face-to-face communication is the richest medium, with standardized written forms exchanged between strangers being the least rich. Electronic communication mediums are much less rich than face-to-face communication, but some forms of electronic communication are more information rich.

Daft and Lengel evaluate alternative forms of electronic communication according to the capacity for information richness. The continuum of electronic communication information richness is matrixed against the Circumplex. Quadrant 1, generate, tasks are linked with the least information rich forms of electronic communication and Quadrant 4, execute, tasks are linked with the most information rich forms of electronic communication.

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Daft and Lengel suggest that the work processes for virtual teams be designed with this relationship between work task types and information richness of electronic communication. Straus (1991) subsequently substantiated this with seventy-two three person groups at the University of Illinois at Urbana Champaign.

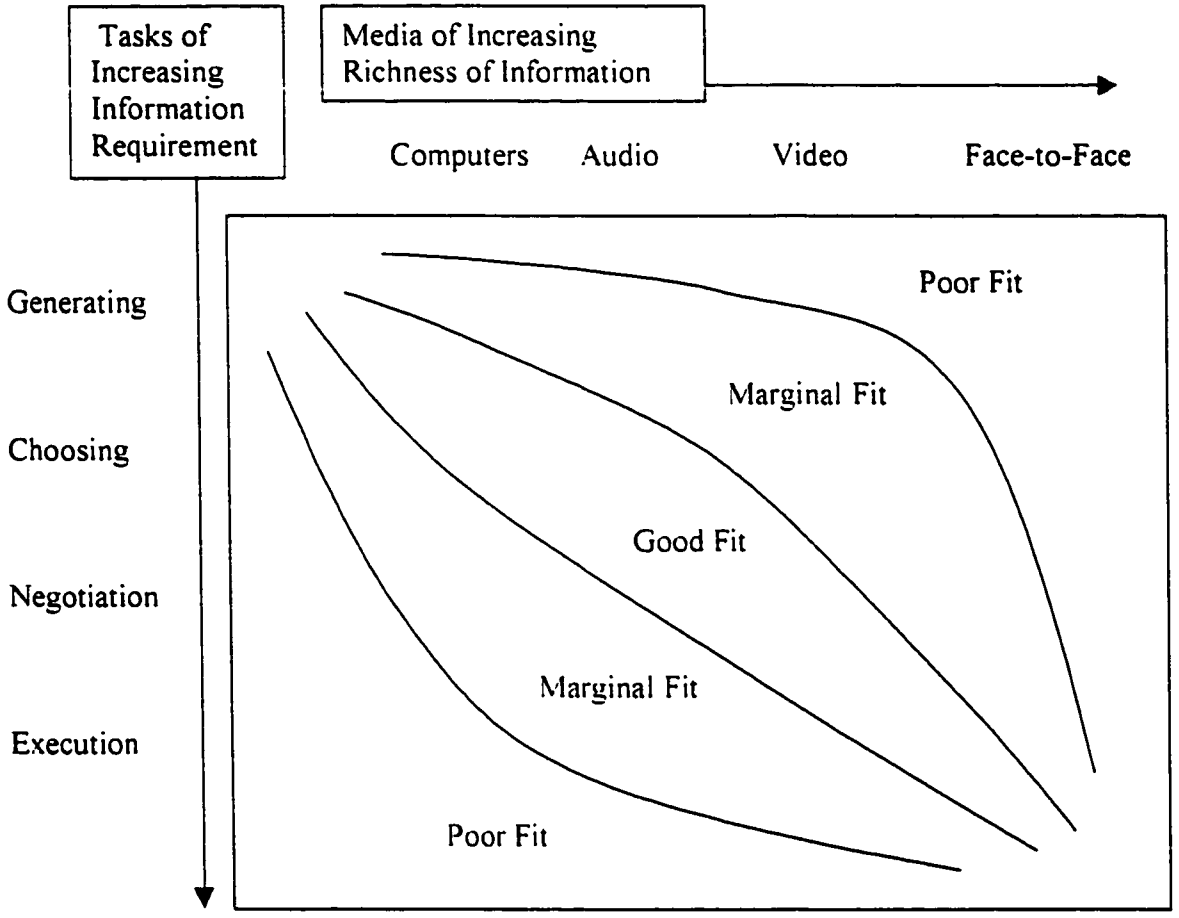

Figure 4. Daft and Lengel Task Media Fit on Information Richness (Daft & Lengel, 1984, 1986; Daft, et al. 1987).

Decision making

Johnson and Johnson (1991a) outlined five characteristics of an effective decision. A decision is only as effective as it meets these five criteria. If all five are not met, the decision has not been effectively met:

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1. The resources of the team are fully utilized.
2. Time is well used.
3. The decision is correct, or of high quality.
4. The decision is implemented fully by all the required team members.

The problem-solving ability of the team is enhanced. Minimally it is not reduced.

Although much has been written on individual decision making, the study focused on decision making in teams. Many researchers utilized a individual decision making model as a referent in group decision making models. As a result, one common individual decision making model is reviewed before addressing group decision making.

Robbins (1997) outlined a rational decision making process for individuals. The rational model has six steps and is based on the work of Harrison (1995). It assumed that decisions are made rationally and do not allow for intuition:

1. Define the problem.
2. Identify decision criteria.
3. Weight the criteria.
4. Generate alternatives.
5. Rate each alternative on each criteria.
6. Compute the optimal decision.

Robbins (1997) also referenced the work of Rowe, Boulgarides and McGrath (1984) in outlining different individual decision making styles. Using a two by two grid with the index of rationality to intuition as the way of thinking on one scale and low to high for the tolerance of ambiguity as the index on the other scale, there are four decision making styles: directive, behavioral, analytic, and conceptual.

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Individuals with the directive style have low tolerance for ambiguity and seek rationality. They are efficient and logical. Their concern for efficiency results in making decisions with minimal information and assessing few alternatives. They make decisions quickly and focus on the short-term.

The analytic type has a much greater tolerance for ambiguity than directive decision-makers, but are also rational. They desire more information and consider more alternatives. They are careful decision-makers who can adapt to new situations.

The conceptual type tends to be very broad in outlook and considers many alternatives. The focus is long-range. Conceptual types are creative and good at finding solutions to problems. They have a high tolerance for ambiguity and are intuitive.

The behavioral style has a low tolerance for ambiguity and is intuitive. They work well with others and are concerned with the achievement of peers and subordinates. They are open to ideas and avid conflict.

There has been debate over the relative effectiveness of individual versus group decision making. Groups take more time to make decisions than individuals, but bringing specialists together can be beneficial. Staw (1981), Bazerman and Appelman (1984), and Bird (1988) have all demonstrated that consensus decisions with five or more participants are superior to individual decision making, majority, vote, or Negotiation leader decisions.

Johnson and Johnson (1991a) reported there is little doubt that teams perform higher than individuals on almost all types of tasks, except brainstorming. (Johnson, et al. 1989; Watson, et al. 1972). As early as 1930, Thorndike (1938) regarded the superiority of groups to individual problem solving and decision making to be clearly established.

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In a group, it is easy to correct chance errors. It is easier to see someone else's blind spots, or mistakes, than your own (Ziller, 1957). Bekhterev (1924) demonstrated that a group made fewer mistakes in remembering pictures than individuals. Villasenor (1977) noted that jurors remembered the evidence better collectively than they did individually. Shaw (1932) concluded that a group is better able to recognize and reject incorrect solutions than individuals. Several studies have found that groups discussing problems get more insights into how to solve problems than do individuals working alone. (Johnson, et al. 1980) and (Skon, et al. 1981). Falk and Johnson (1977) found that group discussions led to discussions that none of the individuals had anticipated. Watson (1931) worked with standardized intelligence tests to show that groups scored better than the average score of its individual participants. Subsequent work found that after group discussions, decisions surpassed both the averages of the decisions of the participants and the best individual answers (Barnlund, 1959).

Gibson et al. (1997) suggested five points concerning group decision making:

1. In establishing objectives, groups are probably superior to individuals because of the greater amount of knowledge available to groups.

2. In identifying alternatives, the individual efforts of group members ensure a broad search in various functional areas of the organization.

3. In evaluating alternatives, the collective judgement of the group, with its wider range of viewpoints, seems superior to that of the individual decision-maker.

4. In choosing an alternative, group interaction and the achievement of consensus usually result in the acceptance of more risk than would be accepted by an

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individual decision-maker. Also, the group decision is more likely to be accepted as a result of the participation of those affected by its consequences.

5. Implementing a decision, whether or not it was make by a group, is usually accomplished by individual mangers. Thus, individuals bear the responsibility for implementation of the group's decision.

When a team reaches the point when its members feel they have sufficient information to make a decision, a social-decision scheme must be utilized to combine the individual preferences into a collective decision. Some teams use explicit social-decision schemes where there is a show of hands. Other teams use implicit schemes where there is not any formal process. Members talk until some consensus is reached (Forsyth, 1999).

Every decision making method has its uses and is appropriate under specific circumstances. Each carries a specific set of consequences for the team's future operation. An effective team understands the different methods of decision making well enough to chose the method that is the best for:

1. The type of decision to be made.
2. The amount of time and resources available.
3. The history of the team.
4. The nature of the task being worked on.
5. The kind of climate the team wants to establish.
6. The type of setting the team is working in.

Johnson and Johnson (1991a) reviewed seven methods of team decision making, decision by authority without team discussion, decision by expert, decision by averaging

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individual's opinions, decision by authority after team discussion, decision by minority decision by majority vote, and decision by consensus. Each has its own merits and disadvantages. The quality of the decisions and the time necessary to make them increases from individual decisions to averaging, to minority control, to majority control, to consensus.

In order for consensus to be reached, group members need to perceive differences of opinion as a way of gathering additional information, clarifying issues, and forcing the group to seek better options. Six basic guidelines for consensual decision making were proposed (Johnson & Johnson, 1991a):

1. Avoid arguing blindly for your own opinions. Present your position as clearly and logically as possible, but listen to others.

2. Avoid changing your mind only to reach agreement and avoid conflict. Support only solutions that you are at least somewhat able to agree. Yield only to positions that have objective and logically sound foundations.

3. Avoid conflict-reducing procedures of voting and averaging.

4. Seek out differences of opinion. They are natural and expected. Try to involve everyone in the decision making process.

5. Do not assume that someone must win and someone must lose when discussion reaches a stalemate. Look for the most acceptable position for everyone.

6. Discuss underlying assumptions, listen carefully and encourage everyone to participate.

Forsyth (1999) outlined five common social-decision schemes based on the work of several researchers (Davis, 1969, 1982; Kerr, 1982; Laughlin, 1980; Stasser, et al. 1980):

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delegation, averaging, voting, and consensus. In delegation social-decision scheme, an individual, or sub-group with the team, makes the decision for the whole team. Under a dictatorship, the chairperson makes the final decision. Under an oligarchy, a coalition of powerful individuals makes the final decision. They are all similar in that some of the decision making power is taken from the members.

In an averaging social-decision scheme, groups make decisions individually, either before, or after, a group discussion. These private recommendations are then averaged together to determine the final decision.

In a voting social-decision scheme, the individuals on the team vote with the majority determining the final decision. A minority and majority position results.

In a consensus social-decision scheme, the problems of voting are reduced when unanimity is required before a decision can be reached. The final decision is not reached until everyone agrees to it.

Social psychologist Irving Janis used the word *groupthink* in the study of decision making. Decision makers are sometimes reluctant to make decisions. They seek relief by rationalizing or denying responsibility, that is, by utilizing a defensive avoidance (Janis & Mann, 1977). One dangerous expression of defensive avoidance is groupthink. After analyzing the decision making process that led to Pearl Harbor, the Bay of Pigs Invasion, and the Vietnam, War Janis observed a recurring pattern of defective decision making. Janis believed that the groupthink syndrome bred these blunders (Janis, 1971, 1972, 1982).

Groupthink is a collective striving for unanimity that overrides group members' motivation to realistically appraise alternative courses of action. It leads to deterioration

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of mental efficiency, reality testing, and moral judgement. External information that is inconsistent with the favored decision is ignored. It is a distorted style of thinking that renders team members unable to make rational decisions. Members try so hard to agree with each other that they make simple mistakes (Janis, 1971, 1972, 1982).

Groupthink is promoted when teams are highly cohesive, when the leader is directive and dynamic, and when the team does not search for and evaluate alternatives. Instead, the team relays on shared illusions and rationalizations to bolster the leader's opinion (Janis, 1971, 1972, 1982).

Johnson and Johnson (1991a) suggested eight characteristics of groupthink.

1. Self-censorship: Each member of the team minimizes any doubts about the apparent consensus.

2. Illusion of unanimity: Each member assumes that everyone, except oneself, is in agreement. There is a state of pluralistic ignorance where members falsely assume that the silence of the other members implies consent and agreement.

3. Direct pressure on dissenters: Anyone expressing doubts is pressured to conform.

4. Mindguards: Certain team members try to prevent dissenters from raising objections.

5. Illusion in invulnerability: Members develop an illusion of invulnerability, characterized by unwarranted optimism and excessive risk taking. The often believe that the team is above attack and reproach.

6. Rationalization: Team members invent justifications for whatever actions about to be undertaken, thus preventing misgivings and appropriate reconsideration.

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7. Illusion of morality: Members ignore the ethical consequences of the favored alternative and assume that the group's actions are morally justified.

8. Stereotyping: Team members dismiss competitors, rivals, and potential critics as too weak to react effectively or as too evil to warrant genuine attempts at negotiation.

Stoner (1961) found that teams were willing to make riskier decisions than those selected by its individuals before the decision. This effect was identified as the risky shift. This effect was substantiated by other researchers (Myers, 1982). More recently, researchers have discovered that although team discussions can produce a shift in individual opinions, that shift is not always towards greater risk; it could be in the direction of increased caution (Fraser, 1971; Myers, et al. 1970). As a result, the phenomenon has been re-identified as group polarization. Teams seem to be more secure than individuals in adopting positions that are more liberal or conservative than those originally held by its members. Team discussion can polarize decisions by causing the team to adopt positions more extreme than those initially held by the individual members (Johnson & Johnson, 1991a).

Three explanations have been given for the group polarization effect. Teams may polarize because members want to create a favorable impression on others by modifying their opinions to reinforce other team members. Teams may polarize because in the discussion team members learn new information that causes them to adjust their opinion. Teams may polarize because individuals want to identify with the team (Johnson & Johnson, 1991a).

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Relationships and Trust

Cohesiveness

Formal and informal groups seem to possess a closeness or commonness of attitude, behavior, and performance. This closeness has been referred to as cohesiveness. It is generally regarded as a force acting on the members to remain in a group that is greater than the forces pulling the member away from the group (Davis, 1969). A cohesive group involves individuals who are attracted to each other. The group that is low in cohesiveness does not possess interpersonal attractiveness for the members.

There are numerous sources of attraction to a group (Cartwright & Zander, 1968):

1. The goals of the group and them members are compatible and clearly specified.
2. The group has a charismatic leader.
3. The reputation of the group indicates that the group successfully accomplishes its tasks.
4. The group is small enough to permit members to have their opinions herd and evaluated by others.
5. The members are attractive in that they support each other and help each other overcome obstacles and barriers to personal growth and development.

These five factors are related to need satisfaction. Individuals join groups to satisfy personal individual needs. If an individual joins a cohesive group, there should be an increase in the satisfaction of needs through group affiliation.

Since highly cohesive groups are composed of individuals motivated to be together, there is a tendency to expect cohesive groups to be effective. This logic is not conclusively supported by research. In general, as the cohesiveness of a work group

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increases, the level of conformity to group norms also increases; however, these norms may be inconsistent with those of the organization. The group pressures to conform are more intense in the cohesive group and may be contradictory to the needs of the larger organization in which the group is embedded. A member who attempts to defy the group jeopardizes their position and status in the cohesive unit (Lott, et al. 1965).

The concept of cohesiveness is an important one for the understanding of groups in organizations. The degree of cohesiveness in a group can have positive or negative effects depending on how congruent group goals are with those of the formal organization. If cohesiveness is high and the group accepts the larger organizational goals, then group behavior will likely be positive from the organizational standpoint; however, if the group is highly cohesive and has goals that are not congruent with the formal organization, then group behavior will likely be negative from the organizational perspective (Kast, et al. 1970)

Behling and Schriesheim (1976) defined cohesion in terms of attraction. It is the attraction of the team for its members. Davis (1969) regarded cohesiveness in terms of a force field. The forces acting on members to remain in the team are greater than the forces pulling the members out of the team. These forces are understood to be primarily forces of attraction. Johnson and Johnson (1991a) also hold an attraction orientation for cohesion.

Group cohesion is all the forces, both positive and negative, that cause individuals to maintain their membership on the team. Group cohesion is the extent to which the influences on members to remain are greater than the influences on members to leave the team. Johnson and Johnson (1991a) understood these forces to be primarily relational.

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When team members like each other and want to be with each other, the team has cohesion. Johnson and Johnson stated that for teams to function effectively the team must cohere; that is, have a positive emotional climate.

Cartwright and Zander (1968) have identified five sources of attraction to a team:

1. The goals of the team and the members are compatible and clearly specified.
2. The team has a charismatic leader.
3. The reputation of the team indicates that the team successfully accomplishes its tasks.
4. The team is small enough to permit members to have their opinions heard and evaluated by others.
5. The members are attractive in that they support each other and help each other overcome obstacles and barriers to personal growth and development.

McIntosh-Fleming (1996) understood cohesion differently. Cohesion is not primarily about attraction, it is about focus. McIntosh-Fleming presented a team model with three stages of teaming: cohesive work group, efficient work team, and effective organizational unit. The characteristic difference between stages is the focus of the team. The cohesive work group focuses on the needs of the individuals. The efficient work team focuses on the needs of the team. The effective organizational unit focuses on the need of the customer.

High cohesion in work teams has two sources: member anxiety and member satisfaction. When a team is effective in reducing the amount of anxiety its members' encounter, it is highly cohesive. In other cases, high cohesion is a function of teams

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obtaining sources of satisfaction for the needs of group members. In these groups cohesion is a tool used to compete for resources (Behling & Schriesheim, 1976).

Some researchers have focused on anxiety reduction as a source of cohesion. Modern interest in cohesion can be traced to Elton Mayo (1933) and his work at the Hawthorne Works of the Western Electric Company. Mayo's work is best understood in the context of a simple, mechanical orientation to production. At Mayo's time Taylor's (1947) method of scientific management was dominant. Individuals were viewed as machines responding to manipulation of finances and environment. Like Durkheim (1897), Mayo concluded that the industrial society had reduced the level of meaning in people's lives. The nature of modern industrial society had destroyed most of the major sources for affiliation need available in simpler societies.

In the transition from small villages to large cities, close family ties were broken and traditional status hierarchies disintegrated. People became rootless. Mayo asserted that people seek out in the work team the roots they can find nowhere else. The behavior of workers can be explained as attempts to satisfy affiliative needs within the work team, the only source for such satisfactions available to them. Work teams become a stable set of social relationships in their lives and provide the support and affection unavailable in other spheres of their lives (Behling & Schriesheim, 1976). See Figure 5.

Mayo and Lombard (1944) substantiated Mayo's findings (1933) related to absenteeism. Their study demonstrated the relationship between rapid expansion of the work force and high absenteeism. Individuals did not respond to management's attempts to motivate them, but did respond to workers around them. Workers showed up for work because of loyalty and affection for those they worked with, not because of patriotism or

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loyalty to the company or any financial reward. They did not want to let their friends down.

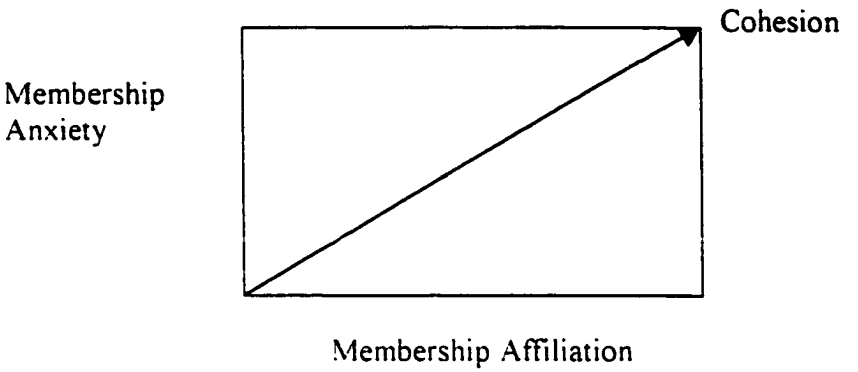

Figure 5. Membership Anxiety and Member Affiliation Related to Team Cohesion.

Schachter (1959) broadened Mayo's work and contradicted theories of anxiety and cohesion. Schachter found that anxiety can actually increase cohesion, that when people are anxious, afraid, threatened, or unhappy, interacting with others reduces the disagreeable emotions. As a result, cohesion in some groups is a result of anxiety on the part of team members.

Other researchers have focused on instrumental effectiveness as a source of cohesion. In some cases, cohesive work teams are coalitions formed to maximize members' competitive advantage. Although much of the research regarding coalitions is conflicting (Behling & Schriesheim, 1976), the work of Thibaut and Kelley (1959) indicated that coalitions develop in similar processes. Coalitions have four types of relationships: (a) solidarity, in which the two most active members give a high degree of support to each other, (b) conflicting, in which the two most active members give each other little support, (c) dominant, where the most active member gives little support but

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receives a great deal from the second most active, and (d) contending, in which the most active member gives much support but receives little from the second most active.

Collins and Raven (1969) identified four types of theories related to why individuals join with others to form coalitions. The minimum resource theories emphasize the desire of coalition members to join with others with limited amounts of power to maximize their voices. These coalitions result in enough power to win but nothing else.

Strictly rational theories suggest awareness for coalition members that not all the members of the coalition have equal amounts of power. Thus, spoils are distributed on the basis of proportion to contribution.

Unrelated variable theories emphasize the importance of personality factors and the perceptions of the other players in the determination of coalitions. The spoils are distributed on the basis of personality and perception.

Last, the utter confusion theories which hold that most potential coalition members are incapable of making the kinds of decisions implied in the other theories. As a result, all types of coalitions have roughly the same chance of emerging.

A number of studies (Cartwright & Zander, 1968; Watson, et al. 1972) have indicated that team cohesiveness affects teams. As cohesiveness increases, so does the ability of the team to keep its members. The longer the team keeps its members, the greater the probability that the team will accomplish its goals. Highly cohesive teams are more productive (Summers, et al. 1988; Mullen, et al. 1994).

Highly cohesive teams are characterized by low turnover and low absenteeism. They are likely to be more sustainable when members leave. As cohesiveness increases,

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member participation increases. The more cohesive the team, the more likely it is that the members will conform to team norms. As cohesiveness increases, members become more committed to the team's goals (Johnson & Johnson, 1991a).

Pepitone and Reichling (1955) found that cohesive groups were better able to handle conflict, particularly hostility toward the leader. Members value each other sufficiently that they are willing to work through conflict. Regardless of how angry members get with one another, communication continues until the difficulty is resolved.

Team cohesion can be measured several ways. Attendance, punctuality, trust, support, the amount of individuality accepted in the team, and the amount of fun can all reflect the cohesiveness of a team. Cohesion can also be measured by asking members if they like each other, if they want to continue their membership, and whether they can work with the other team members (Johnson & Johnson, 1991a). Cohesiveness is also commonly measured by looking at the member's choices for friends (Behling & Schriesheim, 1976).

Gibson et al. (1997) gave the following seven suggestions for increasing team cohesiveness:

1. Make the team smaller.
2. Encourage agreement with the team goals.
3. Increase the time members spend together.
4. Increase the status of the team and the perceived difficulty of attaining membership on the team.
5. Stimulate competition with other teams.
6. Give rewards to the team rather than to its members

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7. Physically isolate the team.

Johnson and Johnson (1991a) suggested four ways to increase team cohesion:

1. Structure cooperation among members. One of the most predictable outcomes of cooperative interaction is that team members will like each other and value their membership in the team.

2. Successfully meeting the personal needs of members. For a group to be cohesive, the members needs for mutual inclusion, mutual influence, and mutual affection among themselves must be met.

3. Maintaining a high level of trust among members. Without a high level of trust, a group cannot be cohesive.

4. Promoting team norms that encourage the expression of individuality, trusting and trustworthy behavior, and concern and affection among team members. For a team to be cohesive, team members need to understand how to implement appropriate norms within the team.

Status

Status is an important variable in understanding behavior because of its motivational power and potential for conflict if individuals sense a disparity between what they perceive their status to be and what others perceive it to be. Status is a prestige grading, position, or rank within a team. If may be formal, or informal. If it is organizationally given, it is a formal status and often carries with it the trappings of high organizational status, titles, benefits, salary, office and preferred work schedules. Most often, status is informal. Education, gender, age, competence, or experience can informally designate status. Anything can have status value if the team members deem it

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as status bearing. Informal status is not necessarily less important than formal status (Johnson & Johnson, 1991a).

Whyte (1954) demonstrated the significance of status. He suggested that individuals work more smoothly if high-status personnel customarily originate action for lower-status personnel. The study indicated a high correlation between conflict and work initiation by lower-status employees. When waitresses told the cooks what the orders were, there was conflict. When a buffer was created, the use of a spindle for the waitresses to post the orders, conflict was reduced.

Behling and Schriesheim (1976) discussed status in terms of prestige. There is a prestige hierarchy, or accepted ranking, of individuals on teams. Prestige does not always follow organizational rank. Among individuals of the same organizational rank, there will also be a prestige hierarchy.

High status satisfies individual needs in two ways. First, the deference attached to high status addresses satisfaction for power and achievement. This power can be seen in a variety of ways. Their opinions carry more weight with others. They are consulted and sought out for opinions. They also have a greater than average impact on the behavior of other members of the team. As a result, they can influence the behavior of the team. Second, high status provides individuals with special freedoms not allowed others. Privileges can be the first choice of tools or work schedule, exemption from minor breaches of discipline, or longer breaks.

Thibaut and Kelley (1959) have found that teams eventually reach an equilibrium involving status. There is an apparent willingness to defer to others on the part of some members. They found that the consensus was sometimes more apparent than real. Some

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individuals will indirectly challenge the status hierarchy by de-emphasizing the advantages of status. For those who hope to attain higher team status, it is essential that they support the whole idea of status and its criteria. Those individuals with high status often reward low status individuals with special deference. Low status individuals tend to attempt to raise their status by hanging out with higher status individuals.

Gardner and Moore (1964) addressed the effects of status differences within organizations. Status differences can be a hindrance to effective team performance, but are also a given in human interaction. One key place of tension with status differences is the addition of new members to the team. The new members may not accept their status, or the status criteria in the team.

Communication

Communication is the most cited source of interpersonal conflict (Thomas, et al. 1976). This is not surprising given that 70 percent of our waking hours are spent communicating, e.g., writing, reading, speaking, and listening. One of the most limiting factors to group performance can be ineffective communication (Robbins, 1997).

Communication saturates every group activity. It is the process that groups use to accomplish their task. Communication is unavoidable in groups, but effective communication is avoidable. In spite of the numerous advances in communication and information technology, communication within groups can be very poor (Krippendorf, 1984). Communication within groups does not primarily depend on technology; effective communication in groups depends more on forces in people and their environments. Communication is a process that occurs within individuals and groups (Gibson, et al. 1997).

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Jensen and Chilberg (1991) included communication as a defining characteristic of groups. Collections of people do not have networks of communication, groups do. The progress of a collection of people to a group of people can be measured by the degree to which communication networks are a part of their relationships. Groups have common goals, interdependence, structured relations, shared norms, and a sense of wholeness. If a group lacks the ability to communicate, these group characteristics are of little value, and the group will remain more of a collection of people than a group of people. The very existence of a group is dependent on communication. As individuals communicate, they form groups that understand each other, build trust, coordinate their actions, plan for goal accomplishment, agree on division of labor, and conduct all group activity. Communication is a prerequisite for every element of group functioning.

Although communication is essential for groups, there has been little agreement on what communication is. Dance (1970) reviewed 95 definitions of communication published in a variety of academic fields. The definitions carried several distinct concepts of communication. The variety of definitions had led theorists and researchers in a variety of different and confounding directions Dance concluded that the concept of communication is confused and impedes our ability to understand it (Johnson & Johnson, 1991a).

The word communication comes from the Latin *communis*, meaning common. The communicator attempts to establish a commonness with the receiver. Thus, communication can be defined as the transmission of information and understanding through the use of common symbols (Gibson, et al. 1997).

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Johnson (1973, 1990) broadly defined interpersonal communication as any verbal or nonverbal behavior that is perceived by another person. Communication is more than words. All behaviors send messages and are a form of communication. Interpersonal communication is defined in a more limiting fashion. Interpersonal communication is a message sent by a person to a receiver. Any behavior aimed at influencing the receiver's behavior is communication.

This understanding of communication is not limited to a sequential process of communication. Communication is more than a sequence of an individual conceiving a message, sending it, and the receiver receiving it. Communication is a concurrent process where everyone receives, sends, interprets, and infers simultaneously. There is no beginning or end (Johnson & Johnson, 1991a).

Jensen and Chilberg (1988) defined communication as a transaction where people collectively create and manage social realities. Transaction means that messages are being concurrently sent and received by each person in the conversation. Together the two persons begin to construct a social reality, a cogent sense of what is happening in their relationship. A series of interactions between people eventually leads to a social reality; they become friends, rivals, or competitors. Or a series of interactions leads to another social reality of consensus or difference.

Jensen and Trenholm (1988) also pointed out that communication creates task reality. As individuals communicate about their dreams and plans, they decide what their mutual task is. There is more to a group decision than a cognitive exchange of data. Group decisions are the product of complex social processes that involve bias, distortion, and politics. Communication is a process that determines task reality.

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McGrath (1984) understood communication to be a process that included two modes, consisting of four patterns and their interaction. The first mode is the content mode. It consists of two communication patterns involving task and interpersonal components between people. A behavior from one person to another can be considered as communication. A series of behaviors between two people can be considered to be a communication process. The form or structure of that series of behaviors can be regarded as a communication pattern, see Figure 6.

The second mode is the influence mode, which also consists of the two patterns of task and interpersonal components. Every set of behaviors contains content. All interactive behavior between people contains both a task component and an interpersonal component. The task elements of the individual's behavior are viewed as a task process that eventually leads to a task performance pattern. The interpersonal elements of the individual's behavior is viewed as an attraction process that eventually leads to an interpersonal relationship pattern (McGrath, 1984).

Table 6.
Value of Interpersonal Component in Communication (McGrath, 1984)

	Communication Components	
	Task	Interpersonal
Content Mode	+	+
Influence Mode	+	+

Communication has four functions within a group or organization: control, motivation, emotional expression, and information (Scott, et al. 1976). Communication

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controls individual behavior several ways. Groups have power distributions, hierarchies, and guidelines that individuals are expected to follow. Communication nurtures motivation as it clarifies what is expected of individuals, how well they are doing, and they can increase low performance. Communication provides opportunities for individuals to express their feelings and fulfill their social needs. Finally, communication provides the information individuals need to make decisions by sending information necessary to identify and consider options (Robbins, 1997).

The general process of communication has five elements: the communicator, the message, the medium, the receiver, and feedback. It can best be summarized as: Who says what, in which way, to whom, with which effect (Lasswell, 1948).

The most widely accepted model of the communication process can traced to the early work of Shannon and Weaver (1948), and Schramm (1953). They were focused on describing the general process of communication in a way that would have universal application The basic components included a communicator, an encoder, a message, a medium, a decoder, a receiver, feedback, and noise. See Figure 6.

The communicator initiates a message by encoding a thought. The message is the physical product resulting from the communicator's encoding. For example, when we speak, the speech is the message. When we gesture, the gesture is the message. The medium is the channel that the communicator chooses. The communicator may use an informal or formal medium. Formal mediums are those predetermined by the group. Informal mediums follow personal or social channels. The receiver is the person intended to receive the message. Before the receiver can receive the message, the receiver must translate the symbols in the message into a form that is understandable, which is

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decoding the message. Feedback is the final step to ensure that the message was received as the communicator intended (Robbins, 1997).

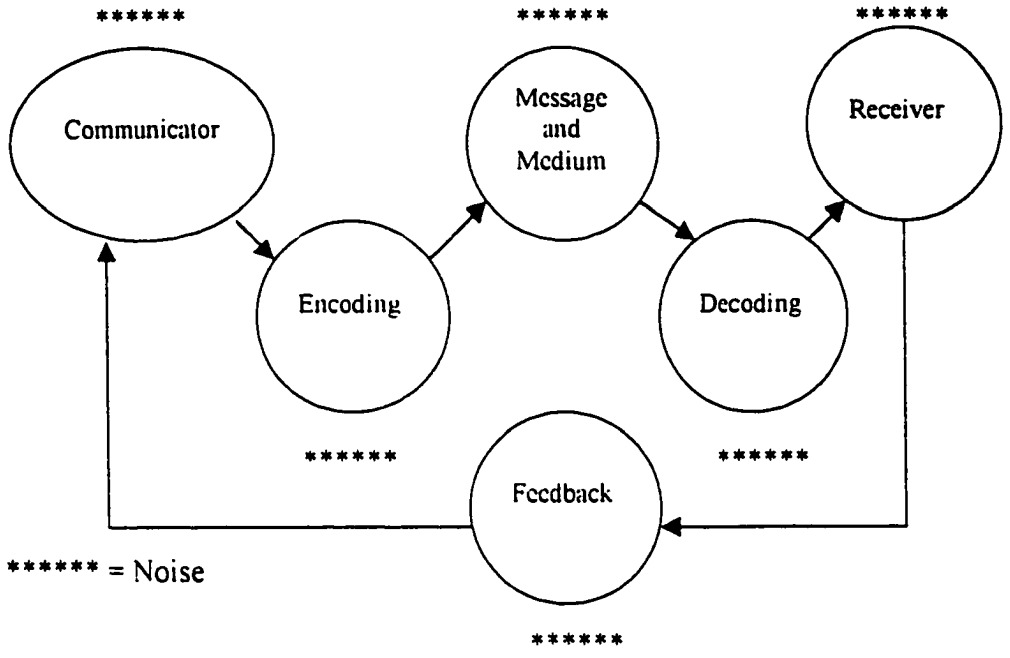

Figure 6. A Communication Model.

Noise is not a step in the communication process model. Noise is a feature at each step in the model. Noise is all the factors that distort the intended message. For example, time can be a noise when individuals are in time-sensitive contexts, or a person may attach a different meaning to a word that the communicator did not intend (Gibson, et al. 1997). See Figure 6.

Johnson's (1986) communication model exactly parallels that of Shannon and Weaver (1948), and Schramm (1953). Robbins' (1997) communication model also parallels the work of Shannon and Weaver, and Schramm, but omits noise as a component in the model.

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A regular pattern of information exchange between group members is called a communication network (Forsyth, 1999). The information channels that determine the flow of communication are critical once the group becomes larger than two or three individuals. The structure a group takes will determine the availability of information to all the group members. The majority of studies on communication networks have been conducted with groups created in a laboratory setting.

The first leading researcher in this area was Bavelas (1948). The results tended to be overly artificial and limited to small groups. Three common communication networks are the chain, the wheel, and the all-channel, see Figure 7. The chain network is rigid and follows the chain of command for the group. The wheel network depends on the leader to be the central channel for all of the group's communication. The all-channel network allows all the group members to freely contribute (Robbins, 1997).

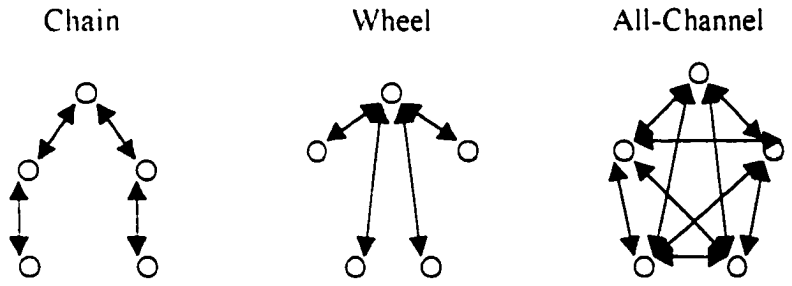

Figure 7. Communication Networks (Bavalas, 1948).

The effectiveness of each network is dependent on the goals of the group. The wheel and all-channel networks are the best when speed is important. The chain and wheel networks are best for accuracy. If developing leadership is needed, the wheel network is best. The all-channel network is best for member satisfaction and the wheel

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network the least (Shaw, 1964). The more removed a group member is from the center of the network, the more discontent the occupant (Krackhardt, et al. 1986). No single network is best in every context (Bavelas, et al. 1951).

Leavitt's study (1951) demonstrated that the most important feature of a network is its degree of centralization. Centralized networks have one position located at the crossroads of communications such as the wheel and Y. Groups with this structure use the hub position as the data processing center. Its occupant collects information, synthesizes it, and sends it out to the other group members.

Leavitt's study (1951) suggested that a centralized network was more efficient than a decentralized network. Reitan and Shaw (1964) and Shaw (1978) also found that a centralized network was more efficient. The only exceptions were when Leavitt's simple tasks were replaced with more complicated ones. With more complicated tasks, decentralized networks outperformed the centralized networks. This led Shaw to suggest that information density determines network efficiency. Shaw concluded that centralized networks were best for simple group tasks and decentralized networks best for complex group tasks.

Nonverbal communication is the information a communicator sends that is unrelated to the verbal communication. Nonverbal messages are messages sent with body posture, facial expressions, hand and eye movements (Gibson, et al. 1997). It is an area of increasing interest to research behavioral scientists (Level & Galle, 1988). Nonverbal communication is very powerful and difficult to repress (DePaulo, 1992). As much as people try not to send nonverbal messages, they end up sending them anyway. In a recent study, speakers who were judged to have greater vocal pleasantness, facial pleasantness,

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and facial expressiveness were judged by the hearers to be more persuasive, even though the message content for all the speakers was the same (Burgoon, et al. 1990).

Ekman and Friesen (1975) developed a taxonomy of body language with five types of expression: emblems, illustrators, regulators, adaptors, and affect displays. Emblems are gestures that quickly convey an understood work or phrase. They function much like sign language, the V sign for victory, the OK sign with the thumb and forefinger. Illustrators are gestures that illustrate what is being said, e.g., extended hands to show the size of the fish. Regulators are gestures that regulate conversation. Raised eyebrows mean that clarification is needed. Head nodding indicates approval or understanding. Emblems, illustrator, and regulators are used consciously (Gibson, et al. 1997).

Adaptors and affect gestures are usually given subconsciously. They display much about the communicator's and receiver's emotions and attitudes. Adaptors are gestures used to psychologically adjust to the climate of a situation (Level & Galle, 1988). They are usually developed early in life and are most frequently used to deal impersonally with stress-filled contexts. Some common adaptor gestures would be drumming fingers on tables, pulling a strand of hair, and bouncing a foot. These are all ways of coping with stress. Affect displays are subconscious gestures that directly communicate a person's emotions. Facial gestures are the most common, but affect displays can also come from body positions, e.g., arms crossed, legs crossed to indicate defensiveness and dislike.

Hall (1966) argued that the dimension of space shapes much of human behavior. Individuals preferred specific amounts of space, or distance, between themselves and others. This personal space provides a boundary that limits physical contact with people. It extends further in front of a person than behind, but an individual is always at the

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center of a physical space buffer. It is the area around individuals that others cannot enter without producing discomfort (Forsyth, 1999). People will take steps to defend their personal boundaries and space (Aiello, 1987). It is more interpersonal space than personal space, because it refers to distances between people (Patterson, 1975). People vary in how much space they require, and it varies depending on the people involved and the situation (Altman, 1975; Hayduk, 1978).

Hall (1966) described four interpersonal zones. These zones represented the varying amounts of personal space individuals need in different contexts. The intimate zone is only for the most involving and personal behaviors such as wrestling and whispering. The personal zone is used for a wide range of small group activities like conversations with friends and interactions with acquaintances. The social zone is used for more routine interactions. Examples would be meetings over desks, formal dining, and presentations. The public zone is for the most formal contexts involving formal meetings, lectures, and theatre. Hall has subsequently added a fifth zone to his taxonomy, the remote zone. The remote zone is used when individuals are physically separated but communicating with each other electronically, see Table 7.

Other researchers have supported Hall's research. Evans and Howard (1973) found that cohesive groups require less space than noncohesive groups. The same study indicated that people intending to create a warm impression choose smaller distances than less friendly people. Patterson and Sechrest (1970) discovered extroverted people require less personal space than introverts. Edney and Grundmann (1979) found groups of friends tend to stand closer together than groups of strangers. Kiesler, Sproull and Waters (1996) found physical distance does not affect individuals communicating

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electronically, unless the medium allows for facial information to be conveyed (Forsyth, 1999).

The equilibrium model explained why distance affects so many group processes. The theory suggested that this distancing behavior in interpersonal settings is determined by the amount of eye contact, the intimacy of the topic, and the amount of smiling (Forsyth, 1999). Argyle and Dean (1965) have found that when group members feel a low level of intimacy, they may sit far apart, not make much eye contact, and maintain a formal posture; however, if the group members are relaxed and interacting on personal topics, they may move closer together, make eye contact, and maintain a more informal posture. Burgoon et al. (1990), and Kaplan, Firestone, Klien, and Sodikoff (1983) suggested that group members can control the level of intimacy in their interactions by constantly adjusting their nonverbal and verbal behavior.

Hayduk (1983) suggested that women require less personal space than men. Women will allow others to get closer to them than men will. Men tend to be expansive with their personal space with open postures, while women take less person space by sitting with their arms together and legs crossed (Heshka, et al. 1972; Mehrabian, 1972).

The type of relationship that connects individuals also affects personal space. A study involving 562 U.S. Navy personnel found that the personal space for subordinates conversing with their superiors was less than the personal space required for conversations with their peers (Dean, et al. 1975). Hayduk (1983) found that when individuals are with friends of either gender, their personal space was less than when individuals are with strangers or mere acquaintances of either gender.

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Table 7

Communication and Interpersonal Zones (Hall, 1966).

Zone	Distance	Activities	Zone Characteristics
Intimate	Touching to 18 inches	Procreation, massage, comforting, accidental jostling, handshake, slow dancing	Sensory information concerning other is detailed and diverse; stimulus person dominates perceptual field.
Personal	18 inches to 4 feet	Friendly conversations, car travel, watching television	Other person can be touched if desired, but also avoided; gaze can be directed away easily.
Social	4 feet to 12 feet	Dining, meetings with business colleagues, interacting with a receptionist	Visual inputs begin to dominate the other senses; voice levels are normal.
Public	12 feet or more	Lectures, addresses, plays, dance recitals	All sensory inputs beginning to become less effective; voice may require amplification; facial features unclear.
Remote	Different locations	Electronic discussions, conference calls, voice mail, e-mail	Primarily verbal inputs; facial and other behavior nonverbal cues unavailable.

Robbins (1997) outlined five barriers to effective communication:

1. Filtering is when the sender purposefully manipulates information to make it more agreeable to the receiver. An example would be a subordinate telling a supervisor what they think the supervisor would want to hear.

2. Selective perception is when the receiver sees and hears things selectively based on their preferences, environment, needs, experience, and other personal

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characteristics. The receiver can also project personal characteristics and preferences into messages as they decode them. The receiver expecting a specific message is likely to find it in the message regardless of whether or not it is really there. Receivers do not see reality, they interpret what they see and call it reality.

3. Gender style can also become a barrier to effective communication. Men and women have different outcomes related to verbal communication. Men use language to establish status and independence; women use language to establish connection and intimacy (Tannen, 1991).

4. Emotions can be a barrier to effective communication. The emotional condition of the receiver when a message is received will influence how the message is interpreted. The same message received in a context of intense depression, or jubilation, will be interpreted differently.

5. Language can be a barrier to effective communication. Words often vary in their meaning depending on both the sender and the receiver. Age, education, and cultural context are the most common variables that influence the language a person hears and the meaning attached to that language. The language of a white-collar worker is different than the language of a blue-collar worker. Although the two parties may be using a common language, e.g., English, their usage of that common language will not be uniform.

Robbins (1997) concluded his discussion of barriers to effective communication with nonverbal cues. Messages always contain both verbal and nonverbal messages. As long as these two mediums are reinforcing, miscommunication is reduced; however, whenever these two mediums are out of alignment, the receiver will become confused,

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reducing the clarity of the message. If I say I am not angry with an angry tone of voice, the receiver will be confused.

Gibson's et al. (1997) treatment of barriers to effective communication included Robbin's (1997) barriers and added several. Gibson had taken Robbin's category of selective perception and divided it into four sub-categories of communication barriers: frame of reference, selective listening, value judgements, and source credibility. Gibson's selective listening was closest to Robbin's selective perception.

Gibson's frame of reference communication barrier refered to differences in the ways individuals interpret messages dependent on their previous experiences in the encoding and decoding processes. When the message is encoded in the field of experience of the sender, unless the receiver has the same field of experience in the decoding process, distortion or miscommunication may occur (Nichols, 1991).

Gibson's value judgements referred to the value judgements of receivers. The receiver assigns worth to a message before they receive the message. The medium the sender selects to encode the message may be more, or less, valued by the receiver.

Gibson's source credibility was another facet of Robbin's selective perception communication barrier. Source credibility focuses on the confidence and trust the receiver has in the sender. The level of credibility assigned by the receiver to the sender will directly affect how the receiver responds to the sender's message.

Gibson also differentiated Robbin's barrier of language into two communication barriers: semantic problems and in-group language. Gibson differentiated language communication barriers between those that are caused by semantic problems and those that are caused by in-group language.

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Semantic problems referred to different meaning senders and receivers have for the same symbols and words. The same words can mean different things to different people depending on the personal context.

In-group communication problems referred to specialized language unique to a specific context that leads to misunderstanding in other contexts. Occupational, professional, and social groups develop words and phrases that contain meaning to their members. This special language helps groups define identity, provides a sense of belonging, and facilitates communication within the group; however, when this language is used outside the group, communication breaks down (Hargie, et al. 1994).

Gibson et al. (1997) added three communication barriers: status differences, proxemic behavior, and time. Status differences were the result of hierarchical rank within groups and organizations. These status differences can be threatening to people lower in the hierarchy, resulting in distorted communication. Hierarchy also limits feedback which limits effective communication (Hennefrund, 1986).

Proxemic behavior was based on the work of Hall (1966). Proxemics is an individual's use of space when interpersonally communicating with others. This can create communication barriers when the proxemic behaviors of the sender and receiver are not the same. When the sender stands too close to the receiver, the receiver feels uncomfortable and may not receive the message well. Proxemic behavior differences can also affect the perception the receiver and sender have of each other. If the sender is too close, the receiver may perceive the sender as pushy or aggressive; the sender may perceive the receiver as aloof and distant.

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Gibson also recognized time as a communication barrier. Time pressures can short circuit communication. The sender and receiver may decide not to use formally prescribed communication systems to save time. This can result in someone being left out of the communication process.

Forsyth (1999) pointed out that miscommunication in groups is more common than accurate communication. One reason is that group members lack the skills to express themselves clearly (Gulley & Leathers, 1977). Misunderstanding is also a product of the inability of group members to listen well (Collins & Guetzkow, 1964). Another problem is when group members do not have the interpersonal skills required to carry on a discussion. Groups fail more frequently than they succeed at solving problems due to their lack of necessary interpersonal skills (DiSalvo, et al. 1989).

The Johari window was a helpful framework for discussing interpersonal styles (Luft, 1961). The Johari Window carried the assumption that although information is held by oneself and others, no one fully knows that information. The combinations of knowing and not knowing are shown in Figure 8.

There are four possible combinations of information known to the self and others: arena, blind spot, façade, and unknown. The arena is the area most conducive to effective interpersonal communication. In the arena, both the sender and the receiver know all of the information needed to communicate. When parties share identical feelings, data, assumptions, and skills, they are in the arena area. The larger this area is, the more effective the communication will be.

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Feedback

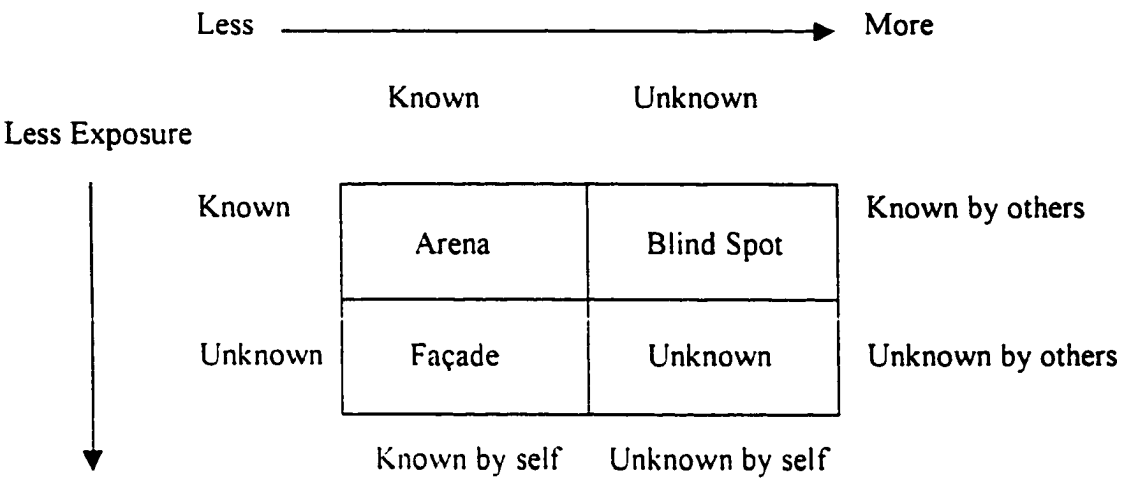

Figure 8. Johari Window (Luft, 1961).

The blind spot is the area that results when others know relevant information, but not the self. This limits the self, because one cannot understand the behavior and communication of others without sharing the same information. Others know how they are feeling, reacting, and thinking, while the self is unaware of them. The result is ineffective communication.

The façade is the area that results when the self knows information, but not to others. Information that the self perceives as being possibly damaging to a relationship or that the self keeps private out of fear, desire for power, or other reasons makes up the façade.

The façade, similar to the blind spot, reduces the area of the arena and leads to a reduction in effective communication. The area consisting of information that is unknown to both parties is the unknown. We don't understand them and they don't understand us. Interpersonal communication in this area is particularly poor.

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Gibson et al. (1997) outlined two ways that interpersonal communication can be improved based on the Johari Window: exposure and feedback. Exposure is the reduction of the façade area and feedback that reduces the blind spot area. Exposure increases the arena area when the sender increases the amount of information available to the receiver. It requires that the sender expose feelings to the receiver.

Feedback increases the arena area when the receiver increases the amount of information available to the sender. The sender's blind spot can be reduced when the receiver provides effective feedback about the sender. Securing feedback is dependent on the cooperation of others. Exposure requires the active behavior of the sender and the passive listening of the receiver.

Research indicated that when a group is cooperative, relevant information is communicated openly, truthfully, and accurately. Conversely, competitive groups led to intentional miscommunication in an effort to mislead group members and extract information from unwilling group members. In cooperative groups each group member values informing as well as being informed by others. In competitive groups, group members only value informing themselves (Johnson & Johnson 1991a).

Gibb (1961) suggested that defensive behavior correlated positively with ineffective communication. As people's competitiveness decreases, communication effectiveness increases. Competitiveness in one group member will increase competition throughout the group. The climate of defensiveness makes it very difficult to communicate clearly and accurately (Johnson & Johnson, 1991a).

Gibb (1961) identified a number of behaviors that either increased or reduced group defensiveness. Evaluative comments increase defensiveness, but descriptive comments

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decrease defensiveness. If a group member sounds like they are evaluating another group member, the group will increase in defensiveness. If a group member describes something, the group will decrease in defensiveness.

Gibb (1961) found the following behaviors increased group defensiveness: evaluation, control, strategy or plotting, neutrality, superiority, and certainty. The behaviors found to reduce group defensiveness were description, problem orientation, spontaneity, empathy, equality, and provisionalism.

Group communication and group work are complex matters, even in proximate contexts. The complexity of group communication and group work increases significantly when the groups are non-proximate and rely on technology as the primary means of communication and work collaboration. McGrath and Hollingshead (1994) categorized electronic systems into four major systems depending on the role technology played in group communication and collaboration: systems for intragroup communication, systems for communication with information bases, systems for external communication, and systems for structuring group task performance, see Figure 9.

Systems for intragroup communication refer to electronic systems that allow each member of a collaborative work group to communicate with the other members of the group. Such systems would include electronic mail, telephone, asynchronous and synchronous computer-mediated communication. Asynchronous and synchronous both refer to time. Asynchronous computer-mediated communication does not occur simultaneously in real time; synchronous computer-mediated communication does.

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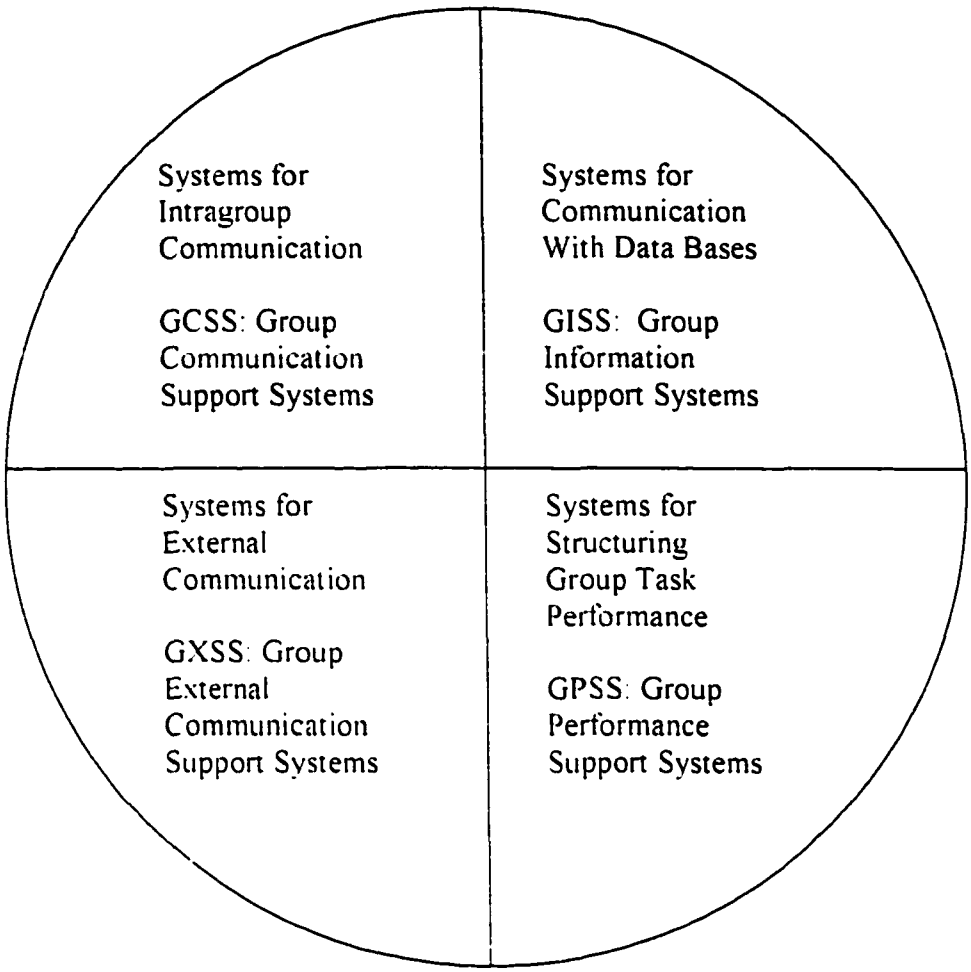

Figure 9. Four Types of Electronic Work Teams (McGrath & Hollingshead, 1994).

Systems for communication with information bases refer to electronic systems that allow each member of a collaborative work group to connect to a number of databases outside their group. Each group member can send and receive messages from extragroup information databases.

Systems for external communication refer to electronic systems that allow each member of the collaborative work group to communicate with individuals outside their current work group. Each group member can send and receive messages from extragroup individuals.

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Systems for structuring group task performance refer to electronic systems that allow each member of the collaborative work group to receive task information and perform tasks. Each group member needs to be in two-way communication with relevant tasks. Electronic systems that support this function of channeling, or modifying the group's work performance, include tools that structure the form of tasks presented to the group and the group's responses (McGrath & Hollingshead, 1994).

Based on the research question, the literature study focused on communication systems for intragroup communication. The primary interest of the study was the impact of collaboration in virtual work environments on groups. While communication systems for communication with data bases, external communication, and structuring group task performance are all related to the impact of technology on groups, the most immediate effect on a group is the effect of technology on its intragroup communication. Further, the study focused on a comparison between teams collaborating in virtual and traditional work environments. The communication system for intragroup communication has the strongest correlation with intragroup communication in traditional teams. The intragroup communication system provided the greatest contrast between virtual and traditional teams.

Collective electronic systems that facilitate communication within work groups have been called many things. The most common labels have been group communication support systems, GCSS, and electronic meeting systems (DeSanctis & Gallupe, 1987). Group communication support systems have positive and negative features. Positively, some forms of electronic communications allow group members to functionally meet although space and time separate them. Negatively, electronic communications reduce

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the number of channels available to group members for communication. Some communication channels such as auditory, visual, nonverbal, and so on, are excluded. The amount of that limitation depends on the group communication support system utilized (McGrath & Hollingshead, 1994). The significance of the reduction of communication channels with group communication support systems depends on the work group task and activities (McGrath & Hollingshead, 1993).

McGrath and Hollingshead (1993) outlined six types of group communication support systems. Figure 10 displays the GCSS types according to their primary characteristics. The non-technologically enhanced, regular face-to-face meeting is also included in Figure 10 to better contextualize GCSS.

The group communication support systems outlined in Figure 10 are organized around two axes. The first axis is the limitations and opportunities of each related to the spatial and temporal placement of group members whether they are distal, proximate, synchronous, asynchronous, or continuous. The second axis is the channels of communication modalities each include, or exclude, for group communication among group members

Unlike face-to-face group communication systems, all group communication support systems allow group members to be geographically scattered while they are communicating (McGrath & Hollingshead, 1994):

1. Three group communication support systems allow group members to communicate in different time periods, asynchronous, and three limit group members to communicate in real time like face-to-face meetings, synchronous.

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2. Two of the group communication support systems in Figure 10 permit both visual and auditory communication channels. Two types of group communication support systems only permit auditory communication channels without text or graphics.

3. The remaining two types of group communication support systems are limited to only text and graphics.

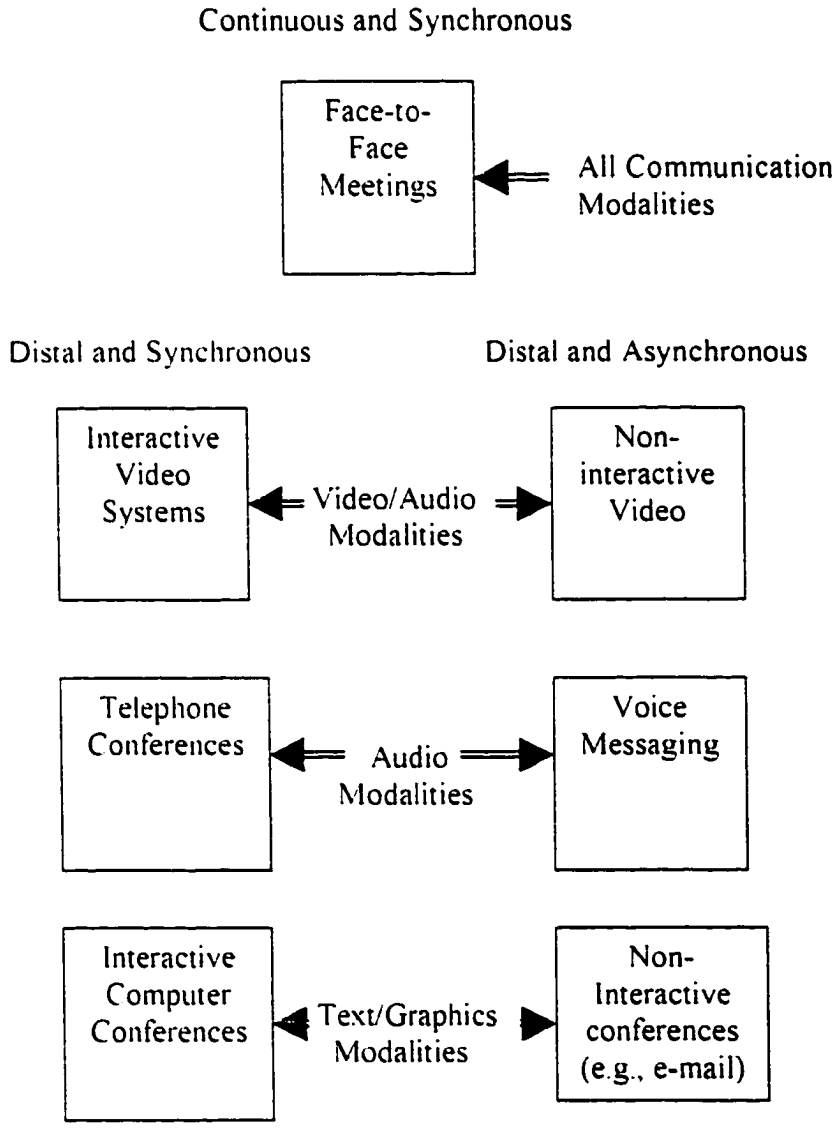

Figure 10 Six Types of Group Communication Support Systems, GCSS (McGrath & Hollingshead, 1993).

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There are three types of synchronous video systems, video walls, video-conferencing, and videophones, which allow for both auditory and visual communication channels. These allow group members to be scattered, but limit the group members to communicate in real time (McGrath & Hollingshead, 1994). The synchronous video systems have not been as effective as they were initially hoped to be (Egido, 1990).

All synchronous video systems are limited to synchronous communication, all parties communicating at the same time although in scattered geographic locations. This results in two time issues. First, the synchronous video communication systems are visually rich, but they do not carry as much nonverbal communication as face-to-face communications do. The lack of nonverbal communication interferes with the timing of transitions between communicators (Abel, 1990). Second, if the communicators are at a great distance from each other, there are time lags in the transmission and feedback. These time lags are different for visual and auditory channels, making the visual images and verbal communications out of synch. Although electronic communication is fast, it is not instantaneous. Human interaction is affected when there are intervals, or gaps, of 100 milliseconds or more (McGrath & Hollingshead, 1994).

Synchronous group communication support systems are very familiar. The simplest example is a phone call between two individuals. Williams (1977) conducted considerable research with these communication systems. Synchronous group communication support systems are restricted to the auditory channel of communication. All the cues present with visual contact are lost. Nonverbal cues and information in text or graphic form are lost. However, paraverbal channels of communication and speech characteristics are retained. Like synchronous video systems, time is a limitation. The

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lack of nonverbal communication interferes with transitions between communicators. It is difficult to tell when a communicator is finished. There can also be significant time lags, if a great distance separates the parties. These lags can be much more than the 100 milliseconds that affect human communication (McGrath & Hollingshead, 1994).

Synchronous computer conference group communication support systems only allow communication between group members through a computer. Interaction is limited to text and graphics. This group communication support system limits all the communication channels described for video systems and telephone conferences, with additional communication channel limitations. Presently, synchronous computer-mediated conferences eliminate all nontext visual and auditory communication channels. It also eliminates the critical nonverbal and paraverbal communication channels necessary to help regulate the flow of communication, who speaks next and for how long, and to allow group members to express emotion and subtle nuances. This results in a confused communication process (McGrath & Hollingshead, 1994).

It is possible to compensate for the loss of paraverbal communication with the use of some writing techniques. Longer and more complete sentences, jargon, punctuation, symbols, and redundancy can add some paraverbal communication to synchronous computer-mediated conferences. Emoticons are special symbols have been designed to represent paraverbal cues; however, all these writing techniques do not compare well with what people can communicate with the nonsemantic elements of speech (McGrath & Hollingshead, 1994).

McGrath and Hollingshead (1994) described four time-related differences between synchronous computer-mediated conferences and face-to-face conferences;

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1. Typing is much slower than speaking, even for experienced typists.

2. Reading is faster than listening. The speed differential is related to the type of material, the skills of the parties involved, the rate of speech, and the degree of interference from other communication channels.

3. Editing slows the synchronous computer-mediated conference communication process. In speech, editing occurs simultaneously as the message is coded.

4. Synchronous computer-mediated conferences feature simultaneous messages. More than one group member is encoding messages and sending them at once. Face-to-face meetings only allow one communicator at a time (McGrath, 1990).

This feature of face-to-face conferences results in more production blocking with more competition to gain the floor. Computer conferences are faster because they allow for less production blocking through simultaneous communication (Lamm, et al. 1973).

As the group size increases, the advantage of simultaneous communication is off-set by the jumbled sequence of messages, the increased reading load, and time delays in transmission. There may be a limit to the number of parties who should be involved in a synchronous computer-mediated conference in order to capitalize on the advantage of simultaneous communication (McGrath & Hollingshead, 1994).

In face-to-face conferences all group members receive messages in the same order. The group becomes entrained to each other allowing for a smooth and linear flow of communication (Kelly, et al. 1990; McGrath, et al. 1986). In synchronous computer-mediated conferences, where group members are scattered geographically and chronologically, this entraining process is affected. The message order, the linear flow of communication, and the amount of time necessary for communication are effected. In

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asynchronous computer conferences, group members receive and respond to messages in different sequences resulting in a jumbled flow of communication (McGrath & Hollingshead, 1994).

The most common form of asynchronous group communication support system is voice messaging. Voice messaging can involve elaborate technology (Rice, et al. 1990a). Electronic bulletin boards and electronic mail are also common examples of asynchronous computer group communication support systems. Like telephone conferences, asynchronous group communication support systems depend on the auditory communication channel with the same advantages and disadvantages of telephone conferences. Asynchronous group communication support systems differ primarily in their lack of interactivity. Unlike telephone conferences, voice messaging does not happen in real time. The lack of real time interaction can complicate communication as the sequence of messages gets interrupted. This lack of logical sequence increases as the number of parties involved in the voice messaging increases. An advantage of voice messaging is its ability to communicate with the paraverbal communication channel. Voice messaging allows the expression of emotion with its subtle meanings (McGrath & Hollingshead, 1994).

Asynchronous types of group communication support systems use video technology in such a way that synchronous, or immediate, interaction is possible. Examples would be the use of videotapes, compact disks, and laser disks that are made by a communicator for a specific receiver. The receiver can then view the message at a convenient time.

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To illustrate the disrupted message sequence, flow of communication, and time required with asynchronous computer conferences, imagine that Members 1 and 2 begin a communication process sending messages to the group at different times. Member 3 reads the message and responds to Members 1 and 2. Member 2 responds to member 3. Member 4 eventually reads the messages, but has entered late into the communication process and asks questions of clarification. Meanwhile, Member 1 wants to move in a different direction and Members 2 and 3 move forward in another.

There is no feedback in asynchronous computer communication processes. The sender is not sure the message has been received or acknowledged. There is no direct way for the sender to know that a particular receiver has received their message. Time is also a factor with asynchronous computer communication. It takes more time to type text and edit it than to speak (McGrath & Hollingshead, 1994).

Synchronous computer communication processes usually have a small closed set of participants. The smaller group size allows the group members greater certainty that their messages are received more or less immediately. When a group member does not respond, the group can assume that it is intentional and interpret that silence. In face-to-face meetings, silence is also interpreted and confirmed through head nods, smiles, and similar behavior. Asynchronous computer conferences frequently involve large open sets of members. Not all the members know each other. In this context, silence is impossible to interpret. The sender cannot be sure that potential receivers have read and understood the message within a short period of time. As a result, ambiguity is a feature of asynchronous computer conferences, because the sender cannot be sure that silence in

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response to their message reflects the member's volition (McGrath & Hollingshead, 1994).

The motivation to connect technology to work groups was been undergirded by three assumptions. First, technology will help improve the task performance of work groups. Technologically advanced systems can be utilized to overcome process losses by changing task processes. Second, technology will help work groups overcome barriers of time and space. Technology can change the spatial and temporal definitions of work groups. Group members do not need to be in the same place at the same time in order to meet. Technology can create groups that were not previously possible. Third, technology will help improve the performance of work groups by giving them greater access to information. Computers can increase the amount and quality of information that group members or groups have access to. Computers also accelerate the speed and power with which this information can be processed, recalled, and used (McGrath & Hollingshead, 1994).

The research questions obliquely addressed the three assumptions. Are teams collaborating in virtual work environments more effective? Can the barriers of time and space be overcome? Does the presence of increased information increase effectiveness?

Not much work has been done on the effects of technological systems on groups. A number of questions arise. What is the effect of spatial and temporal changes on work groups? What is the effect of communication restrictions that are a part of these technological systems? What are the long-term effects dispersed groups will have on the organizations they are a part of?

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Four research groups have focused on the effect of technological systems on group communication. Hiltz and Turoff (1978) initiated the study of group communication through computers with some of the first empirical work in the field. Their seminal work on the impact of technology on groups has provided a template for subsequent researchers. Hiltz and Turoff proposed several potential positive and negative aspects of computer conferencing.

The suggested positive effects include overcoming spatial and temporal limitations to the formation of groups, convenient additions of group members without decreasing the participation of existing group members thereby increasing the flexibility of group size, the ability of group members to be anonymous, and increased access to information.

Hiltz and Turoff also predicted some disadvantages. Increased information can lead to problems of overload and exegesis. Increased information capacity raises questions for groups related to control, access, and regulation. Who regulates and controls the information and its impact on the communication process (McGrath & Hollingshead, 1994)?

Hiltz and Turoff initiated discussion related to the social and psychological differences between face-to-face meetings and computer-mediated interaction. Computer-mediated interaction has a much more restricted band of available communication channels. Paraverbal and nonverbal channels are not present. Occasionally this reduction in communication bandwidth may allow information to be communicated more accurately, allowing for increased rationality of a group and better decisions. Computer-mediated communication will have less noise and distraction than is sometimes present with nonverbal and paraverbal communication. Other contexts will demand a wider

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communication band, a band that includes both nonverbal and paraverbal communication. Such computer-mediated contexts will need supplemental communication media (McGrath & Hollingshead, 1994).

Hiltz and Turoff recognized that computer mediation would lead to new systems of procedures and communication process norms. Unlike face-to-face meetings when only one person can speak at a time, synchronous computer-mediated meetings facilitate simultaneous conversation. The norms used to avoid chaos in face-to-face interaction will need some modification of procedure to produce the same smooth conversation flow present in face-to-face meetings. Hiltz and Turoff suggested that future users of computer-mediated communication would develop those new norms and procedures (McGrath & Hollingshead, 1994).

Hiltz, Turoff and Johnson (1986, 1991) described the effect of computer mediation on decision making processes. They forecasted that the issue of group conformity would be an important dysfunctional feature of computer mediation. The majority, either intentionally, or unintentionally, will exert pressure on the minority to conform to their views.

They also forecast that computer-mediated groups would be more egalitarian and participatory than face-to-face meetings (Hiltz & Johnson, 1990). Computer-mediated groups would be more egalitarian due to the absence of status symbols among group members. Status symbols are more invisible in computer mediation. This would also result in groups being more responsive to information than to social pressure in decision making. The change in status would also result in a change of influence in computer mediation. Influence among group members will be more linked to intelligence and

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problem-solving ability than in face-to-face meetings. This change in status protocol would increase in effect as the size of the group increased.

Nunamaker, at the University of Arizona, built a research group in order to develop a general framework to study electronically-mediated systems, EMS. They developed a conceptual model for electronic support systems and their effects on work groups (McGrath & Hollingshead, 1994). The Arizona group suggested that electronic support systems be called *electronic meeting systems* or EMS (Dennis, et al. 1988). An EMS is an information technology-based environment that supports group meetings, which may be distributed geographically and temporally Distributed facilities, databases, facilitators, methodologies, procedures, audio and video technology, and computer hardware and software can be elements of that environment. Groups in an EMS environment could be involved in conflict resolution, collaborative activities, problem solving, communication, and other activities.

Electronic meeting systems have three related facets: group processes and outcomes, methods, and environment. Group processes and outcomes include the characteristics of the group, the characteristics of the task, the organizational context, the process which the group uses the system, and the outcomes.

The methods and environment facets depend on the features of the specific EMS system being studied. The method facet refers to the software support of the system and its rules and procedures. Three key issues in the method facet are whether the EMS system requires or allows a facilitator, whether group processing is parallel or sequential, and whether the EMS system allows single or numerous group meetings.

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The environment facet describes the hardware and software of the EMS. Two elements are highlighted: proximate or nonproximate group members and synchronous or asynchronous group usage (McGrath & Hollingshead, 1994).

Nunamaker, Dennis, Valacich, Vogel and George (1991) built on the work of Steiner (1972) and suggested four ways EMS could further process gains. Process losses are group performance inefficiencies, e.g., group discussion unrelated to the group task. These are demonstrated when a group falls short of researcher forecasts for what the individual efforts and skills of the group members are when compared with the efforts and skills for the combined group.

EMS can limit process losses by increasing process productivity through process structure, process support, outcome structure, and outcome support:

1. EMS can force a process structure that directs the pattern, pace, and content of interaction.

2. EMS can provide increased process support through the provision of new electronic communication channels.

3. EMS can support outcome structure by supplying a structured method for task analysis.

4. EMS can further support outcome by providing supporting information and computation.

It should be noted that these four avenues of process gain could also lead to process loss (McGrath & Hollingshead, 1994).

Poole, DeSanctis, and their colleagues at the University of Minnesota developed a microlevel theory of group processes called Adaptive Structuration Theory, AST

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(McGrath & Hollingshead, 1994). Adaptive Structuration Theory emphasizes the role of group interaction processes in determining group outcomes in adjusting to the effects of a given technology. Any electronic meeting system presents a format of rules and procedures to a group. Groups are not passive in their reception to these electronic formats and procedures. The group will attempt to restructure the technology to engage with the group's existing interaction system. A technology then becomes a set of social practices that emerge and develop over time (Poole & DeSanctis, 1990).

A group's structure is understood to be dynamic. It is not a permanent set of relations between group members and their task. A group's structure is the pattern of group activities that evolve in a continuous process, as the group uses available resources and reproduces new homeostatic systems. This continuing process of evolution and resulting homeostasis is called adaptive structuration (Poole & DeSanctis, 1990).

The processes that a group uses to select, shape, and explain the features of an electronic meeting system are termed appropriation. Appropriation allows groups to use new technology. Appropriation is not passive, groups are active in their adaptation of the formats implicit in electronic meeting systems to their context. As a result, both social and electronic systems need examination (Poole & DeSanctis, 1989).

Studies involving the interaction of social and electronic systems in the appropriation process must consider three questions. First, what is the nature of the imported technology? What rules, formats, resources, and protocols does it bring? Second, what is the nature of the group? What are the structures, rules, and resources of the group and the influence of those factors on the evolution of new structures? Third, what is the nature of the group restructuring process? How do group members

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appropriate and adapt structures from the new imported electronic system and their previous experience (McGrath & Hollingshead, 1994)?

Kiesler and Sproull, at Carnegie Mellon University, conducted research in the area of the social psychological effects of computer-mediated communication (McGrath & Hollingshead, 1994). They studied the effect of computer mediation on group participation of group members; the types of contributions of group members, e.g., task and social, emotional, and nonemotional; user responses to computer-mediated resources; and user satisfaction related to user experience and context (Kiesler, et al. 1984; Kiesler, et al. 1985; Sproull & Kiesler, 1986).

Like Hiltz and Turoff, Kiesler and her colleagues recognized that electronic communication systems have advantages and disadvantages (McGrath & Hollingshead, 1994). Electronic communication systems have great potential to support and further collaborative work. Electronic systems allow collaborative work groups to have greater access to information, make new configurations of physically scattered people possible, facilitate the development of collaborative computer-mediated work groups, and allow new forms of asynchronous communication interaction. These electronic communication systems also eliminate nonverbal and paraverbal communication channels. The loss of these communication channels has positive and negative effects on task outcomes, user response, and the interaction process (Kiesler & Sproull, 1992; Sproull & Kiesler, 1991).

Kiesler and Sproull (Kiesler & Sproull, 1992; Sproull & Kiesler, 1991) maintained that computer-mediated communication depersonalizes the communication process. As a result, group members lose mental sight of the people with whom they are communicating. Group members lose any visual image of the audience that they would

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normally have in face-to-face interactions. In addition to the loss of mental sight, computer-mediated groups lose the usual signals related to feedback, the impact of their communication and the status symbols of their audience. As a result, group members concentrate more on the messages and less on the people involved in communication.

Kiesler and Sproull (Kiesler & Sproull, 1992; Sproull & Kiesler, 1991) also asserted that messages in computer-mediated work groups are more fleeting than face-to-face messages even though they are recorded in text form in computer systems. This leads individuals to be less vested in what they communicate. They are less committed to their messages, less concerned about them, and less concerned about the group's response. This effects the communication pattern of computer-mediated work groups. Individuals feel more anonymous and read less individuality into the communication of their group members Participation is more equal, because the low status group members are less inhibited Group members focus more on the task and less on the personal and social elements of interaction, because the context is depersonalized. Group members are more willing to send negative and more uninhibited messages, because they are less constrained by the social norms present with face-to-face communication. Group members will have increased difficulty in arriving at group consensus because of reduced feedback and reduced concern for social norms (McGrath & Hollingshead, 1994).

Kiesler and Sproull (Kiesler & Sproull, 1992; Sproull & Kiesler, 1991)have demonstrated that computer-mediated groups have more distributed participation, more negative and uninhibited comments, and more task focus in several empirical studies. Their solid findings give strong support to their hypotheses (McGrath & Hollingshead, 1994).

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Kiesler and Sproull (Kiesler & Sproull, 1992; Sproull & Kiesler, 1991) pointed out that organizations have no norms to govern behavior and processes in computer-mediated work groups. Organizations have launched computer-mediated work groups without thinking through the psychological ramifications. Unless organizations are proactive, they will find themselves more on the negative side of electronic communication than the positive.

Kiesler and Sproull (Kiesler & Sproull, 1992; Sproull & Kiesler, 1991) maintained that even if organizations do this necessary proactive work, they must realize that electronic communication is not the best medium for work groups in every instance. They suggest that face-to-face communication be used for agendas that are complex and involve substantial negotiation. A good balance for many work groups would be to rely on both electronic and face-to-face communication depending on the work context (McGrath & Hollingshead, 1994).

Researchers from Bell Communications Research and the University of Arizona, have studied the effect of computer-mediated collaborative work on intellectually demanding tasks, e.g., scientific writing (McGrath & Hollingshead, 1994). The researchers emphasized the importance of short, unplanned, unstructured interaction in building successful collaboration (Kraut, et al. 1992). Informal interactions were most important in the early phases of collaboration, but continue to be valuable in the planning, execution, and closure phases of collaborative tasks (Kraut, et al. 1990). They pointed out that most scientific collaborations start after casual communication partners conclude a series of unplanned and serendipitous interactions. The collaboration is not intentionally structured as a part of preplanned structured interactions with predetermined

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communication partners; however, most computer-mediated groups are based on the formal communication process. For scientific collaboration, there must be a means of informal electronic communication to support the normative informal pattern of scientific collaboration. The researchers suggested that technologies be developed that encourage spontaneous interaction, like e-mail, and that contexts be developed that allow for both face-to-face and electronic communication among potential collaborators (Kraut, et al. 1990).

Anacona and her colleagues at MIT suggested a relationship between how groups manage their external relationships and their group success. External relational processes were found to be as important to group success as internal group processes. External relational processes deal with communication between group members and group units and with people and units outside the group in the hosting organization or its environment. They demonstrated the improbability of groups being isolated from their larger organization and environment. The resources of both their environment and organization are necessary for groups to be successful. As a result, computer-mediated work groups must not only coordinate interaction and activity within itself, but also with its embedding organization and environment. Important aspects of those necessary external relations are negotiation, information exchange, management, buffering, and others (Ancona, 1999; Ancona & Caldwell, 1988).

External relations management involves strategies of initiating interaction with individuals outside the group to import, or export, data and resources. External relations strategies also include responding to the initiation of individuals outside the group and strategies for defining who is in the group (Ancona, 1999; Ancona & Caldwell, 1988).

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Each of these three strategies has specific actions, or roles (Ancona, 1999; Ancona & Caldwell, 1988):

1. Scouts gather information and resources and are ambassadors who open communication channels with people and units outside the group are needed for the strategy of initiating interaction.

2. Sentries monitor and evaluate imported information and guard who monitors exported information are necessary for the strategy of responding to initiation from individuals or units outside the group.

3. Immigrants are individuals outside the group who are induced to voluntarily join the group.

4. Captives are people assigned to the group.

5. Emigrants are group members who leave the group and are needed for the strategy of determining who is in, and not in, the group (McGrath & Hollingshead, 1994).

Bikson, Gutek, and Eveland (Bikson & Eveland, 1990a, 1990b; Bikson, et al. 1987) with the Rand Corporation and Claremont Graduate School have studied the use of computer technology, particularly asynchronous computer usage. They suggested a technology transfer model and have focussed their study on the importance of implementation of technology.

They maintained that much of technology's impact on organizations and groups is not a result of the technology itself, but rather from the changed organizational and group policies and practices that constitute the context for the implementation of new technology. The change in organizations and groups result not from the technology, but instead from evolving organizational and group policies and practices. Groups adapt

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electronic systems as they use them. It is in the utilization of electronic systems that the implications, meaning, and consequences are discovered (Bikson & Eveland, 1990a, 1990b; Bikson, et al. 1987).

Connie Gersick at the University of California, Los Angeles (Gersick, 1988, 1989) studied computer-mediated work groups that were focused on a large single project for a limited period of time. McGrath (McGrath, 1984) described groups of this nature task forces, a group with predetermined deadlines to accomplish large tasks.

Gersick proposed that task force work groups conducted their work with five temporally ordered segments: three short but critical transition segments followed by two longer and less turbulent segments. Gersick identified this pattern as a punctuated equilibrium. These five segments were defined not in terms of what they accomplish but instead by the amount of time involved (Gersick, 1988, 1989):

1. The initial start-up segment contains a thoughtless adoption of purpose, goals, and plans for the task.

2. A period of work time follows using those thoughtless goals and plans.

3. At the mid-point, there is a complete reconsideration, and frequently a drastic remodification, of the previous thoughtless goals and plans.

4. This is followed by another period of work with the new goals and plans.

5. The group concludes with the group finishing its task and existence.

The pattern is identified as a punctuated equilibrium due to the mid-point remodification between the initial three segments and the final two (McGrath & Hollingshead, 1994).

Gersick's work (Gersick, 1988, 1989) did not focus on technology and groups, but her work was illuminating regarding the temporal processes of groups. A key feature of

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computer-mediated work is its freedom from temporal restraints. Gersick's work demonstrated that there are some temporal variables that are continuous between computer-mediated and non-computer-mediated work groups.

Short, Williams, and Christie (1976) began their research before computer use was common. Their earliest work on technological systems focused on telephone, video, and teletype. They relied on Reid's work (1971) with telecommunications building a social presence model that preceded the work of Daft and Lengel (1984) on information richness, the Kiesler group (Kiesler, et al. 1984) on matching communication medium to task, and McGrath's work taxomomy (McGrath & Hollingshead, 1994). See Figure 3.

Williams et al. (1976) suggested a social presence model to forecast the communication medium that individuals would prefer to use for different types of interaction. Their term *social presence* referred to the degree of salience of the other person in the interaction. Social presence was regarded as a characteristic quality of any communication medium. Media differs in its degree of social presence. People are aware of those differences and people use those criteria to determine which communication medium they will use in any specific circumstance Individuals will avoid a specific communication medium if they perceive that its social presence is not high enough to support their desired interaction. Communication mediums that are low in social presence will be higher in their task orientation than face-to-face communication (McGrath & Hollingshead, 1994).

Daft and his colleagues at Texas A & M (Daft & Lengel, 1984, 1986; Daft, et al. 1987) have made valuable contributions in the area of information processing and communication media (McGrath & Hollingshead, 1994). They suggested that

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information is not only ambiguous and uncertain, but is also divergent or equivocal. They build on a concept of information richness, analyze the degree of information richness of various tasks and communication media within organizations, and propose the importance of a good match between communication media and tasks (Daft & Lengel, 1984, 1986; Daft, et al. 1987). See Figure 4.

According to Daft and his associates (Daft & Lengel, 1984, 1986; Daft, et al. 1987), a context is uncertain or ambiguous when groups or individuals are not given all the available information. A context is equivocal when groups or an individual has access to all the available information, but there is more than one meaning. In this context, additional information will not lead to a single interpretation because there is no definitive information available.

Daft and Lengel (Daft & Lengel, 1984, 1986; Daft, et al. 1987) suggested that communication structures can be designed to reduce this equivocality, or diversity, dependent on the organizational context. They suggested that different forms of communication, e.g., written memos, voice mail, e-mail, all have different degrees of information richness. Those communication mediums that were information rich would reduce equivocality not just uncertainty.

Seven communication mediums were ordered along a continuum according to their information richness and corresponding ability to diminish equivocality. These seven communication mediums were: group meetings, integrators, direct person-to-person contact, planning, special reports, formal information systems, and rules and policy. Daft and Lengel (Daft & Lengel, 1984, 1986; Daft, et al. 1987) proposed that managers would want to match communication methods with their corresponding degree of information

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richness to deal with situations of varying degrees of equivocality. The central feature of their work was the concept of information richness. The more equivocal a situation was, the richer the information needed to be to address it (McGrath & Hollingshead, 1994).

Information richness corresponded well with what the work of Williams (1977), Kiesler (Kiesler, et al. 1984), and McGrath and Hollingshead (1994) had described as social cues, social presence, feedback, and mental sight. Kiesler came to different conclusions than Daft. While they both recognize the difference in information richness between communication mediums, Kiesler proposed that this lack of social presence results in depersonalization of communication and leads to more equal participation, more negative and uninhibited interaction, and more barriers to reaching group consensus. This does not agree with the effects of leaner information richness that Daft and Lengel predict (McGrath & Hollingshead, 1994).

Fulk, Schmitz, and Stenfield at the University of Southern California integrated the work of Daft and Williams focusing on communication media selection (Fulk, et al. 1990; Schmitz & Fulk, 1991). They framed media selection in a social influence model and asserted that social interaction at work shapes shared meanings. Shared meanings determined the basis for shared patterns of media selection.

Instead of relying on the objective criteria for information richness characteristic of Daft and Lengel, Schmitz and Fulk identified the importance of the subjective assessment of individual perception related to information richness. Objective determinations of information richness do not influence individual perceptions of media richness. Other sources of influence for individual perception could be previous computer and communication media experience and keyboard skills.

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Social influence theory suggested that media perceptions and use are subject to a number of factors. Some of those factors are: social influence, subjective rationalization, retrospective rationalization, a lack of concern for efficiency, and a desire to promote, or create ambiguity (McGrath & Hollingshead, 1994).

Rice (Rice, 1989; Rice & Shook, 1990b), working out of the University of Southern California and Rutgers University stressed the shift that electronic communication in groups had on the conceptualization of the communication process (McGrath & Hollingshead, 1994). Conceptualization of communication processes changed from being linear to a network. Emphasis is on the analysis of the communication relationship and pattern instead of an emphasis on the message.

Rice (Rice, 1989; Rice & Shook, 1990b) proposed that computer-mediated communication systems could be more efficient than face-to-face communication. Computer-mediated communication allows for new structures, fewer constraints, and more possibilities than face-to-face communication. Computer-mediated communication can change communication patterns to facilitate efficiency and can change the space, time, and social constraints that limit face-to-face communication (Rice, 1989). Rice tends to be overly optimistic and does not address the disadvantages of electronic communication (McGrath & Hollingshead, 1994).

At the University of Utah, Hesse, Werner, and Altman (1988) used a transactional analysis of the temporal aspects of electronic communication. The transactional view regards communication patterns, holistically with temporal property characteristics. The temporal nature of computer-mediated communication allows events in that communications process to vary (McGrath & Hollingshead, 1994).

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Hess et al. (1990) asserted that time functions in both linear and cyclical patterns. These patterns contain events that are characterized by the temporal properties of scale, sequencing, pace, and salience:

1. Temporal scale describes the continuum of communication ranging from seconds to very long-term patterns. Synchronous computer communication has a lower temporal scale than face-to-face communication because of the limitation that keyboarding places on the exchange of information.

2. Sequence describes the sequence of communication. Computer mediation can disrupt communication sequence, which decreases predictability, user satisfaction, and increases personal conflict.

3. Pace describes the rate of communication. Computer-mediated communication takes longer to generate messages due to keyboarding, but transmission is faster, because reading is faster than listening.

4. Salience describes whether the communication is oriented to the past, present, or future.

Hess et al. 1988) suspected that computer-mediated communication was more present-oriented because of the lack of social presence of the participants. The relationship, past and future, is less salient, because the persons are not physically present in computer-mediated communication.

Arunachalam (1995) conducted a laboratory experiment examining the effects of communication channels and interaction on the outcomes of group negotiations. Arunchalam looked at two levels of communication channels, synchronous computer conferences and face-to-face conferences. Two levels of interaction were examined, no

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formal structure and a modified Nominal Group Technique (McGrath & Hollingshead, 1994).

The results indicated that computer-mediated groups and unstructured groups had lower negotiation outcomes than face-to-face groups. The computer-mediated groups distributed their resources more unequally, deviated more from the integrative agreement, and held more inaccurate perceptions of interactions than the face-to-face groups. The computer-mediated groups were more competitive and developed coalitions more quickly than the face-to-face groups. Computer-mediated groups took more time to reach agreement than the face-to-face groups.

Daly (1993) conducted a study comparing groups working face-to-face with computer-mediated groups on an intellective task. Half of the groups communicated face-to-face and half of the groups communicated through a computer network. There were thirty-two four-person groups in each condition (McGrath & Hollingshead, 1994).

The results demonstrated that although both groups made the same number of correct decisions, the computer-mediated groups made more errors, the computer-mediated groups took longer to complete the task, and participation was more distributed in the computer-mediated groups. Face-to-face groups had more comments and were more positive about the task and the interaction than the computer-mediated groups. Members of the face-to-face groups had less anxiety than the members of computer-mediated groups.

Dubrovsky, Kiesler, and Sethna (1991) conducted a laboratory experiment to examine the effects of electronic mail on the decisions of groups whose members had different social status. When the groups made decisions in face-to-face contexts, the high

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status group member dominated the discussion and influenced decisions. When the same groups interacted through electronic mail, status differences were diminished and the participation was more distributed. The comments were freer and less inhibited when the groups worked through electronic mail than when they worked face-to-face (McGrath & Hollingshead, 1994).

Eveland and Bikson (1989) conducted a field experiment comparing two task forces. One task force was restricted to asynchronous computer conferences, the other had no communication restrictions The results demonstrated that the computer-mediated task force had more distributed participation, more rotating leadership, and higher satisfaction than the standard task force The standard task force had few participants who contributed regularly, had more centralization, and had more stable leadership (McGrath & Hollingshead, 1994).

Hollingshead (1993) conducted an experiment examining the effects of communication media, group decisions, and access to information for individuals on the quality of group decisions. The communication media was varied between face-to-face and synchronous computer conference. The decision task was to choose best versus rank order. The degree of information access during the group decision was no access versus complete information access

Face-to-face groups were more likely to find the best answer. Face-to-face groups had significantly more comments and took a significantly shorter time to reach consensus than the computer-mediated groups. The computer-mediated groups had a higher proportion of conforming influence efforts and a lower proportion of speculation than the face-to-face groups

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Hollingshead, McGrath, and O'Conner (1993) explored the effects of computer-mediated communication and task type on group task performance. For generating and decision making tasks, there was no difference between face-to-face groups and computer-mediated groups. For negotiation and intellective tasks, the face-to-face teams did better than the computer-mediated groups.

Jarvenpaa, Rao, and Huber (1988) conducted an experiment examining the effects of adding computer support for teams working with unstructured, intellective software design problems in face-to-face groups. The teams worked on generating ideas and reaching consensus on the best ideas. One team worked with an electronic blackboard, one with only face-to-face meetings, and one with networked workstations (McGrath & Hollingshead, 1994).

Decision quality was highest for the groups using the electronic blackboard, second for the networked stations, and last for the face-to-face groups. The distribution of participation, perceptions of equal participation, and satisfaction was the same in all three groups. The face-to-face group had the highest degree of communication thoroughness, followed by the electronic blackboard, then the networked workstations. The electronic blackboard had the highest level of group attention.

McGuire, Kiesler, and Siegel (1987) studied the effects of computer-mediation on influence processes in group decisions. The results suggested that computer-mediated discussion contain fewer arguments than face-to-face interaction.

Siegel, Dubrovsky, Kiesler, and McGuire (1986) explored the effect of computer-mediated communication on group behavior. The study reviewed the effectiveness of computer-mediated communication on communication, group member's ability to

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communicate information, opinion and emotion; distribution of participation; interpersonal behavior, overt expressive behavior and conflict; and the development of consensus (McGrath & Hollingshead, 1994).

The results demonstrated that face-to-face groups interacted more in group discussion and took less time to reach consensus than computer-mediated groups. Computer-mediated and face-to-face groups did not differ in the proportion of task related interaction. The computer-mediated groups had more equal distribution of participation and exhibited more uninhibited behavior, i.e., strong and inflammatory expressions. The final decisions for the computer-mediated groups were more different from the group members initial conclusions than the face-to-face groups.

Smith and Vanecek (1988) examined the effects of computer conferencing on group decision making. Sixty-two two-person groups engaged in a complex intellective task through either a simulated conferencing system or in a face-to-face meeting. Computer-mediated groups deviated more from the correct answers, shared less information, found fewer correct reasons to eliminate incorrect options, and considered fewer attributes than the face-to-face groups. Face-to-face groups perceived more freedom to participate and perceived more progress (McGrath & Hollingshead, 1994).

Smith and Vanecek (1990) studied the effect of asynchronous computer conferences on group decision making. Seventeen five-person groups engaged in a complex intellective task. Seven dispersed groups worked on the problem through an asynchronous computer network and ten groups worked face-to-face. Computer-mediated groups shared less of the important information necessary to make the correct decision,

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found fewer correct reasons for avoiding wrong options, and perceived less progress than the face-to-face groups (McGrath & Hollingshead, 1994).

Lipnack and Stamps (1997) parallelled the evolution of human communication with human history. Speech shaped the Nomadic Era and the development of small groups and camps. Writing shaped the Agricultural Age and allowed large-scale hierarchies and cities. Printing shaped the Industrial Age and facilitated the specialized knowledge needed for bureaucracies. Electronic communication is shaping the Network Age and has shrunk the world to a global village.

Each organizational era impacts and builds on the next. New forms of organization do not erase earlier forms, instead, the earlier forms are incorporated into the new (Lipnack & Stamps, 1994). The present Network Age includes and benefits from all the previous forms of organization and communication.

There are six key characteristics in the use of communication media (Lipnack & Stamps, 1997). See Table 8

1. Interactivity determines whether the communication is one-way or two-way.
2. Impact determines how many people can be communicated with.
3. Synchronous and asynchronous describe whether the communication is limited to real time.
4. Speed has to do with the pace of message production.
5. Proximity describes whether the communication is limited geographically.
6. Memory refers to the ability to hold and use a message.

Oral speech is interactive, synchronous, and proximate. Speeches, seminars, and briefings were all one-way forms of communication. Conversation, meetings, and social

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events are two-way forms of communication. Oral media is limited to contexts that are proximate. Speech carries little memory and is slow. The message cannot be physically stored and reproduced. The speed of the message is dependent on the speaker.

Table 8

Historical Progression of Media (Lipnack & Stamps, 1997)

Characteristics	Oral	Written	Printed	Analog	Digital
Interaction					
Space	Collocated	Distributed	Distributed	Distributed	Distributed
Time	Synch	Async	Async	Sync/Async	Sync/Async
Size	Small	Small	Mass	Unlimited	Unlimited
Speed					
Produce	Speaking	Writing	Write/Print	Real-Time	Variable
Deliver	Sound	Transport	Transport	Electronic	Electronic
Receive	Hearing	Reading	Reading	Real-Time	Variable
Delay	None	Some	Lots	None	None
Memory					
Store	None	Integral	Integral	Integral	Integral
Recall	None	Limited	Limited	Limited	Integral
Modify	None	Limited	Limited	Limited	Unlimited
Reprocess	Separate	Separate	Separate	Separate	Integral

Written media represented a significant improvement in communication. It allowed communication to be both nonproximate and asynchronous. People could be in different places and different times in the communication process. Communication was freed from time and space. Writing also allowed communication to be more permanent, allowing for storage of messages. Writing allowed for interaction, but was primarily used for one-way communication. The impact was low, because the actual number of people involved in writing was quite low due to the cost of education, production, and transportation. The speed of production was low due to slow transportation and the reliance on scribes.

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Historians linked the printing press with the beginning of the Industrial Age. Printing was a primarily a non-interactive form of communication with high impact. It allowed one writer to reach a multitude of people. Newspapers and magazines are examples of few senders being able to reach large audiences. Like writing, printing breaks the bonds of time and space. It is also nonproximate, asynchronous, and has a higher degree of memory, since it allows for storage and recall. Printing is slower than writing. Setting up the presses, printing, and distribution make printing a slower form of communication than writing.

Lipnack and Stamps (1997) differentiated electronic communication into analog and digital electronic media. Television, radio, videotapes, audiocassettes, fax, photocopies, and telephone are all examples of analog electronic media. The interactivity of analog media is high or low depending on the medium. The telephone provides high interactivity, but television and videotapes are quite low. The impact of analog media is higher than print. Television and radio can reach millions of people. Like writing and print, analog media allows for asynchronous nonproximate communication. Although the messages travel at the speed of light, the medium still demands real time. It takes an hour to watch an hour program on television. A phone call for 10 minutes takes 10 minutes. Like the memory of written and printed media, analog media has limited recall, reprocessing ability, and modification capabilities.

Digital electronic media consists of computers, e-mail, computer networks, and the Internet. Like every other communication medium since writing, digital media are nonproximate, asynchronous, and interactive. They support communication across time and space. Like analog media, digital media has a very high impact and is unlimited in

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the number of people it can reach. While both analog and digital media communicate at the speed of light, digital media is faster than analog communication. Digital media allows the receiver to control the pace of the communication. The receiver can skim text and skip pages, taking digital media away from the real-time limitation of analog media. The receiver does not need to listen to the whole program to gather the desired information. The primary difference between analog and digital media is not it memory storage, but primarily in memory recall. With digital media it is possible to purse enormous databanks quickly and efficiently. The data can be compressed, translated to other languages, and be graphically displayed. Digital media offers much easier modifications of text than analog media with its simple cut-and-paste function.

Effectiveness and Responsibility

The effectiveness and responsibility domain refers to the effectiveness of the previous domains. In addition to the domains of purpose, leadership, roles, decision processes, communication processes, and relationships and trust, there is a domain related to the effectiveness of the group in performing its task. The effectiveness domain is about the effectiveness of a group in coordinating the domains to achieve its objectives and the accountability and alignment of the group relating to its stated task. The responsibility domain includes control, feedback, effectiveness, performance, and the social effects of group work.

One aspect of the effectiveness domain is management, the management of the group and its domains in order to achieve the group's objective. The American Management Association (American Management Association, 1977b) defines

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management as getting things done through and with people. Management is described in terms of three functions: planning, organizing, and controlling:

1. Planning is defined as outlining a course of action to achieve an objective. Planning includes setting objectives, evaluating the climate, considering the alternatives, and selecting the best course of action to follow.

2. Organizing is defined as establishing the structure and the conditions within which the work of the plan can be done most effectively. Organizing includes analyzing the work which has to be done to achieve the objectives, defining the work in terms of job descriptions and who does what when, and delegating the work and the authority to get achieve the objective.

3. Controlling is the managerial function that ties the planning and organizing together. Controlling is making sure the result match the objective. Controlling completes the management process and returns to planning. Controlling allows new plans to be drafted that are better suited to achieve the initial objective (American Management Association. 1977a).

Controls and controlling are two different things. Controls are the measurements used to keep track of performance. controlling is what a manager does. There are two kinds of controls: first category controls and second category controls. First category controls establish expectations in advance. Second category controls measure what has happened. First category controls are objectives, schedules, budgets, policies, and procedures Second category controls are reports, relationships, and accountability (American Management Association 1977a).

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Managers interested in the performance of groups must focus on individual effectiveness, group effectiveness, and organizational effectiveness (Gibson, et al. 1997). Individual effectiveness is the most fundamental level of effectiveness. It focuses on the task performance of specific group members. Individuals do not usually work alone; individuals usually work in the context of a group.

Group effectiveness is the task effectiveness of a group. Effectiveness can be the summation of the group member's individual performance or effectiveness can be synergistic, the sum of the group performance is more than the summation of individual performance.

Organizational effectiveness focuses on the task performance of organizations. Organizations include both individuals and groups; therefore, organizational effectiveness consists of group and individual effectiveness. Organizational effectiveness is synergistic and is more than the sum of individual and group task performance. Organizations were developed, because they can do more work than individuals (Edwin, et al. 1995).

Figure 11 displays the relationship between individual, group, and organizational effectiveness. The connecting arrows indicate that organizational effectiveness depends on individual and group effectiveness, and that group effectiveness depends on individual effectiveness. Figure 11 also displays the synergistic effect of group effectiveness being more than the sum of the individuals and organizational effectiveness being more than the addition of individual and group effectiveness (Gibson, et al. 1997).

Management's concern is to increase individual, group, and organizational effectiveness. This is accomplished as managers examine the causes of effectiveness. It

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is difficult to differentiate between indicators and causes of effectiveness (Lewin, et al. 1986). Effectiveness comes from effect and can be examined in the context of causal relationships. Figure 12 demonstrates how each level of effectiveness is a primary variable impacted by secondary variables, the secondary variables being the causes of effectiveness (Gibson, et al. 1997).

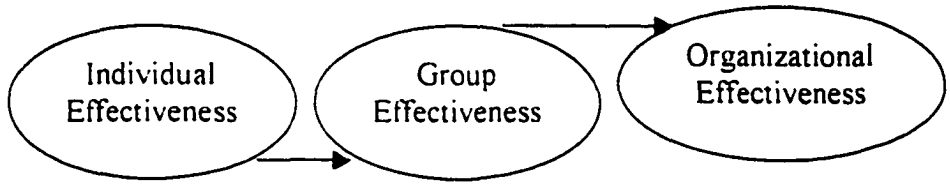

Figure 11. Team Effectiveness.

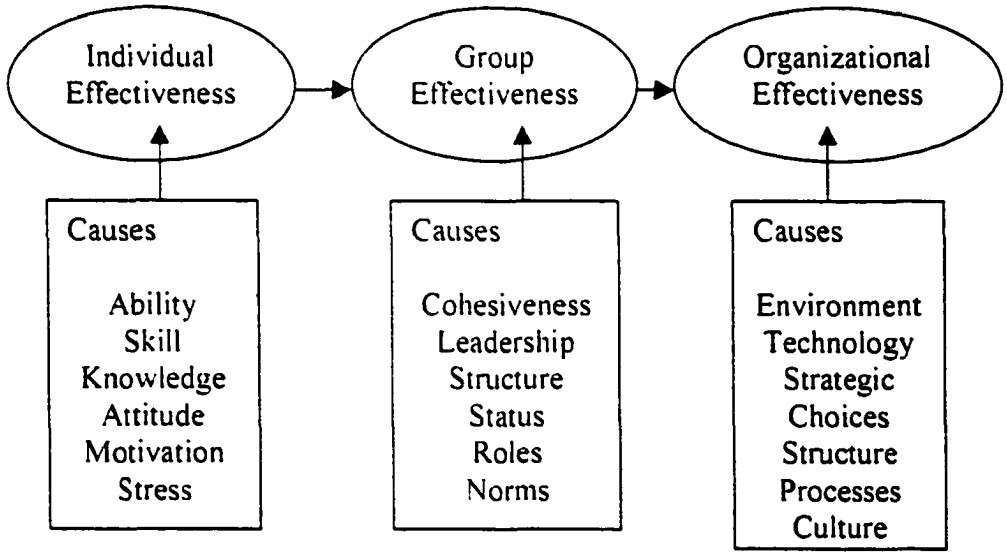

Figure 12. Causes of Effectiveness

Researchers have proposed various theories on the causes of effectiveness at each level. A summary of these theories is provided by Kimberly and Rottman (1987). The

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better accepted causes of effectiveness for individual, group, and organizational effectiveness are noted in Figure 12 (Gibson, et al. 1997); however, in the real world causal relationships are ambiguous. Evaluative judgements must take into account a network of multiple contexts and causes (Kaplan, et al. 1992).

Many theorists have proposed hypotheses suggesting how managers can increase effectiveness (Wren, 1972). One school of thinking is the Classical School of Management (Mooney, 1947). This school was classical in the sense that they were the first to describe managerial work. The Classical School of Management proposed that managerial work is a process of distinct, but interrelated, functions. This process is the managerial process. Management is understood, studied, and applied in terms of the functions and processes of the process (Gibson, et al. 1997).

Mintzberg (1980) described three managerial roles: interpersonal, decisional, and informational. Each role has distinct activities that connect it to the other roles. Interpersonal role activities involve the manager with individuals inside and outside the organization. Decisional role activities involve the manager in making decisions about operations, resources, and negotiations. Informational role activities involve the manager in communication to individuals, groups, and organizations inside and outside their own (Gibson, et al. 1997).

Gibson et al. (1997) conceptualized management as specialized work involving two or more individuals. The resulting specialized work needed to be coordinated. This coordination is managerial work. Managerial work is the coordination of individuals, groups, and organizations through performing the functions of planning, organizing, leading, and controlling.

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There are a number of proposed manager and managerial work functions. The differences in definition often reflect the different expectations of individuals in different organizations (Wren, 1992). The importance of one managerial function compared to another is dependent on context. The ability to contextualize and prioritize these managerial functions may differentiate effective and ineffective managers (Kraut, et al. 1989).

Quinn (1988) highlighted the importance of managerial planning in effectiveness. Planning involves determining the end and the best appropriate means to achieve that defined end. Planning is implicit in the definition of organizations as purposive entities and, therefore, is essential for organizations. Good planning leads to mutual understanding about what the individual, group, or organization is attempting to achieve. Once the end and appropriate means are determined, the next managerial function, organizing, is initiated (Gibson, et al. 1997).

Band (1994) described organization as a variety of different activities integrated into a coordinated whole. The organizing function is comprised of all the managerial actions that take planning into a structure of tasks and authority. Organizing involves drafting job descriptions, outlining the responsibility and authority, for each individual, and determining how these jobs will fit together. The product is an organizational structure. Planning determines what and how; organizing determines who (Gibson, et al. 1997).

Unlike the American Management Association, Gibson et al. (1997) added leadership as a managerial function. The leader's managerial function is the daily contact with individuals and groups, and is primarily personal and interpersonal. Planning and

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organizing provide what, how, and who of management, but it is people who do the work. People are unique and each perceives themselves and their work differently. Managers use their leadership function whenever they take these personal and interpersonal difference and direct them towards the common purpose. Levinson (1988) encouraged managers to learn human psychology as a way to increase effective performance.

The leadership managerial function is the most human oriented and has the most theory and research. An enormous amount has been written on leadership. While leadership is important for effectiveness, there is evidence that this importance is overrated (Thomas, 1988).

Planning determines what and how; organizing determines who. Controlling determines if the group got to the goal and how; controlling completes a logical sequence. Controlling managerial function activities ensure that the actual outcomes are in alignment with the aspired outcomes. It they are not, the control function is also used to determine why. The control function is utilized with all three levels of effectiveness: individual, group, and organization (Gibson, et al. 1997).

Effectiveness means different things to different people. These differences are largely related to different perspectives of effectiveness and if the application is theoretical or practical (Strasser, et al. 1981). There are three major approaches to effectiveness: goal, systems theory, and multiple-constituency. It is important for managers to be able to apply these three approaches appropriately (Gibson, et al. 1997).

Keeley (1984) described the goal approach to defining and evaluating effectiveness, it is the oldest and most common. Organizations are understood to exist to

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accomplish goals. Barnard (1938) followed this approach and described effectiveness as the accomplishing of recognized objectives of cooperative effort. Individuals, groups and organizations should be evaluated by the goals that they set for themselves. Western societies are very comfortable with the goal approach, because it reflects core Western values of purposeful action, rationality, and achievement (Gibson, et al. 1997).

Management by objectives is one form of goal approach. Managers determine the goals for their subordinates and then periodically evaluate their progress. Sometimes the goals are assigned, other times they are mutually processed and determined. Zero-based budgeting and cost-benefit analyses are two other forms of goal approach. All of these management methods assume clear measurable goals (Gibson, et al. 1997).

Harrison (1978) identified some difficulties with the goal approach to effectiveness. For organizations that do not produce a tangible physical product, measurement is difficult. If an organization's goal is to produce better people, how is it measured? Goals are often in conflict; accomplishing one diminishes the other. Organizations that have goals related to maximizing profit and maintaining high worker health and safety may have goals in conflict with each other (Gibson, et al. 1997). It is unlikely that there is any one set of official goals that holds the commitment of all the members of an organization (Connolly, et al. 1980).

Price and Mueller (1986) attempted to counter the problems with the goal approach to effectiveness by proposing that effectiveness be defined in terms of the financial viability of organizations. The more able an organization is to meet its financial obligations, the more effective it is. The financial viability definition addresses profit and non-profit organizations, service and consumable industries. It is easier to measure,

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addresses the issue of competing goals, and simplifies what the official goals are (Gibson, et al. 1997).

The systems theory approach to effectiveness is based on systems. A system is a grouping of elements that individually establish relationships with each other and that interact with their environment both as individuals and as a group (Cavaleri, et al. 1993). Systems theorists suggested three categories of systems: conceptual language systems, concrete mechanical systems, and abstract systems (Gibson, et al. 1997).

Managers construct systems to conceptualize the relationships between the internal and external organizational worlds. Visualizing individuals, groups, structures, and processes in terms of a system helps managers identify patterns that lead to ineffectiveness (Gibson, et al. 1997). The identification of patterns helps to evaluate effectiveness in terms of goals accomplishment (Peterson, 1994).

Systems theory provided a model to describe the internal and external behavior of organizations. The behavior of people within the organization can be seen and understood. The behavior of the organization outside the organization can be assessed and understood. Organizations require resources from their larger environment and, in return, provide goods and services demanded by their larger environment. Managers deal simultaneously with both of these internal and external elements. Using the basic concepts of systems theory reduces this complexity (Gibson, et al. 1997).

According to systems theory, the organization is only one component of several simultaneously interacting. The inputs and outputs are the starting points in describing an organization. The organization takes resources, inputs, from its larger environment,

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processes those resources, and returns them to the larger environment in a changed form, output (Gibson. et al. 1997) See Figure 13.

Systems theory also highlighted an organization's relationship to the larger system to which it is connected. Every organization is a part of a larger industry, every industry is part of a larger society, and every society is a part of a global economy. All these systems are interconnected. The connections are more than commercial; they are environmental, political, psychological, and sociological. The actions of one organization can affect the quality of water, the economy of its national economy, the economy of another part of the world, the relationships between people, and government. It is not enough for an organization to think only in terms of its initial customer, each organization is part of a much larger system (Gibson, et al. 1997).

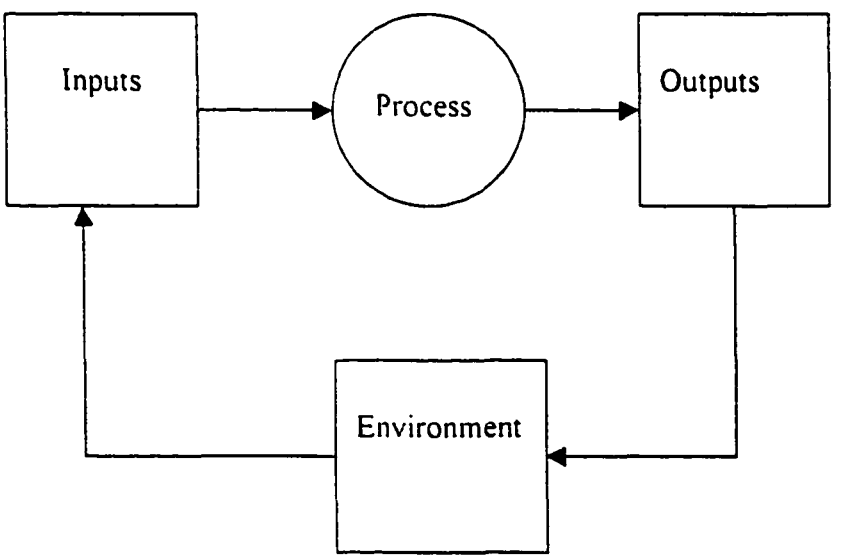

Figure 13. A Simple System.

Systems theory could also be applied to interpersonal relationships. The causes of individual behavior are the inputs. Input is processed through individual psychological and cognitive processes to lead to a specific behavioral outcome. The behavior of groups

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can also be applied to systems theory. The strike behavior of a group of workers, outcome, could be understood in terms of perceived inputs, managerial action, and in terms of the group's cohesiveness, process (Gibson, et al. 1997).

Feedback is a valuable component that systems theory brings to organizational effectiveness. Feedback is the response to the organization's output. Systems theory stresses the importance of responding to feedback. Organizations depend on their environments for resources or inputs and for the acceptance of their outputs. In order to be effective, organizations must produce outputs that their larger environment perceives as valuable. As a result, organizations must be responsive to the feedback of their environment (Gibson, et al. 1997).

Etzioni (1971) pointed out that the systems approach to effectiveness depended on organizations investing resources in activities that were not directly related to their goals. Resources must also be invested in adapting to the environment and maintaining the input-process-output flow. Systems theory emphasizes that organizational effectiveness is dependent on the ability of the organization to adapt to its environment and the ability of its input-process-output cycle to meet those demands (Gibson, et al. 1997).

Zammuto (1984) suggested the multiple-constituency approach to effectiveness. Systems theory's emphasis on balancing each part of a system, of which the organization is but one part, is valuable, but, Zammuto proposed that it is also important to achieve balance among the parts of the system by satisfying the concerns of the constituents of the organization. The multiple-constituency approach stresses the importance of different groups' and individuals' interests in an organization (Gibson, et al. 1997).

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Stakeholders of organizations, e.g., employees, managers, stockholders, directors, suppliers, creditors, and competitors, expect an organization to act in ways beneficial to them. Some of those expectations are complimentary and others are contradictory. If effectiveness is defined as satisfying all the expectations of the stakeholders, how can any organization be effective?

Connolly et al. (1980) answered the question with *relevatism*. All expectations on the organization are valid. There is no way to sort and prioritize the expectations of the stakeholders. There are as many measures of effectiveness as there are stakeholders. As a result, there is no absolute way to make an effectiveness judgement about an organization (Gibson, et al. 1997)

Pfeffer and Salanick (1978) suggested that each of the constituents control valuable resources; however, at each point in time the resources they control fluctuate in their value to the organization. The effective organization satisfies the constituents controlling the most valuable resources. Stockholder's interests would supercede manager's interests if the organization needed equity funding. Managers are effective as they identify the most powerful constituents and satisfying their interests (Gibson, et al. 1997).

Tsui (1989) proposed that the multiple-constituency efficiency theory integrate the goal and systems approaches to efficiency. Some constituencies value outcomes related to ends, the out-put component of the systems approach, and others value outcomes related to the means, the process component of the systems approach. The multiple-constituency approach can then integrate a focus on goals and a focus on process (Gibson, et al. 1997).

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Zigon (1994) made four recommendations for evaluating the performance of a team:

1. Link team results to the organization's goals by finding measurements that apply to both the team and the organizational goals.

2. Start with the team's ability to satisfy the needs of its customers by clarifying who the customers are and what work processes are needed to satisfy their needs. The final product should be evaluated from the perspective of the customer.

3. Measure both the performances of the team and its members. Define each team member's role in terms of what they that support the teams work process. Then evaluate the team's overall performance and each member's contribution.

4. Train the team to develop its own measurement standards. When the team develops its own measurement standards, everyone on the team will understand their niche better (Robbins, 1997).

There are many ways that groups can have low performance. Kerr and Bruun (1983) described a free rider effect. The free rider effect describes situations where less able group members leave it to the more able group members to complete the group's tasks. Group members actually invest decreasing amounts of energy and only go through the motions of teamwork (Johnson & Johnson, 1991a).

These researchers also described a sucker and rich-get-richer effect in group performance behavior. The sucker effect refers to the more able group members intentionally doing less in order to avoid doing all the work. The rich-get-richer effect describes groups deferring to their more able members, or the more able members taking over the group, at the expense of the other group members. For example, when the more

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able group member does all the talking and summarizing, they may be learning more than any other group member. The correlation between explaining and learning allows the more able group member to learn more at the expense of the other group members (Forsyth, 1999). Hill (1982) has described this same phenomenon in a context of brainstorming in which the more able group member dominates the discussion.

Several other studies have demonstrated ways group efforts can lead to poor performance (Forsyth, 1999). Time spent listening in brainstorming sessions can reduce the time group members have to express their own ideas (Lamm. et al. 1973). Groups can demonstrate self-induced helplessness (Langer, et al. 1978), they can demonstrate social loafing and diffusion of responsibility (Latane, et al. 1979), or they can gang up against a task (Salomon, 1981). There can be a dysfunctional division of labor (Sheingold, et al. 1984). Groups can have inappropriate dependence on leadership and authority (Webb, et al. 1986). There can be destructive conflict (Johnson, et al. 1979).

One of the first researchers to wonder about the effect groups had on individual performance was Triplett (1898). He asked the question, "What happens when individuals join together with other individuals?" Triplett's study documented social facilitation. Through his study of cyclists and children, Triplett demonstrated that task performance increases when people work in the presence of other people (Forsyth, 1999). Allport (1920) later also documented this social facilitation effect, as did Dashiell (1930), and Travis (1925). See Figure 14.

There are two contexts in which social facilitation occurs. A coaction task is a performance context where people work individually in the presence of others; an example would be Triplett's study when children were working on the same task in the

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same room, but without any interaction. An audience task is a performance context in which people are working in front of spectators; an example would be the increased performance of weight lifters with the presence of spectators (Forsyth, 1999).

Allport (1920) also noticed that while social facilitation appeared to be valid for coaction and audience tasks, social facilitation did not always occur. Working in groups did not always enhance performance. When Allport had individuals work in isolation and in coaction contexts, to write down as many words as possible in response to words like blue and game, there was only a slight performance improvement in the coaction contexts. Other researchers observed the same effects with both coaction and audience tasks (Carment, 1970; Forsyth, 1999).

These confounding results puzzled researchers for decades. Zajonc (1965) provided an answer. Zajonc differentiated behavior into dominant and nondominant responses. Dominant responses are behaviors that are easier to learn and perform. They are dominant in the sense that they are at the top of a person's response taxonomy and dominate all the other potential responses. Nondominant responses are behaviors that are new or complicated behaviors which a person has not used frequently or at all (Forsyth, 1999).

Figure 14 displays the relationship between nondominant and dominant behaviors and social facilitation. Zajonc's study indicated that the presence of others increases our ability to perform dominant tasks, but decreases our ability to do nondominant tasks. If the dominant response is the best response in a specific context, the group will perform better collectively than the group would individually; however, if the nondominant response is the most appropriate response for a group of people, then the group will

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interfere with the performance of the group making the individual's performance stronger than the group's.

This has been documented with two sets of people playing pool. The set that was accustomed to pool did better as a group. The set that was not accustomed to pool did better individually (Michaels, et al. 1982). Markus (1978) observed the same effect with sets of people unobtrusively changing clothes together. When people were changing their own clothes, they were faster as a group; however, when they were changing clothes that were not their own, they were faster as individuals. Zajonc et al. (1969) observed the same phenomenon with cockroaches in the context of a maze.

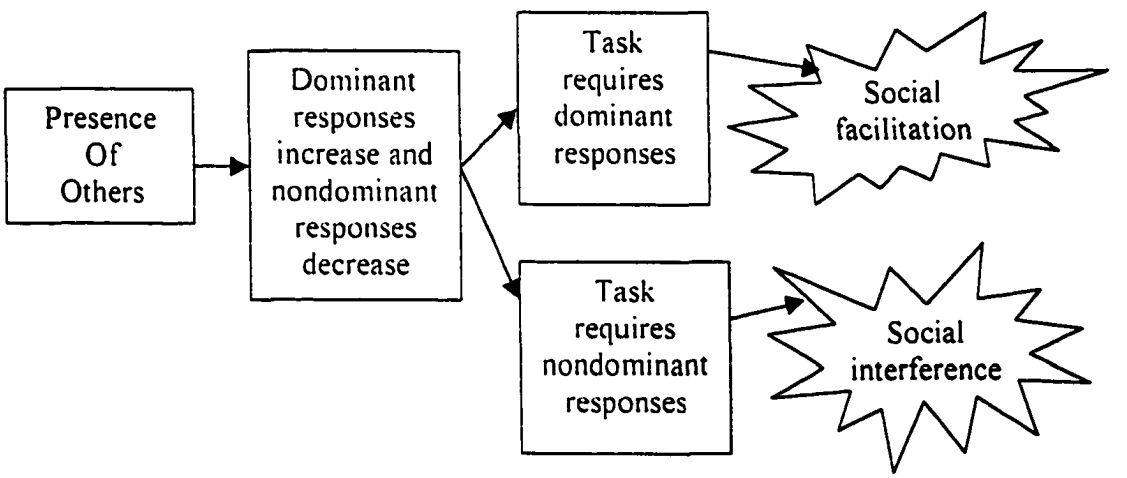

Figure 14. Social Facilitation.

Bond and Titus (1983) found, after examining 241 social facilitation studies involving about 24,000 subjects, that people performed better doing simple tasks when other people were present. The presence of others increased speed, but rarely quality. For complex tasks, the presence of others tended to result in reduced quantity and quality of performance. They also observed that the gains made with groups working on simple tasks did not off-set the losses of groups working on complex tasks. The losses resulting

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from complex group tasks were significantly larger than the gains made from simple group tasks. Other researchers have documented the work of Bond and Titus (Forsyth, 1999; Geen, 1991).

Zajonc's hypothesis explained the presence of social facilitation, but did not explain why the presence of others enhances dominant responses. Triplett (Triplett, 1898) suggested a psychological stimulation as the answer, but was unclear about its source or nature. Zajonc (1965) used the word *compresence* to describe the phenomenon of responding when others are present. Compresence arouses most species. This arousal occurs because the individual never knows what responses will be expected or required next. Zajonc suggested that it is arousal, not another higher order cognitive response like competition and evaluation, that sustains social facilitation (Forsyth, 1999). See Figure 15.

Markus (1978) supported Zajonc's compresence hypothesis that the presence of people triggered social facilitation (Forsyth, 1999). When researchers totally isolated subjects from observers to avoid all forms of communication and evaluation, social facilitation still occurred. When subjects were blindfolded and using earplugs, the presence of observers improved performance on simple tasks and reduced performance on complex tasks (Schmitt, et al. 1986).

The physiological arousal facet of Zajonc's compresence hypothesis has not been demonstrated (Forsyth, 1999). Some researchers have demonstrated increased heart rate and blood pressure, but the physiological effects of compresence are mixed (Geen, et al.1989). Physiological arousal occurs when people are present, but often only when they are too close (Middlemist, et al. 1976). When people feel evaluated, they have a

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physiological response (Seta, et al. 1992); however, the close proximity of some people diminishes arousal. The presence of close friends can have a calming effect (Kamarck, et al. 1990).

Cottrell (1972) disagreed with Zajonc's view linking arousal to compresence. Cottrell suggested that people learn experientially through the rewards and punishments of other people. As a result, people learn to feel apprehensive in social contexts. The resulting evaluation apprehension will increase performance on simple tasks, but reduce performance on more complex tasks. Evaluation apprehension is the anxiety-creating concern to appear normal or competent (Forsyth, 1999). Cottrell asserts that it is apprehension, not arousal, that promotes social facilitation (Weiss, et al. 1971).

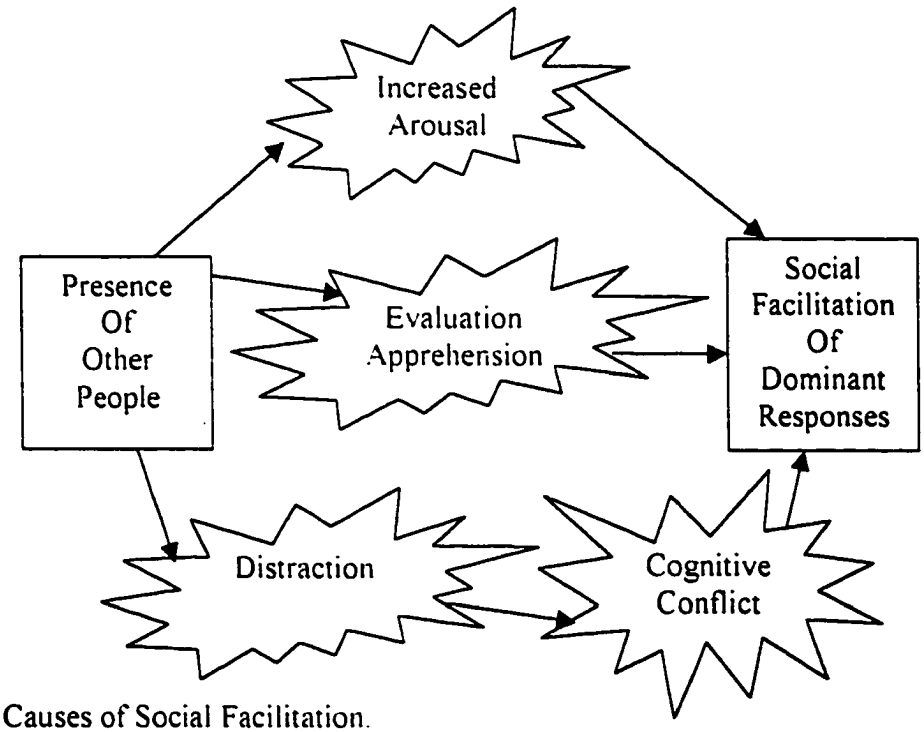

Figure 15. Causes of Social Facilitation.

Goffman (1959) examined the effect of self-presentation on Cottrell's view of evaluation apprehension. Self-presentation is influencing people's social perceptions by selectively disclosing personal information. It includes deliberate and unintentional

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efforts to establish, maintain, or change the impress others have (Forsyth, 1999). Self-presentation theory proposed that group members attempted to control what others think of them by using social behaviors that established and maintained a specific perception. To avoid situations that might be embarrassing, group members significantly increase their self-presentation behavior (Bond, 1982).

Cottrell's hypothesis that any stimulus-increasing apprehension regarding pending rewards or punishments will increase levels of drive has been demonstrated (Bond. et al. 1983). People prefer to perform dominant tasks when in evaluative contexts (Seta, et al. 1989). When people working on simple tasks were told that they were being evaluated by their observers, their performance increased (Geen, 1983). People performed worse the second time they tried a task at which they initially failed at when observers were evaluating them (Sanna, 1992). Social facilitation effects were often eliminated in contexts where evaluation apprehension was diminished with private responses and nonevaluative audiences (Sasfy, et al. 1974). People with low levels of individual confidence performed better when alone, and people with high levels of individual confidence performed better when under evaluation (Sanna, 1992).

Even the presence of friends, when introduced in an evaluative role, has a physiological impact (Kamarck, et al. 1990). Pets are a good source of social support, because they have an assuring presence that lacks the ability to evaluate their owner's performance (Allen, et al. 1991).

Other studies do not support this emphasis on evaluation (Forsyth, 1999). Social facilitation occurs even when the observer totally ignores the individual (Worringham, et al. 1983). Social facilitation also occurs in contexts involving activities that do not

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involve much threat of evaluation like eating, drinking, and getting dressed (Markus, 1978).

Zajonc emphasized arousal, Cottrell emphasized evaluation, other models suggested the distraction-conflict theory of social facilitation (Forsyth, 1999). The distraction-conflict theory stated that social facilitation is related to people's ability to adequately process information. Guerin (Guerin, 1983; Guerin, et al. 1982) pointed out that individuals working in the presence of others must divide their attention between complex tasks and their audience. People may also be less able to focus on complex tasks in the presence of an audience because of their resulting self-awareness and self-focus. (Mullen, et al. 1987). Baron (1986) has shown that although the presence of other people is a distraction, that distraction does not automatically lead to reduced performance. Distraction does limit the amount of attention individuals can focus on a task, these distractions can be overcome. On complex tasks, the drive produced by social facilitation is not enough to overcome the distraction interference resulting in reduced performance. On simple tasks, the drive produced by social facilitation is enough to overcome the distraction interference, resulting in increased performance (Forsyth, 1999).

Several other studies have supported the distraction-conflict theory of social facilitation (Forsyth, 1999; Sanders, 1984). As the theory suggested, people overlooked aspects of a task when they worked on it in the presence of observers that they do not overlook when they worked alone (Gastorf, et al. 1980). This distraction effect has been shown to be essential in social facilitation. If observers are present, but are not experienced as a distraction, social facilitation does not occur (Sanders, et al. 1978).

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People are social beings. Social facilitation occurs, because people respond in predictable ways to other people (Forsyth, 1999). Figure 15 displays this predictable social interaction. Zajonc described these social responses as basic ones related to arousal (Seta, et al.1992). That arousal is increased when people sense that they are also being evaluated with the real possibility of making a poor impression if they perform poorly (Geen, 1991).

Aiello et al. (1995) found the effect of social facilitation in the context of electronic performance monitoring. Contemporary business can trace the daily performance of their employees through computer information networks. When employees use their computers to do data entry, send electronic mail, conduct asynchronous and synchronous computer conferences, and search databases, their activity can be monitored automatically Aiello has found that electronic performance monitoring effects employee performance in ways consistent with social facilitation theory. Electronic performance monitoring increased the performance of skilled employees when they were working on their dominant tasks; it decreased the performance of non-skilled employees when they were working on non-dominant tasks (Forsyth, 1999).

Steiner (Steiner, 1972, 1976) wondered why sometimes interacting groups would succeed at their joint task and other times they would fail. His resulting social combination theory attempted to answer that question by splitting it into two questions. First, does the group have the resources it needs to be successful? Second, does the group combine its resources effectively? His resulting social combination theory assumed that group performance was dependent on the member's resources and the

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processes that determined how those resources were combined to make a group product (Forsyth, 1999).

If a group does not have the ability and willingness to complete its task, it will fail. If a group does not have the ability and willingness to marshal their resources well, it will also fail. Group performance is, therefore, a result of a group's resources and how it combines those resources to accomplish its task (Forsyth, 1999). Several subsequent researchers have substantiated Steiner's approach (Hackman, 1992).

Steiner's first question, does the group have the resources it needs to be successful, is addressed with group composition. Group performance is dependent on the composition of the group. The qualities of the individuals in the group determine the effectiveness of the group. Researchers have looked at several aspects of group composition related to group effectiveness: KSA, diversity, gender, and types of tasks. The group's achievement depends on the KSAs of its group members. KSA is an acronym for knowledge, skills, and abilities and other characteristics that are necessary for a group to complete its task (Forsyth, 1999). Simply stated, better players make better teams (Bennis, et al. 1997). Several researchers have demonstrated the need for communication skills, leadership ability, and conflict resolution skills as necessary KSAs for effective work teams (Stout, et al. 1997).

Group diversity has also been documented as a group composition variable that can increase group performance (Forsyth, 1999). Pelz (1967) found that interdisciplinary teams of researchers are more productive than teams of researchers from the same discipline. Peterson and Nemeth (1996) found that groups with individuals of divergent opinions produce more creative and thorough solutions. Jackson (1992) found that

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management teams consisting of diverse educational and historical backgrounds were more creative than homogeneous teams. McLeod, Lobel, and Cox (1996) found groups consisting of Asian, African, Latino, and Anglo-Americans outperformed Anglo groups.

Tziner and Eden (1985) found that it is not a given that group diversity increases performance. The advantage of group diversity occurs when the group members are highly skilled in areas that do not overlap. Diversity in skill level, with some more skilled than others, does not increase group effectiveness. Shaw (1981) found that group personality homogeneity was better than personality heterogeneity. Groups consisting of members with a similar personality type were more effective than groups whose members had different personality types (Forsyth, 1999). Bond and Shiu (1997) found that group members with similar personalities who focused on task attainment were most effective in the classroom. Other researchers have found that diversity in groups could lead to conflict that diminished their effectiveness (Moreland, et al. 1996).

What difference does gender diversity make in group composition in terms of group effectiveness? Wood (1987) reviewed 52 sex difference studies on group effectiveness. She observed that in some studies all-female groups outperformed men and that in some studies all-male groups outperformed women (Forsyth, 1999).

Two variables covary with sex differences in group effectiveness: task content and interaction style. Male groups outperformed women in studies where the tasks favored the typical abilities, skills, and interests of men. Male groups were better at tasks that demanded math and physical ability. Female groups outperformed male groups on tasks that were primarily verbal.

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As to interaction style, sex differences in group performance are shaped by gender specific interaction styles (Forsyth, 1999). Men interact around tasks and women around relationships. Male groups outperform female groups when group success is primarily task oriented and female groups outperform male groups when the success of the group is more dependent on social interaction (Wood, et al. 1985). Eagly and Wood (1991b) found that female work groups can perform consistently with male work groups in contexts that are primarily task focused, if there is also room for social activity.

Initial studies of heterogeneous gender groups indicated that heterogeneous gender groups, whether based on abilities, skill, or gender, often were more effective than homogeneous groups (Forsyth, 1999). Wilder (1986) demonstrated that group diversity based on token individuals, adding only one or two individuals outside the majority social category, may decrease group effectiveness. These social tokens are more closely examined than the other group members thus increasing their apprehension and decreasing their individual performance (Kanter, 1977). Tokens often experience sexism and prejudice (Fiske, 1993).

Occasionally, social tokens can overcome the negative effects of their minority status through effective individual performance and communication of their commitment to the group (Ridgeway, 1982). Rogelberg and Rumery (1996) described contexts in which groups with the presence of a social token, outperform homogeneous groups. Groups of men, with one woman, outperformed all male groups in wilderness survival tasks. The researchers suggested that the female presence diminished male competition and facilitated collaborative behavior. If a group attains heterogeneity through the use of tokens, they are still able to outperform homogeneous groups (Forsyth, 1999).

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Steiner's (1972) second question, does the group combine its resources effectively, is addressed by combination processes. Steiner suggested that any combination process be determined by the task demands of the group. Task demands are dependent on the divisibility of the task, the output desired, and the combination protocol to complete the task (Forsyth, 1999). Table 5 displays Steiner's work typology and Table 9 displays Steiner's potential level of productivity for his work typology.

Steiner (1972) developed a typology of tasks. These are displayed in Table 5:

1. Divisible tasks can be divided into sub-tasks assignable to individual group members.

2. Unitary tasks cannot be divided, e.g., only one person can fit under the car to change its oil.

3. Maximizing tasks are dependent on quantity. A tug-of-war is based on maximum effort.

4. Optimizing tasks are based on predetermined criteria. Estimating the jellybeans in a jar is an optimizing effort.

5. Additive tasks involve summing individual contributions to achieve a group product.

6. Compensatory tasks involve an average of individual member's solutions, judgement, or votes.

7. Disjunctive tasks require a single specific answer.

8. Conjunctive tasks are completed when each group member has finished a specific action.

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9. Discretionary tasks are left to group members to freely decide the method they will use to combine their efforts.

Table 9 summarizes the potential productivity of groups working on Steiner's work typology. Additive tasks are divisible and maximizing. They require the summation of each individual's input to maximize the group product. As long as each individual can do the simple individual task, the productivity of the group will be higher than the productivity of the individual (Forsyth, 1999). See Table 9.

Compensatory tasks involve averaging the individual judgements to get an average. Individuals may prefer avoiding face-to-face meetings and submitting their votes to a chairman who adds them up (Lorge, et al. 1958) Shaw (1981) used a meta-analysis to find that compensatory judgements are more accurate than the decisions of the individuals involved. Knight (1921) also demonstrated this effect with group decisions related to air temperature in a room. Stoop (1932) found that this same averaging effect increased the accuracy of individual decisions. An average of individual multiple judgements is more accurate than an individual's single judgement (Forsyth, 1999).

Disjunctive tasks demand that groups determine a single judgement, which will serve as the group's product. Groups usually perform these tasks better than the average of their group members, but they rarely outperform their best group members. Studies have contrasted two types of disjunctive judgements (Forsyth, 1999). The Eureka-type problem is when a group member suggests an answer, it is obvious and certain that it is correct. The non-Eureka problems are not as clear. Even after prolonged discussion, the group is still unsure its judgement is correct. Maier and Solem (1952) found that groups perform well with disjunctive tasks, if someone in the group suggests the correct answer,

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and if the group members accept the answer. Groups do better on disjunctive tasks in response to the Eureka-type problem. Subsequent researchers have confirmed these findings (Littlepage, 1991).

Table 9

A Summary of the Potential Productivity of Teams Working on a Variety of Tasks

Type of Task	Productivity Effect
Additive	Better than the best: The group exceeds the performance of even the best member.
Compensatory	Better than most: The group exceeds the performance of a substantial number of the individual members.
Disjunctive	Equal to the best: The group performs at the level of the most capable member, but only if the group accepts the most capable member's input as the group solution.
Conjunctive: Unitary	Equal to the worst: Group performance equals the performance of the least capable member.
Conjunctive: Divisible	Better than the worst: Performance will improve if subtasks match members' capabilities.
Discretionary	Variable: Performance depends on the combination rules adopted by the group.

Conjunctive tasks that require input from all the group members are not completed until all the group members are finished, e.g., a group climbing a mountain (Forsyth, 1999). Frank and Anderson (1971) found that groups involved with conjunctive tasks are limited to the performance of their slowest member. Groups often attempt to improve their performance on conjunctive tasks by encouraging their slowest members to work

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harder, with the weaker members increasing their performance. This increased performance by groups engaged in conjunctive tasks when the performance of the least effective members improves is termed the Kohler effect (Stroebe, et al. 1996).

Steiner's final task category is discretionary. A discretionary task is an unstructured task that can be solved in a variety of ways. The group uses any of the previous task categories to arrive at their judgement. The members choose the method of combining their individual inputs (Forsyth, 1999).

Are groups better able to perform than individuals? Steiner suggested in his social combination theory that a group's success is dependent on the resources of the group and the social combination rules used to combine those resources. Table 9 displays the potential level of productivity for each task type. Groups do not always reach their potential. Steiner (1972) proposed the concept of process loss to explain the gap in performance and potential. Steiner's law of group productivity is that actual productivity equals the difference between the potential productivity and the losses due to faulty processes. Even groups with skilled resources combined well can be unproductive due to process losses. Some productivity losses are due to the Ringelmann effect, social loafing, anonymity and evaluation apprehension, and illusions of productivity (Forsyth, 1999).

Kravitz and Martin (1986) provided a summary of Max Ringelmann's seminal work in this area from the nineteenth century and his work on the productivity of animals and machines. Ringelmann found productivity loss in additive tasks. Although a group will be able to more work than any one member, the sum of the individual performances will be less than the group summation (Forsyth, 1999). The individuals in the group do

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not work at maximal efficiency on additive tasks. The larger the group gets, the less efficient the group becomes (Steiner, 1972).

The tendency for people to become less productive when they join a group, and the larger the group the more pronounced the effect, is termed the Ringelmann effect. Some researchers have described the Ringelmann effect in terms of coordination loss (Forsyth, 1999). Coordination loss is the inefficiency that results from group members' lack of ability to combine their resources in a maximally productive fashion (Forsyth, 1999). For example, new teams involved in the physical act of pulling a rope need time to learn when to pull and pause. New teams are limited in their additive performance, because they are still learning how to combine their resources (Wittenbaum, et al. 1996).

Williams, Harkins, and Latane (1981) have explored the Ringelmann effect in terms of social loafing. Ringelmann suggested that the loss of productivity of people in groups was related to their tendency not to work as hard in groups (Forsyth, 1999). The reduction of effort by individuals in groups is termed social loafing. Williams, Harkins, and Latane found that even when groups were highly organized to eliminate all productivity losses due to poor coordination, group productivity was still less than the sum of individual performance. They suggested that the Ringelmann effect was due to coordination and motivation loss in groups. Social loafing has been shown to be pervasive with groups across a wide spectrum of work tasks. It applies regardless of gender, age, and culture (Karau, et al. 1993a). See Figure 16.

Williams et al. (1981) attempted to understand social loafing in terms of anonymity. They conducted a study that demonstrated that when individual output in

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group contexts was identifiable, social loafing was almost eliminated (Forsyth, 1999). This was supported by Kerr and Bruun (1981) and Sanna (1992).

Several researchers have linked the reduction in social loafing to member identification with evaluation apprehension (Forsyth, 1999). When a member's individual performance is known, members become apprehensive about their evaluation. When a member's individual performance is unidentified, evaluation apprehension is reduced and social loafing increases (Harkins, et al. 1988).

People are usually unaware of their loafing (Karau, et al. 1993b). Paulus, Dzindolt, Poletes, and Camacho (1993) found that when group members were asked to estimate how many ideas they generated in relation to a group problem, each group member over-estimated their actual contribution. Members of most groups evaluate their group as more productive than other groups (Polzer, et al. 1997). Homma, Tajima, and Hayashi (1995) discussed an illusion of group productivity. In many work contexts, the group's performance is shaped by the contributions of its members. These contributions are rarely objective, so group members must intuitively estimate the quantity and quality of their group's performance and their contribution to that performance. This intuitive environment leads to an illusion of group productivity where the group members believe that their group is performing effectively (Forsyth, 1999).

A number of ideas have been proposed to reduce social loafing (Forsyth, 1999). Social loafing erodes group effectiveness. People are individually less productive in groups than they are individually. Unfortunately, people are unaware of their social loafing behavior. Brickner, Harkins, and Ostrom (1986) suggested that when people think that a poor group performance will adversely affect them, they will not loaf.

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Correspondingly, people will not loaf if they perceive that a high quality work team will be rewarded (Shepperd, 1993; Shepperd, et al. 1989). People are also less likely to loaf if they are involved in challenging tasks (Zaccaro, 1984). In one study, researchers asked college students a question related to graduation. Some students were told that the question did not pertain to them, others were told that it did and would effect their graduation, others were told nothing. The students that were unidentifiable and uninvolved demonstrated loafing behavior. The students that were involved, whether they were identifiable or not, did not loaf (Brickner, et al. 1986).

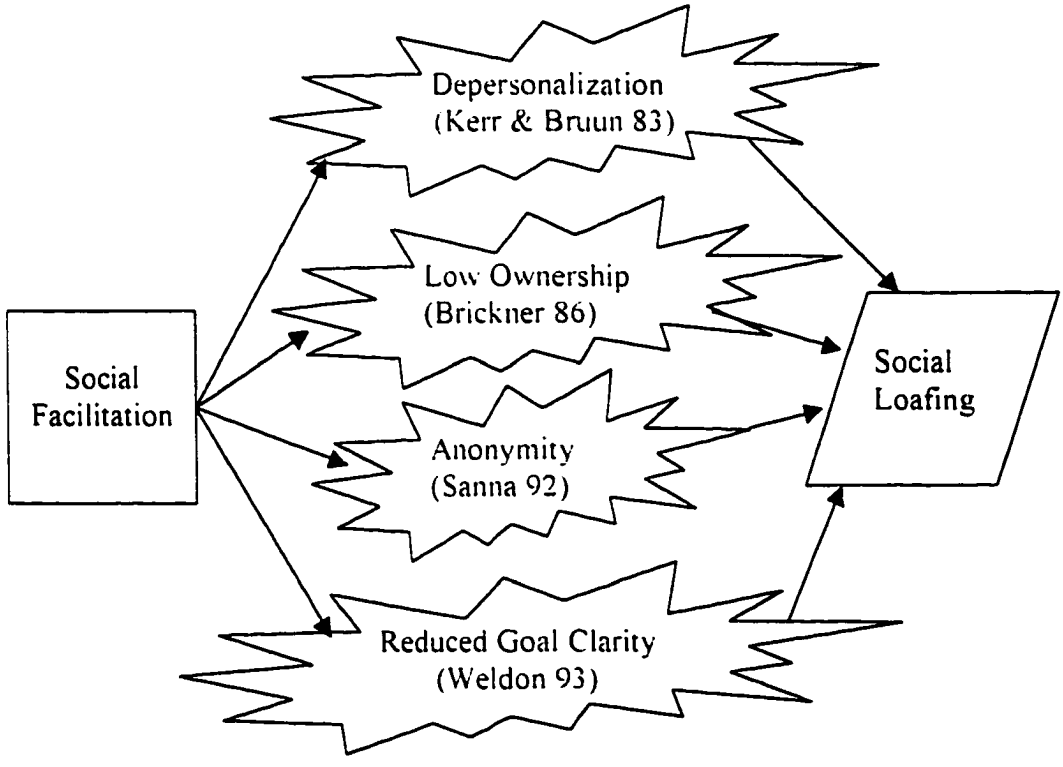

Figure 16. Social Loafing.

Williams and Karau (1991) wondered if increased personal involvement in the group's tasks would lead group members to work harder than if they were alone. They

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found that group members worked the hardest when the task was meaningful to them and their fellow group members' ability was minimal. This was termed the compensation effect, e.g., an increase in performance by groups engaged in additive tasks when members work harder to compensate for the real, or imagined, inability of their fellow group members (Forsyth, 1999).

Researchers have suggested other ways to limit social loafing (Forsyth, 1999). When group members believe that their performance is indispensable, unique, and essential for the group's success, they loaf less (Kerr, et al. 1983). Reducing the size of groups can minimize loafing (Kameda, et al. 1992). Loafing is also diminished when group members perceive that the other members of their group are competent and willing to support group effectiveness (Kerr, et al. 1983).

Weldon and Weingart (1993) proposed that clear attainable goals would reduce social loafing. Truck drivers that were told to haul loads that were their best, best by weight, only hauled 60 percent of what was allowable. When they were told to haul within 94 percent of the legal limit, they did (Latham & Baldes, 1975).

Some researchers suggest that high standards will reduce social loafing. Lewin et al. (1944) suggested how people set goals for themselves and their groups. People enter performance contexts with ideal outcomes in mind, e.g., getting an A in class. As they gain experience in that performance context, after taking a few exams, people revise their ideals to be more realistic. Lewin used the term level of aspirations to delineate this adjustment from the ideal to the real (Forsyth, 1999).

Groups also go through the process involved with levels of aspirations (Forsyth, 1999). Several researchers have tried to apply this theory to limit social loafing. Medow

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and Zander (1963) proposed that cohesive groups and groups with more central leadership have higher levels of aspirations. Unrealistically high standards can reduce the performance of groups by eroding their motivation (Hinsz, 1995).

Other researchers have suggested collective efficacy as a way to correct social loafing, see Table 32. Collective efficacy is the group member's belief that their group can produce and regulate its own outcomes (Forsyth, 1999). There is a link between group performance and group members' sense of probability for the group's success. Groups that believe that they will be effective are more likely to be effective than those that do not (Guzzo, et al. 1993). Confident groups outperform less confident groups even if their levels of ability are the same (Silver, et al. 1997).

These findings related to collective efficacy support Karau and Williams's (1993b) collective effort model. The model traces losses of productivity in groups to lower expectations for successful goal attainment and the reduced value of group goals (Forsyth, 1999). Building on expectancy motivational theory, two factors are outlined for group member motivation: their expectations for attaining the goal and their sense of value for the goal (Karau & Williams, 1993b). Group members' motivation will be highest when they have both high expectation and high valuation. Motivation is reduced when expectations are minimal or the goal is not valued. Their meta-analysis comparing the collective effort model to social loafing indicated that loafing is reduced if the group members' expectations are high and the goals are perceived as valuable (Karau, et al. 1993a).

Finally, some researchers suggested increased group unity would diminish social loafing. People work harder for groups that they value (Forsyth, 1999). Group members

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have the option of working for themselves, for the group, for both, or for neither. As a result, some group members opt not to work for group effectiveness (Zander, 1977). When group members are united around a common goal, group behavior should replace individualistic behavior, and the desire for group effectiveness will increase (Wekselberg, et al. 1997). People who are more collectively motivated loaf less than people who are more individually motivated (Erez, et al. 1996). People from Eastern cultures loaf less than people from Western cultures, and women loaf less than men (Karau, et al. 1995). Cohesive groups loaf less than noncohesive groups (Karau, et al. 1997).

Other researchers pointed out that increased unity would not automatically reduce social loafing (Forsyth, 1999). Cohesiveness can have a variety of effects dependent on how many interactions are necessary for the group to be effective (Landers, et al. 1974). Some groups are effective in the midst of their lack of unity. Olympic rowing teams that have the greatest degree of internal conflict have the greatest team effectiveness (Lenk, 1969). One team was so fragmented that the team considered dissolving, but managed to continue by forming coalitions. Despite the anger and hostility, that team won the Olympic gold medal that year (Cratty, 1981).

Effectiveness Theories

Most researchers agree that building effective work teams is essential for organizational effectiveness. There is disagreement concerning the basic assumptions and techniques recommended. Most of the rational-systems ideas were developed prior to the Hawthorne studies (Mayo, 1933). Rational-system theorists assert that the whole is less than the sum of its parts. Teams are less than the sum of its parts. They believe that groups are to be tolerated, but preferably destroyed in order to maximize individuals

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efficiency (Forsyth, 1999). If coordination cannot be avoided, it can be achieved by proper departmentation, hierarchy, the assembly line, or some other mechanical means (Schein, 1965). The emphasis is on the productivity of individuals, not teams.

The rational-systems approach to building effective teams consists of channeling individual efforts. An effective team is one that focuses on its individuals. The influence of informal groups is ignored in favor of a concentration on increasing the effectiveness of individuals. Individual effectiveness is enhanced through the use of formal rules and hierarchy (Forsyth, 1999).

The social-systems approach to teams is an approach that is essentially group centered. It assumes that effective work teams are needed in all organizations and that organizations function best when employees function, not independently, but interdependently (Forsyth, 1999). Organizations function best when its members are in effective work groups (Likert, 1961). Group-centered activity and effective work groups are essential.

One social systems theorist, Likert (1961), suggested that a major determinate of group effectiveness is the sensitivity of group members and formal leaders to problems. There can be problems related to communication, respect, and psychological needs. The effectiveness of a group depends on understanding such problems and dealing with them (French, et al. 1973).

Burns and Stalker (1961) understood organizations to be a continuum with organic and mechanistic systems as the two extreme points in open theory. Open theory attempts to bridge the individual oriented rational theory and group oriented social theory. The mechanistic system, similar to rational theory, emphasized formalized role definitions

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and rules, narrow spans of supervision, and reliance on hierarchy to attain organizational goals. The organic system, similar to social theory, positioned people in less-structured roles and encourages interpersonal interaction (Behling& Schriesheim, 1976). Burns and Stalker found that those organizations experiencing success in stable environments had mechanistic structures, and those in dynamic and changing environments had organic structures.

Thompson (1967) built on the work of Burns and Stalker (1961) in open theory by further distinguishing between the technical core and the boundary-spanning units of organizations. Thompson stated organizational environments encounter stability and homogeneity. Stability refers to the degree of change in the environment. Homogeneity refers to the degree the environment is segmented. These two dimensions, as dichotomies, result in a four-fold classification scheme in open systems theory: (a) homogeneous and stable, (b) homogeneous and shifting, (c) heterogeneous and stable, and (d) heterogeneous and shifting. According to Thompson, boundary-spanning units facing homogeneous task environments should develop simple structures. Those facing heterogeneous environments should be more complex, with many boundary spanning units developed to face small homogeneous portions of the task environment. Boundary spanning units facing stable conditions should rely on rules and standard operating procedures, while those operating in shifting environments should rely on rational individual initiative.

In summary, open systems theory can be understood as a prescriptive framework that suggests the contexts in which a social system or a rational system should be utilized. The type of organizational structure used is dependent on the external environment.

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Requirements for flexibility and adaptation lead to organic organization. Requirements for stability require mechanical organization. In order to integrate, the rational systems approach should be used in situations where mechanistic organizations are required. The social systems approach should be used when organic organizations are required.

What is useful in this discussion of rational, social and open systems is the recognition that success is dependent on the environment. There is no single team constellation that will be successful in every context. The first question to be answered is related to environment What environment do we want groups to be successful in?

Team Effectiveness Research

Mayo (1933) concluded at the end of the Hawthorne study that there were eight essential elements in team effectiveness:

1. The boss, chief observer, has a personal interest in each person's achievement.
2. The boss took pride in the record of the group.
3. The boss helped the group work together to set its own conditions of work.
4. The boss faithfully posted the feedback on performance.
5. The group took pride in its own achievement and had the satisfaction of outsiders showing interest in what they did.
6. The group did not feel they were being pressured to change.
7. Before changes were made, the group was consulted.
8. The group developed a sense of confidence and candor.

McGregor (1960) and Likert (1961) in the early 1960s began to emphasize teams as a part of organizations. McGregor pointed out that many activities and any one individual could not solve problems. He acknowledged that groups and teams may be

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inept, but group performance can be improved with research. The real problem is that so little attention has been given to group behavior and that management does not know how to create effective groups. The problem is one of ignorance, not over-emphasis on groups.

McGregor (1960) identified eleven characteristics of an effective work team:

1. The atmosphere tends to be informal, conformable, relaxed. There are no obvious tensions. It is a working atmosphere in which people are involved and interested. There are no signs of boredom.

2. There is a lot of discussion in which virtually everyone participates, but it remains pertinent to the task of the group. If the discussion gets off the subject, someone will bring it back in short order.

3. The task or the objective of the group is well understood and accepted by the members. There will have been free discussion of the objective at some point, until it was formulated in such a way that the members of the group could commit themselves to it.

4. The members listen to each other! The discussion does not have the quality of jumping from one idea to another unrelated one. Every idea is given a hearing. People do not appear to be afraid of being foolish by putting forth a creative thought even if it seems fairly extreme.

5. There is disagreement. The group is comfortable with this and shows no signs of having to avoid conflict or to keep everything on a plane of sweetness and light. Disagreements are not suppressed or overridden by premature group action. Their

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reasons are carefully examined, and the group seeks to resolve them rather than to dominate the dissenter.

6. Most decisions are reached by a kind of consensus in which it is clear that everybody is in general agreement and willing to go along; however, there is little tendency for individuals who oppose the action to keep their opposition private and thus let an apparent consensus mask real disagreement. Formal voting is at a minimum; the group does not accept a simple majority as a proper basis for action.

7. Criticism is frequent, frank, and relatively comfortable. There is little evidence of personal attack, either openly or in a hidden fashion. The criticism has a constructive flavor in that it is oriented toward removing an obstacle that faces the group and prevents it from getting the job done.

8. People are free in expressing their feelings as well as their ideas both on the problem and on the group's operation. There is little pussyfooting, there are few hidden agendas. Everybody appears to know quite well how everybody else feels about any matter under discussion.

9. When action is taken, clear assignments are made and accepted.

10. The chairman of the group does not dominate it, nor does the group defer unduly to him. The leadership shifts from time to time, depending on the circumstances. There is little evidence of struggle for power as the group operates. The issue is not who controls, but how to get the job done.

11. The group is self-conscious about its own operations. It will stop to examine how well it is doing or what may be interfering with its operation. Whatever it is, it gets open discussion until a solution is found.

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At the same time, Likert (1961) was developing a view of organizations as a series of interlocking groups with managers as the lynch pin. Likert suggested that in order for managers to be successful lynch pins, they must have a participatory style of leadership.

Likert (1961) drafted his own list of twenty-three properties and characteristics of effective groups:

1. Members are skilled in all the various leadership and membership roles and functions required for interaction between leaders and members and between members and other members.

2. The group has been in existence sufficiently long to develop a well-established, relaxed working relationship among all its members.

3. The members of the group are attracted to it and are loyal to its members, including the leader.

4. The members and leaders have a high degree of confidence and trust in each other.

5. The values and goals of the group are a satisfactory integration and expression of the relevant values and needs of its members. They have helped shape these values and goals and are satisfied with them.

6. As members of the group are performing linking functions, they try to have the values and goals of the groups, which they link in harmony, one with the other.

7. The more important a value seems to the group, the greater the likelihood that the individual member will accept it.

8. The members of the group are highly motivated to abide by the major values and to achieve the important goals of the group. Each member will do all that they can,

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and at times all in their power, to help the group achieve its central objectives. Each member expects every other member to do the same.

9. The entire interaction, problem-solving, decision making activities of the group occur in a supportive atmosphere. Suggestions, comments, ideas, information, and criticisms are all offered with a helpful orientation. Their contributions are received in the same spirit.

10. The superior of each work group exerts a major influence in establishing the tone and atmosphere of that work group by their leadership principles and practices. In a highly effective group, the leader adheres to those principles of leadership, which create a supportive atmosphere in the group and a cooperative rather than a competitive relationship among the members.

11. The group is eager to help each member develop to their full potential. It sees for example, that relevant technical knowledge and training in interpersonal and group skills are made available to each member.

12. Each member accepts willingly and without resentment the goals and expectations that the individual and the group establish for themselves. The goals are adapted to the member's capacity to perform.

13. The leader and the members believe that each group member can accomplish the impossible. These expectations stretch each member to the maximum and accelerate personal growth

14 When necessary or advisable other members of the group will give a member the help needed to accomplish successfully the goals set for that person. Mutual help is a characteristic of highly effective groups.

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15. The supportive atmosphere of the effective group stimulates creativity. The group does not demand narrow conformity. The group attaches high value to new, creative approaches, and solutions to its problems and to the problems of the organization of which it is a part.

16. The group knows the value of constructive conformity and knows when to use it and for what purposes. Although it does not permit conformity to affect adversely the creative efforts of its members, it does expect conformity on mechanical and administrative matters to save the time of members and to facilitate the group's activities.

17. There is high motivation in the group to use the communication process so that it best serves the interests and goals of the group. Every item that a member feels is important, but which for some reason is being ignored, will be repeated until it receives the attention that it deserves

18. Just as there is high motivation to communicate, there is correspondingly strong motivation to receive communication. Each member is genuinely interested in any information on any relevant matter that any member can provide. Members do not look behind information and attempt to interpret it in ways opposite to its purported intent.

19. In effective groups, there are strong motivations to try and influence other members as well as to be receptive to influence by them.

20. The group processes of effective groups enable members to exert more influence on the leader and to communicate far more information to them, including suggestions as to what needs to be done.

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21. The ability of the members of a group to influence each other contributes to the flexibility and adaptability of the group. Ideas, goals, and attitudes do not become frozen if members are able to influence each other continuously.

22. In effective groups individual members feel secure in making decisions which seem appropriate to them because the goals and philosophy of operation are clearly understood by each member and provide a solid base for making decisions.

23. The leader of an effective group is selected carefully. Their leadership ability is so evident that they would probably emerge as the leader in any unstructured situation.

Blake and Mouton (1964) emphasized leadership, task specialization, and division of labor as key elements of effective teams. Their metaphor is an athletic one describing football and baseball involving synchronized effort by everyone, pair action with meshing between two players, and solo action

Lawrence and Lorsch (1967) have advocated *differentiation-integration*. As work groups are created for specific projects by drawing on people from several departments, it is important that groups are allowed to develop along different lines. A sales department is different than a manufacturing group. It is unwise to expect all groups to function the same, particularly when the groups are made up of people from a variety of departments. Lorsch and Lawrence contended that work teams should be differentiated, but in such a way that there is effective integration. Common goal setting, planning, and coordination can all be methods of integration.

Dyer (1977) developed a team development scale using the following indices: membership, safety, communication, decision making, goals, cooperation, planing,

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conflict, leadership, and responsibility. The scale focuses on process. Dyer assumes that if there is good process in these areas, there will be a successful product.

Tasks and Effectiveness

McGrath (1984) suggested four basic types of work tasks in the Task Circumplex. McGrath identified the tasks as generate, chose, negotiate and execute. He puts them in a pie diagram entitled the, McGrath Task Circumplex, and identifies a linear sequence to work, see Figure 3 Generation leads to choosing. Choosing leads to negotiation, which leads to execution. Work first involves generating tasks involving planning, tasks to create, and creativity tasks, to generate ideas. Next, work is choosing tasks. Choosing tasks involves intellective activities focusing on problem solving and decision making. Choosing results in negotiating tasks. Negotiating involves cognitive conflict about different viewpoints and mixed motive tasks which are about resolving conflicts of interest. This results in executing tasks. Execution involves contexts and competition that are physical resolutions of conflicts of power and performances that require joint action.

Like McGrath, Dyer (1977) defined groups in terms of the tasks that they do. Dyer's taxonomy included these critical tasks: building relationships, building a facilitative emotional climate, and working out methods for goal setting, problem-solving, decision making, insuring follow through and completion of tasks, developing collaborative effort, establishing lines of open communication, and insuring a support system that affirms people and promotes discussion and disagreement.

Lipnack and Stamps (1997) suggested teams orient around the tasks of McGrath's Task Circumplex. Typically teams begin with planning, then gather information and

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attempt to be creative, then do problem-solving and finally decision making. Different teams will address this sequence of work differently. A dominant task team will determine what type of work it participates in and what success looks like in that task environment. Any consideration of success must also include a taxonomy of team type and accompanying work tasks.

Psychological Needs of Members and Success

Another set of criteria for team success is the group's effectiveness in addressing the psychological needs of the group members. It is assumed that those teams that meet the individual needs of the group members will be successful in their task.

Society is currently in an epidemic of depression, anxiety and mental illness (Seligman, 1988). Contrary to expectations, younger people are more likely to be depressed than older people (Robins, 1984). The rate of depression has increased by tenfold over the last two generations. This may be the result of breakdowns in cooperative relationships within the family, neighborhood, community, work, church and country. In today's world, each individual is encouraged to live exclusively for themselves. When adversity hits, each individual is expected to lean exclusively on themselves (Johnson & Johnson, 1991a).

To address this epidemic, our society needs more effective teams and groups. The psychological health, coping skills, and ego strengths needed to develop, build, and maintain psychological health comes from being involved in caring and committed relationships in the context of groups. The more individuals understand about group dynamics and the more skillful they are in enhancing productivity and building

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supportive and caring relationships within groups, the more healthy they tend to be psychologically (Johnson & Johnson, 1991a).

According to Robbins (1997) individuals join groups for six reasons:

1. Security; by joining a group, individuals can reduce the insecurity of standing alone. People feel stronger, have fewer self-doubts, and are more resistant to threats when they are part of a group.

2. Status; inclusion in a group that is viewed as important by others provides recognition and status for its members

3. Self-esteem; groups can provide people with feelings of self-worth. In addition to conveying status to those outside the group, membership can also give increased feelings of worth to the group members themselves.

4. Affiliation; groups can fulfill social needs. People enjoy the regular interaction that comes with group membership. For many people, these interactions are their primary source for fulfilling their needs for affiliation.

5. Power; what cannot be achieved individually often becomes possible through group action. There is power in numbers.

6. Goal Achievement; there are times when it takes more than one person to accomplish a particular task. There is a need to pool talents, knowledge, or power in order to get a job completed. In such instances, management will rely on the use of a formal group.

Three of the most important psychological benefits related to group membership are social support, self-esteem, and psychological health. Social support is about the exchange of resources to enhance mutual well being. It deals with the existence of

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available people who can be relied on for assistance, encouragement, acceptance, and caring. People's productivity, psychological well being and adjustment, physical health, and ability to cope with stress are helped directly and indirectly through the emotional concern, instrumental aid, information and feedback of groups. Social support and stress are related in that the greater your social support, the less stress you experience, and the better able you are to manage the stresses involved in life (Johnson & Johnson, 1991a).

Self-esteem comes from relationships and interaction with others. The degree of self-esteem, as well as the reasoning process used to derive it, are both products of interpersonal interaction (Johnson, et al. 1987). The more cooperative your relationships with others, the higher your self-esteem will be, and the more constructive will be your processes for arriving at conclusions about self-worth (Johnson & Johnson, 1991a).

Psychological health depends on belonging to groups where one is valued and respected. The basic attitudes and competencies needed to stabilize psychological health are developed in groups. One important aspect of groups for psychological health is humor and fun (Johnson & Johnson, 1991a)

Several psychological indices are helpful in clarifying the psychological needs of team members. Maslow's hierarchy suggested that team members will physiological needs, safety needs, social needs, esteem needs, and self-actualization needs (Maslow, 1954).

Herzberg et al. (1959) also provided a possible index with motivation-hygiene theory. The index is based on what people want from the team. The focus of the index is on the motivating satisfiers that Herzberg identified, i.e., Achievement, Recognition, Work Itself, Responsibility, Advancement and Growth.

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McClelland (1959, 1975) provided a possible index with three major relevant motives in the workplace: the need for achievement, the need for power, and the need for affiliation. Achievement refers to the need to excel. Power refers to the need to make others behave in a way they would not have behaved in otherwise. Affiliation refers to the desire for friendly and close inter-personal relationships. Atkinson and Raynor's (1974) work supports McClelland's Three Need Theory.

Locke's Goal Setting Theory (Locke, 1968; Locke, et al. 1990) is also a possible index. The theory suggested that intentions, expressed as goals, can be a major source of work motivation. Specific goals lead to increased performance and difficult goals, when accepted, result in higher performance than easy goals (Tubbs, 1986).

Adams' Equity Theory (1965) index stated that workers compare their own job inputs and outcomes with those of others, and that inequities can influence the degree of effort those employees make. Equity Theory asserts employees weigh what they put into a job against what they get out of it and compare their input-outcome ration with the same ratio of relevant others.

The three referents that employees chose to compare themselves against are: others, systems, and self. Other includes other friends, neighbors, or professional associates. System considers organizational pay polices and procedures as well as the administration of the system. Self refers to input-outcome rations that are unique to the individual, such as past jobs or family commitments (Mowday, 1991). The choice of referents is related to the information available and perceived relevance.

Equity Theory indices report that when employees perceive an inequity they make one of five choices (Vecchio, 1984):

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1. Distort either their own or others' inputs or outcomes.
2. Behave so as to induce others to change their inputs or outcomes.
3. Behave so as to change their own inputs or outcomes.
4. Choose a different comparison referent.
5. Quit their job.

Vroom's Expectancy Theory index (1964) argued that the strength of a behavioral tendency was dependent on both (a) the individual's perception of the probability that their outcome would be successful and (b) the attractiveness of that outcome to the individual. If the behavior is attractive because is attached to need, linked to a perceived attractive reward, and linked with probability of the behavior being successful, the behavioral strength will be high (House, et al 1974).

Lastly, it must be remembered that most current motivation theories are culture-bound. Americans developed them in the United States about other Americans. They strongly forward individualism and masculinity (Robbins, 1997).

Elements for Team Success

Researchers have come up with a variety of elements necessary for team success. Carr (1992) suggested effective teams were competent and committed to the extent that their work challenged them, lets them control it, and provided them the opportunity to cooperate with each other. Customers benefit from competence and commitment based on challenge, control, and cooperation

Carr (1992) outline eight characteristics of successful teams:

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1. Shared values that support teamwork. Trust, influence and commitment all begin in shared values. Values are what we want to believe in and are willing to work for. Goals are the end results that will embody our values.

2. Clear worthwhile goals. When Larson and LaFasto (1989) set out to determine what made teams successful, one condition was crystal clear. High performance teams have both a clear understanding of the goal and a belief that the goal is important and worthwhile.

3. Genuine need for each member of the team. Shared values and a worthwhile goal is not enough. There must be a real need for the combination of skills and stakeholders that the team represents. A team is only a team if the members really need each other to accomplish its goals.

4. Genuine commitment to the goals. Larson and LaFasto (1989) also discovered that the most common issue resulting in ineffective teams was the raising of some other issue or focus above the teams performance objective. These issues could be a personality conflict, a power struggle, and interesting tangent, whatever.

5. Specific measurable objectives. If a team has established a clear short-term goal, that goal can be measurable and establish clear links with long-term objectives.

6. Direct, prompt, dependable and usable feedback to the team. Objectives lack value if the team does not know how its performance lines up with them.

7. Rewards for the team, not just for individuals. This is the most often violated variable for effective teams. Evaluate the team's performance, not individuals.

8. Solid individual and group competence. For the team to succeed, the members must have the competence to do what is required. Competence involves subject

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matter teamwork. Members must have the skills required to see that the task is completed and the skills to ensure that relationships are effective.

In order to measure these eight characteristics, Carr (1992) suggested eight questions:

1. What are the important values shared among the team players, and between the team and myself, which will support teamwork?

2. What are the clear, worthwhile goals the team is to accomplish?

3. Why do the team members need each other to accomplish these goals?

4. What will create genuine commitment to the team's goals?

5. What are the specific objectives by which the team's success will be measured?

6. How is the team going to get direct, prompt, dependable, and useable feedback on its performance?

7. What rewards are there for team, rather than just individual success?

8. How competent is the team, both as individuals and as a team?

In addition to these eight characteristics of effective teams, Carr recommends six key processes for teams:

1. The team must see that all of the members get their individual needs satisfied.

2. The team must have effective interaction processes to facilitate communication, conflict, and disagreement.

3. The team must have an effective managerial process to coordinate the actions of the team.

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4. The team must have effective leadership processes that focus and maintain the purpose of the group. It focuses on values and purpose.

5. The team must produce an output effectively and efficiently.

6. The team must maintain effective interaction with its environment.

Fisher and Fisher (1998) built on the research of Lorsch and Lawrence (1967) with his team effectiveness concerns. Fisher emphasized the importance of integration with teams. Differentiation is a natural process like entropy. Effective teams have thought through how to balance differentiation with integration. Fisher emphasizes four key linking integration functions for effective teams: structure, leadership, shared values, and rewarded goals.

Structure is the physical design of the team including variables of size, membership, reporting relationships, etc. Leadership is the method used to give the structure direction and coaching. Effective teams rely on a participatory style of leadership with an emphasis on empowerment. Shared values are the context for work and the compass to determine which actions are best. Rewarded goals refers to the fact that neither rewards alone or goals alone seem to account for effective teams. Rewards linked to goals seem to make the difference (Fisher & Fisher, 1998).

George and Wilson (1997) outlined eight critical elements for effective teams:

1. Establish clear organizational direction. Where is the organization going? How are the organizational goals translated into goals for the team?

2. Encourage organizational involvement. Make sure the organization knows about your team and their connection to the organization's goals.

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3. Implement design principles. Implement simplicity, cross-training, job ownership, meaningful work, aligned systems, and evolution.

4. Shared responsibilities. Delegation of team tasks. Develop an empowerment schedule.

5. Shared leadership roles. Organize the empowerment schedule by function. Assign these leadership functions: quality, maintenance, communication, production, and safety.

6. Have a charter. The charter includes purpose, responsibilities, completion, boundaries, ground rules, and meetings

7. Practice team skills Ensure that members have skills related to business skills, job skills, interaction skills, team skills, and problem solving skills.

8. Monitor results.

Jensen and Chilberg (1991) defined a group in terms of its characteristics. One possible scale for effective groups would be to build a scale based on the definition of a group or a team Jensen stated that members constitute a group when they perceive themselves as having: common goals, a network of communication, behavioral interdependence, structured relations, shared norms, and a sense of wholeness. Such an effectiveness scale would measure the strength of common goals, a network of communication, behavioral interdependence, structured relations, shared norms, and a sense of wholeness.

McIntosh-Fletcher (1996) also used the definition of a team to be the yardstick for determining team effectiveness A team is understood to be a group of individuals who share work activities and the responsibility for specific outcomes. As a result, McIntosh-

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Fletcher outlined interdependence, shared responsibility, and team outcomes as the critical dimensions for effective teams McIntosh-Fletcher introduces a checklist for a productive team based on these three critical dimensions: cohesiveness or developing relationships, integration or linking with other teams, and productivity or doing the work. These seem to be related to the initial three dimensions as interdependence or cohesiveness, shared responsibilities or integration, and team outcomes or productivity.

McIntosh-Fletcher's (1996) productive team checklist has sixteen questions:

1 To what extent do you enjoy performing your team activities?

2. To what extent do you feel a real responsibility to help your team be successful?

3. To what extent do you feel you are accepted as a member of your team?

4. To what extent do you feel you receive enough praise or recognition when a job is well done?

5. How receptive are people higher in the organization to team suggestions and new ideas?

6. Does the organization keep an open and frank flow of information about important events affecting your team?

7. Do other functions or teams plan and coordinate their efforts to maintain an effective flow of work activity?

8. Are there things, people, policies, or conditions, about working on this team that encourage you to work hard?

9 To what extent is the organization generally quick to accept your team's improved work methods?

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10. Are the decisions made at those levels where the most adequate and accurate information is available?

11. Does the organization have a real interest in the welfare and happiness of those who work on your team?

12. How much does the organization try to improve working conditions for your team?

13. To what extent does the organization have clear-cut, reasonable goals, and objectives for your team to support?

14. To what extent are work activities for this team sensibly organized?

15. How adequate is the information you get about other functions or related teams?

16. Are the equipment and resources your team has to work with adequate, efficient, and well maintained?

Johnson and Johnson (1991b) stated that group effectiveness does not occur magically whenever groups are formed. Members must work intentionally to build and maintain group effectiveness. Effective groups have three core activities: accomplishing goals, maintaining good working relationships between its members, and developing and adapting to its environment in ways that enhance its effectiveness. Group members must have the skill to support these activities.

Johnson and Johnson (1991a) proposed nine dimensions of group effectiveness. These dimensions are used diagnostically to suggest areas of improvement for a team:

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1. Group goals must be clearly understood, be relevant to the needs of group members, highlight the positive interdependence of members, and evoke from every member a high level of commitment to their accomplishment.

2. Group members must communicate their ideas and feelings accurately and clearly.

3. Participation and leadership must be distributed among members.

4. Appropriate decision making procedures must be used flexibly to match them with the needs of the situation

5. Conflict should be encouraged and managed constructively.

6. Power and influence need to be approximately equal throughout the group.

7. Group cohesion needs to be high. Cohesion is based on members liking each other, desiring to continue as part of the group, and being satisfied with their membership

8. Problem solving adequacy should be high

9. The interpersonal effectiveness of members needs to be high. Interpersonal effectiveness is a measure of how well the consequences of behavior match intentions.

Johnson and Johnson (1991a) defined organizational effectiveness as the ability of the organization to achieve its goals with the minimal use of resources while maintaining effective cooperation among members and adapting to the external environment. Organizational effectiveness is dependent on four factors.

1. The interpersonal, small group skills, personal attitudes, and technical competencies of its members.

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2. Organizational structure, roles and norms, that support interpersonal skills, small group skills, personal attitudes, and technical competencies.

3. Organizational culture that supports the patterns of interaction and relating among members. The patterns of interaction are based on norms, values, history of internal and external conflicts, types of people attracted to the organization, work processes and physical layout, modes of communication, and the use of authority.

4. The psychological energy of the members must be connected to the organization's work.

Peace (1985) has a simple approach to team effectiveness. For Peace, the primary criteria is process. Effective teams are those that pay informed attention to group processes. As group dynamics are nurtured, the group matures and more is likely to fulfill its potentials.

Scholtes et al. (1996) linked effective teams to organizations. Effective teams are those that stay in touch with organizational needs Scholtes emphasized the importance of checking the link between team purpose and organizational priorities.

Scholtes et al. (1996) has a list of six critical team dimensions:

1. Teams must have clearly defined purposes and goals that serve the organization.

2. Teams need clearly defined parameters within which to work.

3. Teams need to be able to communicate within the organization.

4. Teams need to have people with the necessary knowledge and skills to accomplish their tasks.

5. Teams need to know how they are going to accomplish their tasks.

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6. Teams need to know how to do their tasks.

In order to build effective teams, it is necessary to first understand the variables that influence its performance. Beckhard (1972) proposed that effective teams must manage four areas: goal, roles, processes, and relationships. Rubin, Plovnik and Fry (1975) determined that these four areas are causally related. Shonk (1982) found a fifth dimension to team life that is essential for effective teams, the team's interaction with its external environment. Shonk suggested that it was the five dimensions of goal, roles, processes, relationships, and environment, that must be the focus of attention for effective team performance.

Rubin, Fry and Plovnick (1978) found that these five dimensions interact. The effective or ineffective performance in one dimension can affect another dimensions. They also found that there is a hierarchy of interaction for these dimensions (see Figure 17). Some dimensions were found to potentially influence all the others. Those at the top of the hierarchy influence all below them.

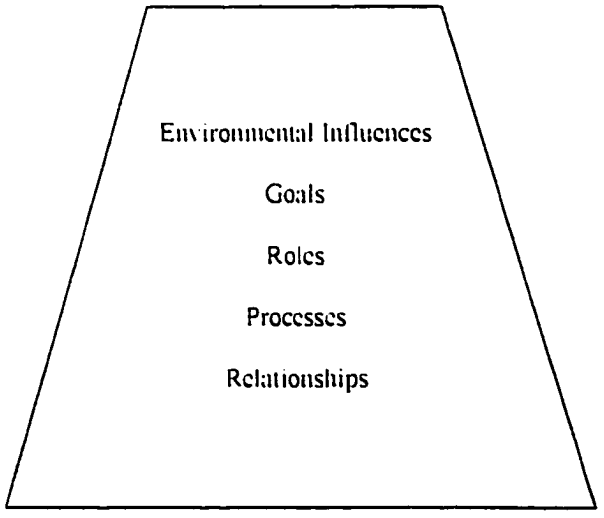

Figure 17. Connectivity of Team Dimensions to Team Effectiveness.

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The interactive capability can be seen by identifying problems commonly seen in teams and tracing them to their source (Shonk, 1982). For example, two members of the team are experiencing a relational problem and express a desire for a team building exercise. Experience has demonstrated that the relational problem is not a social one, it is a work problem. The individuals involved interact well off the job. Closer examination indicates that the source of the relational tension on the job is that they disagree on what the goal should be, or they have conflicting roles, or they disagree about the decision making process. What appears to be a relational problem may have another root cause Rubin et al. (1978).

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DISSERTATION

WHAT IS THE IMPACT OF TELEPHONES AND SYNCHRONOUS COMPUTER-MEDIATED COLLABORATION ON THE WORK OF VIRTUAL TEAMS?

VOLUME TWO

CHAPTERS THREE, FOUR, AND FIVE

Submitted by

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In partial fulfillment of the requirements

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CHAPTER THREE

Methods

Introduction

In the following chapter we will review available research methodologies to use in investigating the research problem and research questions. First, let's review some of what we have learned from the first two chapters.

Virtuality is a conceptual reality. It involves a new way of thinking. Virtuality refers to appearance. Something is potentially real or appears to be real, is something that is virtual. Virtuality also carries the image of enhancement. It makes something better than it was before. Virtuality is a way of thinking that deals with potential, appearance and enhancement.

This virtual way of thinking is forwarded by changing philosophic and work contexts. The philosophic context has changed from modernity to postmodernity. Postmodernity is about changed epistemology and metaphysics. Knowledge is no longer based on the use of reason. There is no utopian hope for society. Truth is not understood as an objective detached reality. Postmodernity understands truth to be more about choice than absolutes. Knowledge is based on subjective group experiences not individuals. Social groups determine the choices.

Postmodernity forwards virtual work environments in several key ways.

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1. The postmodern era values simulation or what is not real. These simulations are only possible through the medium of technology. It is a world of hyperreality where appearance and fantasy are valued. The orientation towards technology and its production of simulated reality allows an increased use of virtual teams in the work environment.

2. Postmodernity's emphasis on social constructions of truth supports virtual thinking and virtual teams. One of the potentials of virtual teams is their social perception of their environment. Team processes are relied on to increase the quality and delivery of new innovative products. As the group interacts with the environment, the group discovers new truths, purposes and goals.

3. Postmodernity's subjective basis of knowing supports virtual thinking. Virtual processes emphasize relationships, participatory leadership and communication. These personal subjective experiences are central for virtual teams and highly valued in postmodern culture.

4. Postmodernity focuses on collaboration instead of conquest. Virtual thinking and teams are also very concerned with connection and collaboration.

5. Postmodernity emphasizes the role of intuition in knowing. Virtual thinking and teams support the use of intuition as central to innovation.

In addition to a changed philosophic environment, the work environment has also changed from a physical to a virtual work environment. There has been a dramatic increase in the number of teleworkers and virtual teams over the last decade. Telecommuting was initially seen as a concession to workers, but lately managers have

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understood telecommuting to be strategic. As a result, there is a dramatic increase in virtual teams.

North American culture is shifting from an industrial to an information society. We are living in a post-industrial society. We do knowledge work instead of physical work. These changes are affecting management and organizational structures. Work processes are now concurrent instead of serial. Work is no longer based on Newtonian science. The new paradigm is quantum physics.

The global nature of marketplaces has also forced change in the work environment. Legislation, technology and worker values have also changed the work environment. New leadership focuses on communication. Organizations focus on employability, flatter organization, diversity, performance, and whole life. The mechanics of trust have changed in the workplace.

The virtual work environment is an expression of this new age. It involves new social organization, rules, roles, distribution of power, work processes, and structures. It is knowledge work, not physical work. Any work environment where people collaborate at a distance greater than fifty feet is a potential virtual work environment. In order to be an actual virtual work environment, that potential work environment must be connected to thinking virtually.

Groups and teams are not the same things. The terms are used interchangeably, but do not mean the same thing. Groups feature two or more individuals, interaction between group members and some interdependence between the members. Teams are similar, but add the dimension of intention, purpose or task.

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There are many different kinds of teams. Some teams are classified by their mode of leadership, some by whether they are informal or formal, some by whether they are proximate or distant, some by whether they are temporary or permanent, and some by whether they have single department or cross-department membership.

Virtual teams have been defined ten ways.

1. On the basis of distance: Collated or greater than 50 feet distant.
2. One the basis of interaction. The primary means of interaction is electronic.
3. On the basis of time: They are temporary or cross time zones.
4. On the basis of boundaries. They are cross-functional and boundary-less.
5. On the basis of leadership. Leadership rotates.
6. On the basis of membership. It is dynamic and skill oriented.
7. On the basis of thinking: It is primarily conceptual.
8. On the basis of work design: It is concurrent and knowledge based.
9. On the basis of purpose. They are special purpose oriented.
10. On the basis of place: They have no home.

This study will define virtual teams as individuals at a distance of over fifty feet interacting interdependently with intention whose primary means of collaboration is electronic communication.

A review of the literature revealed thirty-two possible team domains. See Table 3. There is a fair amount of redundancy of team domain terms in the literature. For example, some researchers use plan, others goals, others purpose when referring to essentially the same idea. Because the research indicated that what makes teams work is teamwork, collaboration was used as a gathering paradigm to sort the literature.

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The model used in the study is adapted from Team Resources (Team Resources, 1998) and includes seven team domains. See Table 4.

1. Purpose: The Reason for Collaboration.
2. Roles: Creates Interdependence and Demands Collaboration.
3. Leadership: The Structure for Collaboration.
4. Decision Processes: The Process for Collaboration.
5. Relationships and Trust: The Climate for Collaboration.
6. Communication: The Means for Collaboration.
7. Effectiveness and Responsibility: The Accountability of Collaboration

Several usual team dimensions are folded into these seven team domains.

1. Roles include norms, membership and group size.
2. Decision processes includes meetings
3. Relationships and trust includes conflict, status, and cohesion.
4. Effectiveness and responsibility includes feedback and performance.

The model incorporated both recurring stage and sequential stage developmental theory. The next sequential stage will not occur until the recurring issues are addressed in that sequential stage. Hensey's developmental sequence (1992), coupled with Worchel's et al. (1992) and Tuckman's (1965) stage sequence will not proceed until the team strengthens the recurring issue of collaboration sufficiently to take the next step. Effective team building will be continuous.

The literature suggested that these seven domains were important for effective teams in traditional settings. Next is to determine if these domains are also important

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with teams collaborating in virtual work environments and if there are any domains unique to teams collaborating in virtual work environments.

What is missing in the literature is the contextualization of teams in postmodernity and the new virtual work environments. Most of the literature addressed teams in traditional work environments. This study will add to the literature by discovering what is distinctive in virtual teams and what elements are shared with traditional teams. The study will not address the role of postmodernity and modernity with traditional and virtual teams. It will only observe the connection between postmodern thought and virtual work environments.

Selection of Qualitative Method

Logical positivism has been the epistemological foundation for most social science inquiry in the 20th century. Logical positivism asserts that all knowledge is derived from direct observation and logical inferences based on direct observation. The concept of objectively studying people is derived from the impact of natural science on social science. The natural scientist understands nature by isolating phenomena, observing them and formulating mathematical laws to describe patterns. Current research in the social sciences is strongly influenced by the empirical and quantitative traditions (Rudestam, et al. 1992).

Statistical methods are effective for reducing relationships and patterns to numbers. Descriptive statistics describe these patterns of behavior. Inferential statistics are based on probabilistic arguments to generalize findings from samples to populations of interest. Kerlinger (1979) centered on this inferential approach in his definition of statistics as,

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> the theory and method of analyzing quantitative data obtained from samples of observations in order to study and compare sources of variance of phenomena, to help make decisions to accept or reject hypothesized relations between the phenomena, and to aid in making reliable inferences from empirical observations (Kerlinger, 1979).

The focus in the natural science model of research is the study of average or group effects as opposed to the study of individual differences (Rudestam, et al. 1992).

In experimental research, quantitative research designs are used to discover group differences between groups of subjects. The emphasis is on precise measurement and controlling for extraneous sources of error. The purpose is to isolate a variable of interest, the independent variable, and manipulate it to observe the impact of a second, dependent variable. Extraneous variables are controlled to allow the researcher to infer a causal relationship between the variables of interest (Rudestam, et al. 1992).

Methodological control is accomplished on the principle of randomness. One control is random sampling using subjects that have been randomly taken from a pool of subjects in such a way that each member of the pool has an equal chance of being selected. Random selection allows the researcher to generalize the results of the study from the sample to the population of interest. Another randomization procedure is when subjects are assigned to groups or conditions in such a way that each subject has an equal chance of being selected for each condition. Subject characteristics are then randomly distributed allowing the researcher to infer that any differences between groups must be due to the isolated variable under study (Rudestam, et al. 1992).

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Unfortunately, this natural science approach is often impractical in the social sciences. Psychology, sociology, education and political science have difficulty enforcing the strict control necessary in the experimental model. It is not pragmatic to conspire to rear children using two distinct parenting styles, nor ethical to use child abuse to study the impact of child abuse. Other research methods have arisen as a result. The research method favored in the social sciences is the quasi-experimental design. This design compromises some of the rigor of a controlled experiment, but also maintains the argument and logic of experimental research (Cook, et al. 1979).

A different trend in social science research calls for avoiding the artificiality and narrowness of experimental studies by promoting studies that allow researchers to be more spontaneous and flexible in exploring phenomena in their natural environment (Rudestam, et al.1992) These methods of study are challenging the epistemological and philosophical foundations of traditional social science research (Guba, et al. 1981; Patton, 1990; Spradley, 1979). Some proponents of these approaches question the validity of logical positivistic science applied to human behavior and social systems and take issue with the notion that investigators can be neutral and disengaged (Feyerabend, 1981a, 1981b; Popper, 1965; Toulmin, 1972) Following modern physics, they suggest that the presence of the observer inevitably alters what is being observed. Feminist theorists have another reason for challenging the traditional experimental method. They claim that it creates a hierarchy of power where the omnipotent male researcher instructs, observes, records and sometimes deceives the subjects (Peplau, et al. 1989).

The label commonly used to describe these alternative research strategies is qualitative research. Qualitative implies that the data are in the form of words instead of

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numbers. While quantitative data are generally evaluated using inferential statistics, qualitative data are usually reduced to themes or categories that are evaluated subjectively. There is more emphasis on description and discovery and less emphasis on hypothesis testing and verification (Rudestam, et al. 1992).

Patton (1980) maintained that all qualitative research shares three fundamental assumptions: a holistic view, an inductive approach, and naturalistic inquiry. The holistic approach emphasizes that the whole is more than the sum of its parts. An inductive approach is one where the researcher does not impose much of an organizational structure or make assumptions about the interrelationships among the data prior to making the observations. Naturalistic inquiry intends to understand phenomena in their naturally occurring states.

What is often forgotten in the dialogue between quantitative and qualitative methods are the types of questions that each addresses The dialogue for either method seems to assume that both methods attempt to answer the same questions or assume that they are both based on the same assumptions. A better way to debate the methodologies is to examine each method in light of the specific research question being asked (Howe, et al. 1990). This view of matching research questions with methodology is essential (Martella, et al. 1999).

Quantitative research is focused on the reliable and valid investigation of the impact of independent variables on dependent variables or the relationships between or among variables. Quantitative researchers focus on the outcomes of interventions and the measurement of the dependent variable. Qualitative research focuses on how people feel, what they believe, how they process experiences or events, and the meaning people

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attach to experience. Qualitative researchers focus on understanding the context of behavior not just the behavior itself. The assessment is subjective in that dependent variables are not clearly defined (Martella, et al. 1999). Qualitative data is better for discovering and exploring new areas. Qualitative data supports the discovery of hypotheses (Miles, et al. 1994).

The research problem in this study will be best addressed by the qualitative method. The primary purpose is to describe on-going domains of virtual teams. The hypotheses will be developed during the course of the study in an inductive fashion. There is no specific independent variable, as the study's intent is to study virtual teams without interference. Objective collection of the data is not required. The research design will be variable and developmental over the course of the study. The data will be represented and summarized in verbal forms. The study will examine behavior in its natural setting. Virtual teams will be studied holistically as a complex system. The conclusions will be tentative and subjected to on-going examination. The focus will be process not outcome or product.

Selection of Heuristic Case Study Method

The qualitative methodological approach is best equipped to discover hypotheses and address the research question. There are multitudes of methodological approaches within the qualitative paradigm to select from. The primary quantitative approaches are case study, ethnography, phenomenology and grounded theory (Leedy, 1997). Patton (1990) added a number of other traditions and orientations, one of which is heuristic inquiry.

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Patton proposed that the method used to derive a theory will determine the theory. How you study the world will determine what you learn about the world (Patton, 1990). A number of other researchers have made the same observation (Glaser, et al. 1967; Denzin, 1978; Blumer, 1969; Whyte, 1984; Becker, 1970; Lofland, et al. 1984). Thus, selection of method will strongly influence the study findings. It is essential to select a qualitative method that will best support the research problem.

The ethnographic approach is based on the discipline of anthropology and addresses the question, What is the culture of this group of people? (Patton, 1990). Given this parameter, there are still a number of ethnographic styles including the classic holistic style(Mead, 1977), the semiotic style (Boas, 1943; Geertz, 1973), and the behavioristic style (Sanday, 1983). A focus on culture has also become a part of organizational studies (Pettigrew, 1983; Raia, et al. 1985; Schein, 1985) and an approach for program evaluation (Fetterman, 1984). The distinctive element of the ethnographic method is the interpretation from a cultural perspective (Wolcott, 1980).

The phenomenological approach addresses the question, What is the structure and essence of experience of this phenomenon for these people? The phenomenon under study may be an emotion, a relationship, a marriage, a job, a program, an organization, or a culture (Patton, 1990).

Patton (1990) reviewed Husserl (1962) as the first to use phenomenology as a philosophical tradition to develop a rigorous science. Schutz (1977) was important in extending phenomenology and establishing it as a major philosophical and social science perspective. Other key influences have been Merleau-Ponty (1962), Whitehead (1958), Giorgi (1971), and Zaner (1970).

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Husserl (1962) described phenomenology to be the study of how people describe things and experience them through their senses. His basic philosophical assumption was that we could only know what we experience by paying attention to perceptions and meanings that awaken from our conscious awareness. All of our understanding comes from sensory experience of phenomena. In order to be understood, that experience must be described, explicated and interpreted; however, descriptions of experience and interpretations are so connected that they become a unit. Interpretation is important to understand experience and experience always includes interpretation. Phenomenologists then focus on how we put together the phenomena experienced in such a way as to make sense of the world. There is no objective separate reality for people. There is only what they know their experience is and means. Their subjective experience incorporates the objective with a person's reality (Patton, 1990).

Two implications of phenomenological research are easily confused. The first is that what is important to know is what people experience and how they interpret the world. That is the subject matter of phenomenological research. The second is about methodology. The only way to really know another's experience is to experience it for ourselves. This leads to participant observation. Thus, a phenomenological inquiry can mean either or both, a focus on what people experience and how they interpret the world or a methodological mandate to actually experience the phenomenon being studied (Patton, 1990).

Heuristics is a form of phenomenological inquiry that brings the personal experience and insights of the researcher to the study (Patton, 1990). Heuristic inquiry

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asks, What is my experience of this phenomenon and the essential experience of others who also experience this phenomenon?

In a heuristic study the researcher must have personal experience with and intense interest in the phenomenon being studied. The researcher must also have co-researchers, others, as a part of the study who share the same intensity of experience with the phenomenon. Heuristic inquiry focuses on intense human experience, intense from the perspective of both the researcher and the co-researchers. It is this combination of personal experience and intensity that will produce an understanding of the phenomenon (Patton, 1990). Heuristics is concerned with meanings not measurements, with essence not appearance, quality not quantity, and experience not behavior (Douglas, et al. 1984).

Heuristic is from a Greek word meaning to discover (Patton, 1990). Craig (1978) has defined heuristic as "I find" and relates it to discover and "eureka." Heuristic research is filled with discovery, personal insight and reflections of the researcher. Discovery occurs as the researcher is in wide-open surrender to the phenomenon (Douglas, et al. 1984).

Heuristic inquiry is unique in the extent to which it legitimizes and elevates the researcher's personal experiences, reflections and insights. A sense of connection develops between the researcher and the subjects as together they try to explain significant human experiences (Patton, 1990). It affirms the possibility that the researcher can live deeply and passionately in the phenomenon and still be engaged in meaningful research (Craig, 1978).

Classic works in heuristic inquiry are Moustakas's studies of loneliness (Moustakas, 1961, 1972, 1975). Other examples are Craig (1978), Hawka (1985),

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Weidman (1985), Katz (1987), Cheyne (1988), and Marino (1985). Heuristic methods have roots in humanistic psychology (Maslow, 1954; 1966; Rogers, 1961, 1969, 1977; Polanyi, 1962).

Heuristic inquiry is based on *tacit knowing*. Tacit knowing involves knowing what operates behind the scenes. It gives birth to hunches and vague insights that characterize heuristic study (Douglas, et al. 1984). Polyani explains tacit knowing as the inner essence of human understanding, the things that we know but are unable to articulate (Polanyi, 1983).

Heuristic inquiry is similar to phenomenology, but also differs in four significant ways. Heuristics emphasizes the connectedness and relationship, while phenomenology encourages detachment. Heuristics leads to descriptions of meaning and significance, while phenomenology focuses on descriptions of phenomenon. Heuristics ends with a synthesis that includes the researcher's intuition, while phenomenology ends with a distillation of the structures of the experience. Phenomenology loses the subjects in the process of description, while in heuristic study the subjects remain visible (Patton, 1990). Phenomenology concludes with the essence of the experience; heuristic inquiry retains the essence of the person in the experience (Douglas, et al. 1984).

Heuristic inquiry places the researcher as the primary tool of inquiry. It challenges the traditional scientific concerns related to researcher objectivity and detachment. It is only through researcher subjectivity and attachment that meanings can be found (Patton, 1990).

Patton (1990) presented grounded theory as a central methodology in the theory linkage in qualitative inquiry. The linkages being that how you study the world

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determines what you learn. Grounded theory relies on methods that take the researcher into and proximate to the real world, so proximate that the findings are grounded in the empirical world. Blumer (1978) used the metaphor of lifting veils that obscure what is occurring. The task of inquiry is to be close enough to the subject to know what is going on. Patton (1990) saw grounded theory as being a part of all qualitative research not just one qualitative approach.

Tesch (1990) identified 20 types of qualitative research types, including grounded theory as one type. Leedy (1997) and Creswell (1994) also identified grounded theory as being a specific type of qualitative inquiry.

Grounded theory uses multiple stages of data collection, refinement and inter-relationship of categories to derive a theory (Strauss, et al. 1997). Two primary characteristics of this design are the constant comparison of data with emerging categories coupled with the theoretical sampling of different groups to maximize the similarities and differences of information (Creswell, 1994).

Leedy (1997) stated that the purpose of grounded theory design is to derive a theory that links participants' perspectives to general social science theories. It focuses on process and interaction. It draws from historical records, interviews and observations. Its primary method of data analysis is open, axial and selective coding with the constant comparative method. Its findings are typically communicated as an analytical story.

All of the qualitative designs can be considered case study designs in that each involves a focused study on the phenomenon of interest (Wolcott, 1992). All of qualitative inquiry is usually derived from a small number of case studies. The cases are selected because they are of special interest for the study's problem. If the purpose of the

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inquiry is to make generalizations, then some form of random sampling is the best design; however, if the intent is to understand a specific set of people, a particular problem, or unique situation at depth, then a single case study design is best, if the researcher can identify a case rich in information (Patton, 1990). The case study approach has the researcher focus on a single entity of the phenomenon, the case, bounded by time and activity (Creswell, 1994). The researcher collects detailed information using a variety of collection procedures during a sustained period of time (Yin, 1989; Merrian,1988). As a result, case study inquiry is particularly helpful for in-depth study of problems related to understanding processes or situations in context (Gilgun, 1994).

What makes case studies unique from other qualitative types of inquiry is the focus in depth of a single case. The information gathered from the case can help develop hypotheses and theories for later studies. Typically, a case narrative is written to present a holistic portrayal of the case (Martella, et al. 1999).

Case studies are particularly valuable when the inquiry intends to capture individual differences or unique variations from one program setting or experience to another. A case can be a person, an event, a program, an organization, a time period, a critical incident or a community. Regardless of the unit of study, a case study seeks to describe the unit in depth, detail, context and holistically. The more program or treatment aims at individualized outcomes, the greater the appropriateness of case methods. The more a program emphasizes common outcomes for all participants, the greater the appropriateness of standardized quantitative measures of performance and change (Patton, 1990).

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In order for case study to be valid, the information for each case must be as complete as possible. Critical facts and claims that are unsubstantiated by the data must be held suspect. It is also essential that the description of the case be logical and easy to follow. If the case is not readable, it will be difficult to comprehend and apply the results of the inquiry (Martella, et al. 1999).

A qualitative inquiry of a single group may be a case study. Within that single-group case study (n = 1), it is possible to do case studies of several participants. With this approach, analysis begins with the individual case studies. Then the cross-case pattern analysis of the individual cases would be a major part of the data for the group case study (Patton, 1990).

Case data consists of all the information known about each case. Each case analysis includes all the interview data, the observational data, the documentary data, impressions and statements of others about the case, and data over time. It includes all the information the researcher has gathered about each individual case involved in the case study. This provides the raw data for case analysis. At the individual level case data can include clinical records, statistical information, background information, life history profiles and diaries (Patton, 1990).

Denzin (1989) found particular value in the use of *epiphanies* in case studies. Epiphanies are problematic moments in the lives of individuals. Epiphanies can be moments that touch every aspect of an individual's life with long term and immediate effects. Epiphanies can also be eruptions, or reactions, to events that have been occurring for a long time. Epiphanies may also be events that are minor, but symbolically representative of major moments. Epiphanies may be moments that are immediate, but

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their meanings not understood until later. Denzin identified these epiphanies as major, cumulative, illuminative or minor, and relived.

After the raw case data has been gathered, the researcher begins to write a case record. The case record pulls together and organizes the case data into a comprehensive, primary resource package (Stenhouse, 1977). Information is edited, redundancies are sorted, parts are fitted together and the case record is organized for ready access either chronologically or topically or both. The case record must be complete, but manageable. It should include all the information needed for later analysis, but be organized beyond the raw case data (Patton, 1990)

The case record is utilized to construct a case study. The case study includes the information that will be communicated in the final report. It represents the descriptive data of the report. The report may consist of several case studies that are compared and contrasted, but the base data of the study are the separate cases

The process of moving from raw case data to a written case report has three steps. First, the raw case data is assembled. All the information gathered about the person, program or process related to the purpose of the study is assembled. Second, a case record is constructed. The raw case data is condensed through organizing, classifying and edited into a manageable and accessible package. Third, a written case narrative is developed. A case study narrative is a readable, descriptive picture of the person, program or process making accessible to the reader all of the information needed to understand that person, program or process. The narrative case study is presented chronologically, topically, or both. It will present a holistic portrayal of the person, program or process (Patton, 1990).

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The case study should take the reader into each case situation, a person's life, a group's life, or a program's life. Each case study in the report should stand alone allowing the reader to understand that case in a unique, holistic way. Later the cases are contrasted and compared, but initially each case must be represented and understood as a unique representation of the phenomenon under study. The descriptions of the case should be holistic and comprehensive (Patton, 1990).

Patton (1990) suggested that some strong resources for qualitative case analysis are Stake (1978, 1981, 1983), Herriott (1982), Yin (1989), and Merrian (1988). The General Accounting Office has published a major methodological manual (General Accounting Office, 1987) that is also very helpful on case studies.

As noted earlier, Patton proposed that the method used to derive a theory will determine the theory. How you study the world will determine what you learn about the world (1990). It is essential to select a qualitative method that will best support the research problem. The case study approach with a heuristic element based on grounded theory and constant comparative analysis was used in this study. The ethnographic approach was not applicable, as the research problem did not focus on culture.

The phenomenological approach with its question of, What is the structure and essence of experience of this phenomenon for these people, initially seemed to be relevant to the research problem; however, the research methods for typical phenomenological study were outside the primary interest of the research question. The primary focus was a group, not individuals. The method of data collection was not limited to unstructured interviews with a purposeful sample of individuals. The method

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of data analysis was not primarily meaning oriented. The research problem related to discovering hypotheses for virtual teams.

The grounded theory approach had some application to the research problem and was a part of the research design. The research problem supported the aspects of grounded theory related to deriving a theory linking participant perspectives to general social science theories, focusing on process, drawing from historical records, interviews, observations and diaries, was concept oriented, used open, axial and selective coding, and used the constant comparative method

The heuristic method also supported the research problem as it answered the question, What is my experience of this phenomenon and the essential experience of others who experience this phenomenon? The individuals in the group were co-researchers in the discovery process. The researcher's personal experience with the virtual team was a part of the data collection and analysis. Tacit knowledge was a part of the inquiry process. Although similar to the phenomenological inquiry, the heuristic inquiry supported the research problem more closely, as it emphasized the connection of the researcher and subjects instead of their detachment, it led to meaning and significance instead of description, it concluded with a synthesis that included the researcher's intuition instead of a distillation of the structures of the experience, and it kept the subjects visible instead of losing the subjects in the process of description. Phenomenology concludes with the essence of the experience. Heuristic inquiry retains the essence of the person in the experience.

The case study method also supported the research problem. The research problem intended to understand a virtual team in depth. The study was about examining a single

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case in-depth in order to understand the phenomenon of virtual teams. The research methods included interactive fieldwork, informal and formal interviews. The inquiry was interpretational in looking for themes, structural in searching for patterns of discourse, and reflective in portraying the view of the participants. The data collected was used to articulate hypotheses for later studies.

Selection of Case Sample

The focus of the study was domains of teams collaborating in virtual work environments. As a result, the members of a formal virtual team bound membership in the study. The study was also bound temporally. The inquiry lasted for six weeks. The heart of the study consisted of the experiences of the members of the formal virtual team. Roles or encounters did not bind the study. Every aspect of the experience of the group members over the six-week period were included in the study. The study introduced two virtual tasks to an existing team and examined the responses of the individuals to those experiences. One venue was a telephone conference call. The other was a synchronous computer conference, a computer conference held in real time. Thus, the study included specific virtual settings, specific actors, specific events, and processes; however, the study was not bound by the settings, events or processes related to the two virtual tasks. The research problem addressed the whole virtual team experience, not these isolated settings, events and processes (Miles, et al. 1994).

Given the complexity of teams, the virtual team also had to demonstrate these criteria.

1. The work environment had to be virtual.
2. The case had to be a team not a group.

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3. The case had to be in the sequential development Performance Phase.

4. The case had to be a potential virtual team.

5. The case had to be a formal, distant, permanent and bounded within a single organizational department.

6. The leadership had to be participatory.

7. The virtual team had to demonstrate the following characteristics of effective teams: clear goals, interdependent membership, a clear decision making process, a clear connection to the broader organization, communication, relationships, and accountability for assigned tasks

The selection of the case also had to support the research problem. The selection of the case was based on convenience, criterion, and intensity (Kuzel, 1992; Miles, et al. 1994; Patton, 1990). The case had to demonstrate convenience. The researcher had limited time and resources available to complete the study. The case also had to meet the criteria necessary to bind the study. Finally, the case had to demonstrate intensity. The team had to be an information rich team that was experiencing virtuality intensely.

The study used within-case sampling (Miles, et al. 1994). The study design included a nesting feature. The nesting design feature allowed for the team members to be studied in a variety of contexts. Virtual team members were be studied on the basis of their personal diaries, formal and informal interviews. There was movement between methods of data collection. The design was theoretically driven. The choice of sample was based on a conceptual question, not with a primary concern of representativeness. The primary concern was with the conditions under which the theory operated, not with generalization of the findings to other contexts. The study also had an iterative quality. It

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worked in progressive stages as the study unfolded. At each step of the evidential trail, sampling decisions were be made to clarify the emerging main patterns.

A case study is a form of observation study. It is helpful to think of case studies on a continuum from complete participant to complete observer (Bogdan, et al. 1992; Gold, 1969). With complete participation, observers are involved with the participants as if the observers were a part of the group. The participants do not usually know that they are being observed (Martella, et al. 1999). At the other pole is the complete observer. The observer attempts to remain separated from the subject matter. The participants may or may not know that they are being observed. Between the two poles are participant-as-observer and observer-as-participant. Participant-as-observer involves the observers engaging with the participants, but also informing them of their intent to observe. Observer-as-participant is similar in that they both involve informing the participants of the researcher's intent; however, they are different in that the observers do not become involved with the participants (Martella ,et al. 1999).

The selection of observation method is again driven by the research problem. The research problem is related to the individual and team experience of virtuality. As a result, simple observation was not sufficient. To better understand the experience, the researcher had to be involved as a participant. In order to behave ethically with the team, this study utilized the participant-as-observer method of observation.

Given the virtual nature of the research problem, How will I physically observe virtual environments? The research method was to gather artifacts generated by the participants and study them. There were three artifacts generated: a notepad, see Appendix E, an electronic diary, see Appendix F, and the tape recording of a formal

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interview, see Appendix G. All three were transcribed to a qualitative research analysis software, HyperRESEARCH, for analysis. Following the first virtual task, the phone conference, the participants completed a notepad and an electronic diary. The notepads and diaries were then utilized to draft a formal interview. The interviews was conducted face-to-face, or by telephone, with the participants following the second virtual task, the synchronous computer-mediated conference. Due to the heuristic nature of the study and the researcher's role as a participant, the researcher also completed the notepad, diary, and interview.

The case selection was a virtual team led by the researcher consisting of six members. Two of the members have been on the team for fifteen years, three of the team for two years, and one was new to the team. One team member did not participate in the study due to sabbatical leave. One of the team members was delivering her third child during the study. The team had two women and four men. The team ranged in ages from twenty-seven to forty-four. The team lacked any ethnic diversity. Two members of the team had completed graduate degrees the rest, bachelor's degrees. Two of the team had been with the organization for twenty years or more, the most junior team member, for five years. No one on the team was comfortable with computers, although they had all used them for word processing and electronic mail. One of the team members avoided computers.

The existing team was virtual in the sense that they were scattered geographically and collaborated primarily through electronic communication. It had been the intent of the team to use more electronic communication to increase their performance, but the team had never actualized that intent. The team relied on electronic mail for

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communication and the generation of ideas. Most of the team's electronic interaction was by telephone on an individual basis. The team had the capability to use bulletin boards and chat rooms and had tried a chat room once, but were unable to get everyone into the room. The team had a secure electronic bulletin board that it had never used.

Data Collection

The study included inductive, deductive, and abductive elements. McGrath's (1984) work taxonomy was used deductively as an axial and systematic code template to collect open codes related to task effectiveness. The work agendas for the phone conference, face-to-face conference, and the synchronous computer-mediated conference were all designed to ensure work tasks from each category in McGrath's work taxonomy.

The literature review resulted in seven team domains which were used abductively (Coffey & Atkinson, 1996). Abductive inquiry describes the interaction of deductive and inductive processes. The inductive literature review yielded seven team domains. During the process of grouping initial individual open codes into axial codes the relevance of the seven team domains became clear as the initial individual open codes grouped around them. As the analysis proceeded the seven team domains became a deductive template to gather axial and systematic codes.

The study also included inductive inquiry. During the coding process groups of initial individual open codes were identified as addressing user satisfaction. This led to new axial and systematic code categories resulting in findings related to user satisfaction. The identification of a new technology domain also involved the inductive emergence of initial individual open codes grouped to axial and systematic codes.

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The design of the study included two team tasks in virtual work environments separated by team task in a face-to-face traditional work environment. Three artifacts were generated, a notepad, see Appendix E, an electronic diary, see Appendix F, and an interview, see Appendix G.

After the team was briefed regarding the research problem, design, timeline and outcomes, the notepad and diary were sent electronically to each team member. The notepad was designed to help the Subjects record their experience as it occurred. The Subjects kept the notepad next to them during the phone conference to make short notes related to their experience of the phone conference. The diary was designed to help the Subjects record their experience, opinions, knowledge, feelings, background, sights, and behavior related to the findings of the literature review. The diary provided the Subjects the opportunity to attach their phone conference experience to the literature review's seven team domains. The participants, including the researcher, each completed the notepad and diary.

The artifacts were separated into two groups: researcher artifacts and nonresearcher artifacts. Each artifact was then coded with initial individual open codes. The initial individual open codes of each individual artifact were then grouped as axial codes for that individual artifact. The axial codes for each individual artifact were then grouped into axial codes for that artifact group to connect themes for each artifact group. The axial codes for each artifact group were then gathered to make systematic codes to connect themes between the two artifact groups. The analyses were submitted to a peer examiner to check for observer effects and bias.

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On the basis of the first thematic study, a formal interview was drafted that was conducted either fact-to-face, or on the phone, with all the participants including the researcher. These interviews were all taped, thereby generating the third artifact. The interviews were transcribed and submitted to the same analysis process. The analysis was again submitted to the same peer examiner to check for observer effects and bias. See Figures 18 and 19

Internal validity was addressed by triangulation and member checking (Krefting, 1990; Guba, 1981). The triangulation was provided by methods of data collection, a peer examiner for observer bias, and the committee chairman for quality. The methods of data collection were a notepad, diary, and a formal interview. A peer examiner reviewed the thematic study of each artifact. Member checking was also used during the formal interviews. The participants were queried about the research proceedings for their validation. Lastly, the artifact contents were cross-checked with each other. The notepad was checked against the conference call and the conference call checked against the interview.

Dense descriptions and time sampling addressed external validity (Krefting, 1990; Guba, 1981). The study provided a participant and context depth of description that will allow readers to individualize their generalizations. The conference call, the synchronous computer-mediated conference, and the interviews were timed so that each participant engaged in them at a different time of the day morning, afternoon or evening.

Triangulation and a dependability audit addressed reliability (Krefting, 1990; Guba, 1981). The triangulation was done with methods, the use of a peer examiner and my committee chairman as previously described. The dependability audit will be available

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on request. The audit trail consists of the researcher's logbook recording raw data, data reduction, code analysis, code indexes, personal reflections, events, times, interactions, and decisions.

Reflexivity, triangulation, and the researcher's log addressed objectivity (Krefting, 1990; Guba, 1981). The reflexivity was conducted as in the process of keeping the researcher's logbook. The researcher's logbook provided the audit trail previously described. Triangulation has already been reviewed.

Researcher and Subject Bias

The involvement of the researcher as a participant introduced the concerns of observer effects and bias. A potential problem was the presence of the researcher affecting the behavior and experience of the participants. Bogdan and Biklen (1992) have found that observer effect can be minimized in larger research contexts where the observer can blend into the crowd; however, when working with small numbers of participants, observer effects become more likely (Martella, et al. 1999). This study addressed observer bias through triangulation.

Observer bias refers to the pre-existing attitudes, or experiences, of the observer that leads the observer to record inaccurate observations or analysis. Subjectivity is a strength of qualitative research (Peshkin, 1988); however, observer subjectivity can also be perceived as a weakness in the research when the observer's observations and conclusions may not be a true reflection of what happened. One way to handle observer bias is for the observer to record their feelings during observations (Bogdan & Bilken, 1992). Another method is the triangulation of obtaining information from a variety of sources such as interviews and documents (Martella, et al. 1999).

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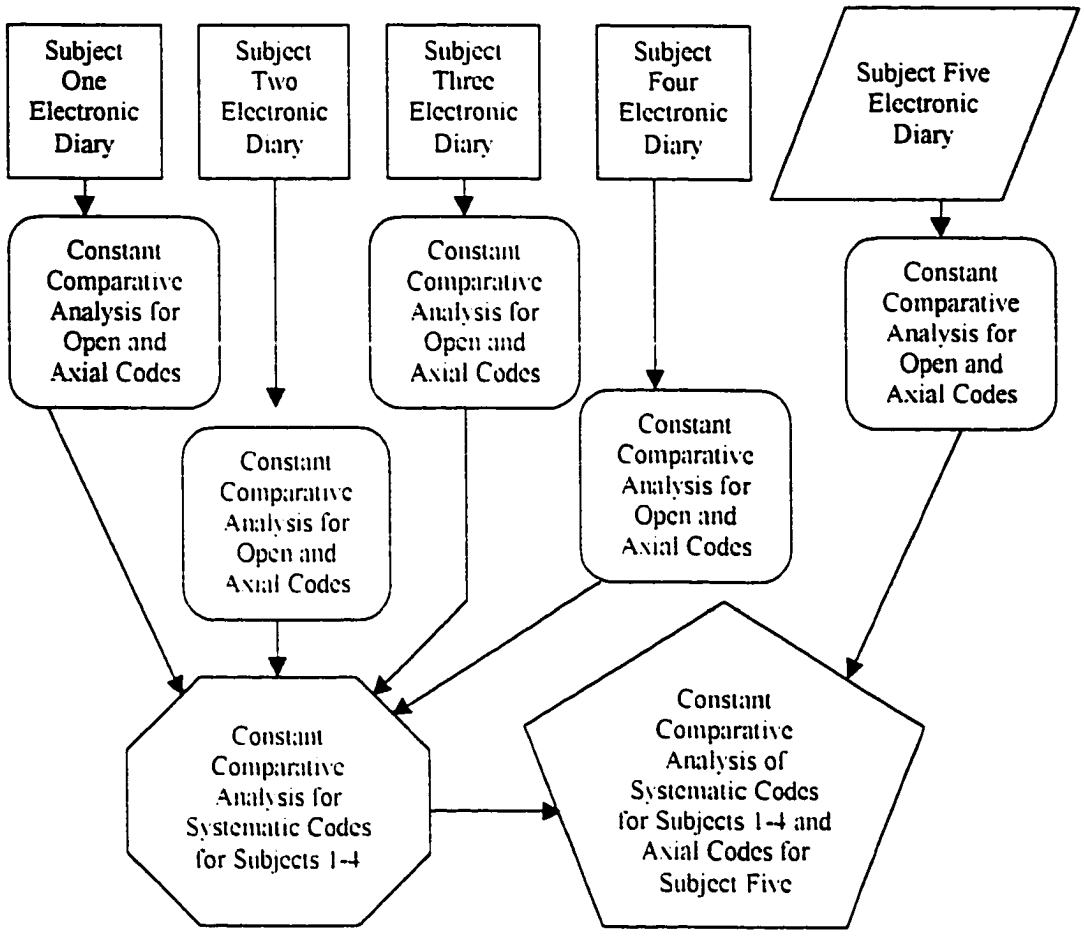

Figure 18. Data Collection Method

A peer examiner, following each intervention and analysis of artifacts, specifically addressed issues related to observer effect and bias. Triangulation was also used with the documentation of notepads, diaries, and interviews

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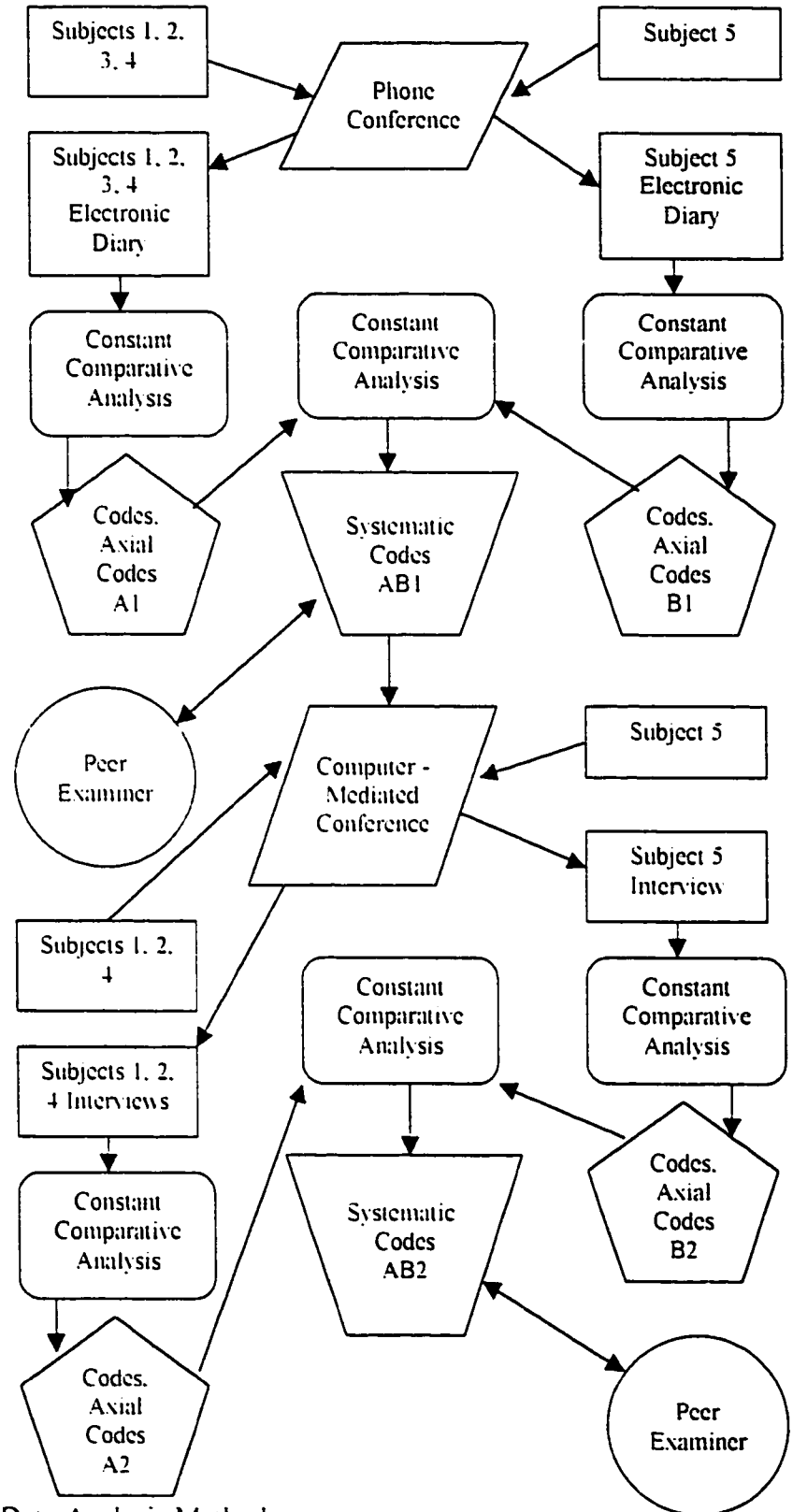

Figure 19 Data Analysis Method

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CHAPTER FOUR

Results

Introduction

The following chapter explores the results of the study. It was the purpose of the study to determine what domains of successful teams in traditional work environments must be present to insure success in the virtual work environment. Secondly, the study intended to determine if there were any new domains of characteristics not currently found in traditional successful teams that must be present to ensure success with virtual work environment teams.

The nature of the research question necessitated the use of a qualitative research method based on its ability to inductively examine virtual teams in process and allow the emergence of hypotheses. The study used a heuristic, grounded, phenomenological, case study method. The study explored the structure and essence of the virtual team experience for the virtual team members, of which the researcher was one. A specific case was studied with grounded theory and constant comparative analysis.

A review of the literature indicated significant philosophical changes taking place in contemporary work environments. There was a philosophic shift from modernity to postmodernity, from a perspective of knowledge being objective and rational to a perspective of knowledge being subjective and existential. This philosophic shift supported a virtual work environment in ways that modernity did not. There has also

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been a cultural shift in work environments from industry to information. Contemporary work environments emphasize knowledge instead of physical work and production.

Further literature review indicated that although much had been written on traditional teams, little research had been conducted on teams functioning in virtual work environments. Thirty-two traditional team domains were identified in the literature and collected around the seven domains of purpose, roles, leadership, processes and decisions, relationships and trust, communication, and effectiveness and responsibility. The seven domains were used as the primary criteria to compare virtual and traditional teams.

The two research questions featured in the study were:

1. What domains of characteristics of successful teams in traditional work environments must be present to insure success in the virtual work environment?

2. What domains of characteristics that are not currently found in successful teams must exist in order to insure successful team performance in the virtual work environment?

The purpose of this chapter is to present the findings of the study. The contextual displays are in Figures 20 and 21. Figure 20 shows the conceptual framework and Figure 21 displays the research process. Tables 10 and 11 and Figure 22 are the sampling displays. Table 10 describes the subjects in the virtual team under study. Table 11 displays the electronic prior experience of the virtual team under study. Figure 22 displays the work environment of the case.

The data analysis included three coding levels. Open codes were the initial codes given within each source either the notepad, electronic diary, or the interview. Axial

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codes were the codes given to groups of open codes within each source. Systematic codes were the codes given to axial codes grouped between sources.

The data analysis is inductive, deductive and abductive. The seven team domains, see Table 4, were used abductively (Coffey & Atkinson, 1996) as axial and systematic codes. Both inductive and deductive processes were used as the open codes grouped around the seven team domains. Once this grouping was observed inductively, the seven team domains were used deductively as a template to gather the remaining open codes. McGrath's (1984) work taxonomy, see Figure 3, was also used deductively as a template for axial and systematic codes to group open codes. The indicators of user satisfaction emerged in the study inductively as a number of open codes were identified relating to user satisfaction. Curiosity led to the grouping of these open codes to axial and systematic codes related to user satisfaction.

Following the contextual and sampling charts, the findings will be displayed six ways.

1. Checklist matrixes and axial code frequencies for the phone conference to display the relationship between the open codes and the intra-group axial and systematic codes for the phone conference.

2. Checklist matrixes and open code frequencies to display the relationship between the open codes and intra-group axial and systematic codes for the synchronous computer-mediated conference.

3. Open code frequencies for each domain in the phone and synchronous computer-mediated conference.

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4. Open code frequency related to the axial and systematic codes for work taxonomy.

5. Open code frequency for a new technological domain and its related axial and systematic codes.

6. Open code frequencies for the axial and systematic codes related to the indicators of user satisfaction.

In the first group of displays, Table 12 is a checklist matrix for the axial codes and supporting open codes used in the phone conference. Table 13 is an open code frequency display for the axial codes presented in Table 12.

In the second group of displays, Table14 is a checklist matrix listing the axial codes and some of their supporting open codes for domains of team characteristics in the synchronous computer-mediated conference. Table 15 is a code frequency display for the open codes in Table 14. Table 16 is a checklist matrix listing the axial codes and some of their supporting open codes for indicators of user satisfaction in the synchronous computer-mediated conference. Table 17 is an open code frequency display for the axial codes in Table 16

In the third group of displays, Tables 18 to 31 display open code frequencies for each domain in the phone and synchronous computer-mediated conferences.

In the fourth group of displays, Tables 33 and 34 display the process and decision open code frequency integrated with a work taxonomy for the phone and synchronous computer-mediated conference.

In the fifth group of displays, Table 35 displays the Technological Domain and its features by open code frequency.

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In the sixth group of displays, Tables 36 to 40 display some indicators of user satisfaction by open code frequency for team membership, isolation, task and relational purpose, individual information process, and member personality. In the sixth group of displays, Table 41 displays the open code frequency related to subject and observer research bias.

The chapter is organized with eight sections:

1. The first section is the contextual framework, see Tables 10 and 11; Figures 20 to 22. These review the larger research context of the study, the research design of the study, the subjects in the sample, and the rationale involved in the selection of the sample related to generalizability.

2. The second section contains the checklist matrixes featuring axial codes and their open code frequencies by team domain for the phone and synchronous computer-mediated conferences, see Tables 12 to 15

3. The third section contains the checklist matrixes featuring the axial codes and their open code frequencies for indicators of user satisfaction, see Tables 16 and 17. During the course of the study several possible satisfaction indicators began to emerge. Patterns developed between subjects who preferred virtual work environments and those who did not. The indicators were degree of individual isolation, individual perception of team purpose, individual personality, and perception of individual membership. Individual satisfaction with the phone and synchronous computer conference may have had some relation to these individual satisfaction variables.

4. The fourth section contains the phone and synchronous computer-mediated conference open code frequency for each of the seven domains of team characteristics,

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see Tables 18-31. Each domain is treated separately with a segment describing the findings followed by a segment relating the findings to research literature addressed in chapter one.

5. The fifth section discusses work taxonomy related to the phone and synchronous computer-mediated conference, see Tables 33 and 34. As the study progressed a relationship emerged between types of work tasks and virtual work environments. This section presents that relationship and interacts with the literature presented in chapter one concerning work taxonomy and the effect of virtual work on those work tasks.

6. The sixth section reviews a new domain of team characteristics that emerged in the study, see Table 35. The findings for a new team domain of technology are presented.

7. The seventh section introduces another set of emergent variables observed during the study, see Tables 36 to 40. The user satisfaction of the team members with the phone and synchronous computer-mediated conferences seemed to have some predictors. Predictors of individual isolation, individual perception of team purpose, individual personality, individual mode of information processing, and individual perception of team membership are related to individual satisfaction of virtual work.

8. The eighth section looks at research bias, see Table 41.

Contextual Framework

An extensive literature review was conducted to discover the key domains for successful teams in traditional work contexts. Thirty-two characteristics were identified and grouped into seven domains: purpose, roles, leadership, processes and decisions,

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relationships and trust, communication, and effectiveness and responsibility, see Tables 3 and 4. The sample team was then placed in two virtual work environments; a phone conference call and a synchronous computer-mediated conference. Notepads, see Appendix E; electronic diaries, see Appendix; and interviews, see Appendix G; were then utilized to determine the impact of the virtual environment on these domains and to determine the presence of any new domains, see Figure 20.

Figure 21 outlines the research process. In early January, the team had its first virtual experience via a conference phone call. The conference call agenda was intentionally designed to include tasks from all four of McGrath's (1984) work taxonomy, generate, chose, negotiate, and execute, see Figure 3. Electronic diaries were used to collect data on the subjects' experience of the conference phone call. The diaries were subjected to a constant comparative method utilizing the software program HyperRESEARCH. Findings were reviewed with a peer examiner to check for researcher bias and the initial hypotheses drafted to be checked in the next virtual experience.

In mid-January, a collated physical meeting was held for three days in Greeley, Colorado to follow up on the conference phone call and to set up the next virtual experience. In late January, the team had its next virtual experience, the synchronous computer conference. The agenda for the synchronous computer-mediated conference was again designed to include tasks from all four of McGrath's (1984) work taxonomy.

Interviews were conducted in person and on the phone within 10 days of the synchronous computer-mediated conference on audiotape. The tapes were transcribed to text and examined using a constant comparative method. The same peer examiner for

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research bias again checked the findings. Follow up e-mails were sent for the subjects to verify age, previous technological experience, perception of team purpose, personality, and perception of their individual membership on the team.

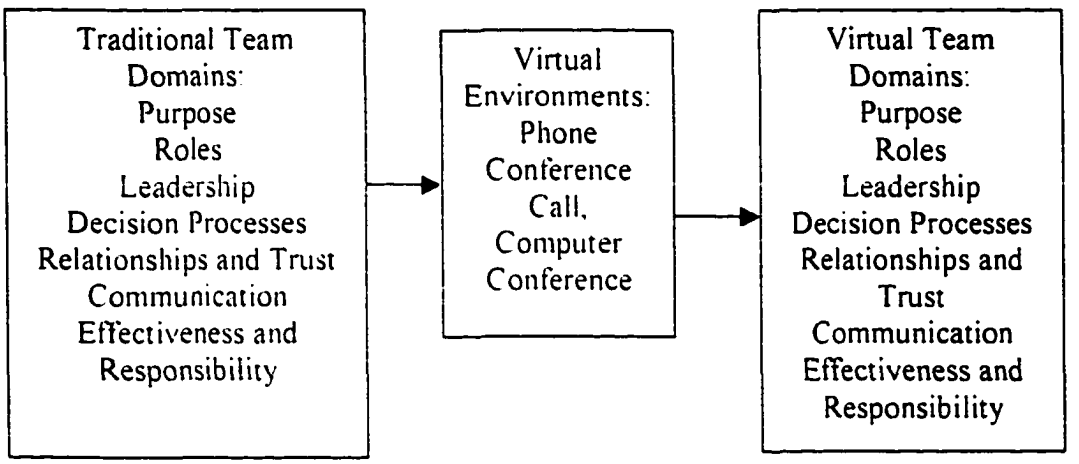

Figure 20. Research Context.

The design sandwich of virtual meetings with a core traditional meeting heightened the contrast between virtual and traditional work environments. The temporal proximity of these two kinds of work environments added intensity to the study. Reliability of the study is increased through the use of triangulation with two virtual work environments.

Case Demographics and Selection

The case in the study was a team of six individuals working in a non-profit organization. This team had been working together for six months prior to the study. In that six months, the team met twice for two day meetings. Some members on the team had worked together on this team for twelve years. One of the team members was on sabbatical at the time of the study and was not included in the study. A second team member dropped out of the study after the Greeley meeting for a maternity leave, see Table 10. The case was a pre-existing team located within a single organizational

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department and young in its team development. All of the seven domains were in process and not fully clarified. Using Tuckman's Team Taxonomy (1965), the team was in a storming phase, see Figure 2. The case was selected, because it was initially identified as a mature team; however, as the study processed, it became clear that the team was not as mature as it initially appeared.

Membership and time bound the case. The inquiry lasted six weeks. The team itself determined membership.

The case was selected for a number of reasons. First, the case functioned as a team, not a group; a task, not relational preference or interest collected the team. Second, the team's work environment was virtual; the team was scattered geographically and functioned in virtual work environments. Third, the case was convenient; it fit the resources available to complete the study. Fourth, the case demonstrated intensity; it was a team that experienced its virtual work environment intensely and was rich in virtual information.

Another key selection criterion was to find a team that would provide greater generalization. Both the individuals on the team, see Table 11, and the team itself, see Figure 22, were at a midpoint in their virtual experience. That midpoint allowed for greater generalization across the virtual spectrum. Most organizations find themselves in neither a totally traditional or totally virtual work environment, but find themselves in a work environment somewhere between. The team selected for this case found itself functioning in both work environments.

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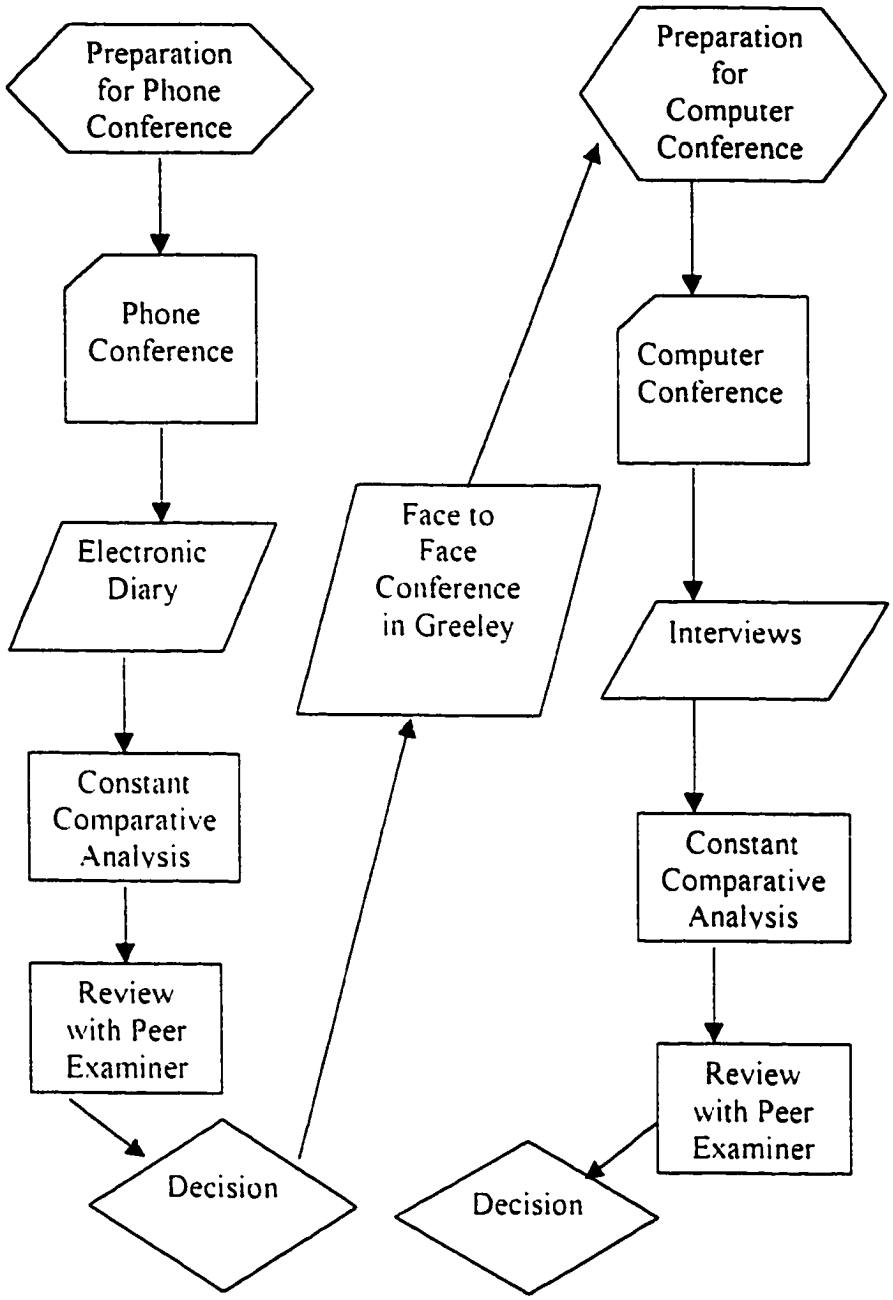

Figure 21. Research Design of the Study.

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Table 10

Subjects in the Case Sample

Subject	Age	Gender	Tenure in Organization	Tenure on Team	Context
01	31	Male	7 years	18 months	Boulder, CO
02	43	Male	20 years	12 years	Bozeman, MT
03	32	Female	10 years	18 months	Greeley, CO
04	29	Female	6 years	6 months	Tucson, AZ
05*	45	Male	23 years	16 years	Denver, CO

* The researcher is subject 05

Table 11

Subjects' Previous Electronic Experience

		Subjects				
Time	Electronic Communication Frequency	1	2	3	4	5
Asynchronous	Use e-mail daily		x	x	x	x
	Use Web site once a month or more		x			x
	Use a Bulletin Board once/6 months or more		x			
	Use Voice Messaging once a week or more	x	x	x	x	x
Synchronous	Use a Computer Conference once a year or less					
	Use Phone Conference calls once/6 months or more		x	x		x
	Use Video Conference once. a year or less					

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The diagonal in Figure 22 displays the continuum of virtual work environments. At the low end of the continuum are teams that are physically and temporally proximate involved very minimally in virtual work environments. At the high end of the continuum are teams that have no physical contact and only work together virtually. The continuum represented the usage of virtual work mediums and the accumulative amount of work conducted in virtual environments. The varieties of virtual work environments represented in the continuum were individual phone calls, voice messaging, phone conference calls, fax, electronic mail, synchronous and asynchronous computer conferences, electronic databases, interactive and noninteractive video.

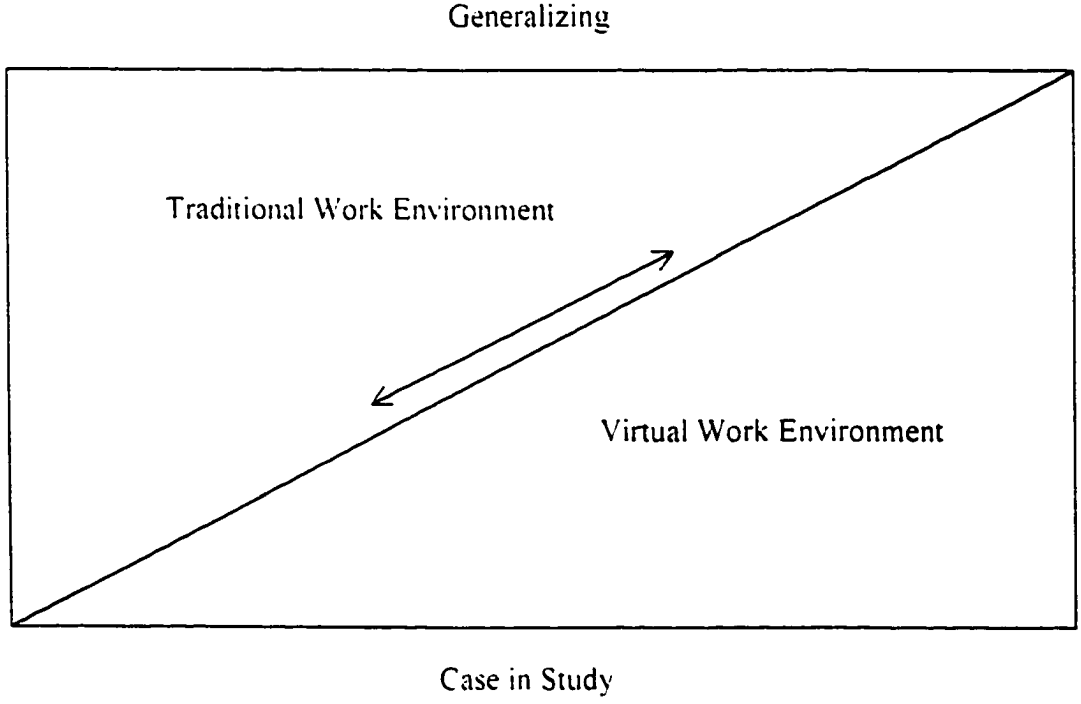

Figure 22. Sample Selection and Generalizability.

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Checklist Matrixes for Phone and Synchronous Computer-Mediated Computer Conferences

Table 12 is a checklist matrix display for the phone conference. The seven domains are listed as axial codes with some of the open codes that were grouped with that domain. Table 13 is an axial code frequency display for the phone conference listing the number of open codes related to each axial and systematic code team domain.

Tables 14 and 16 are checklist matrix displays for the synchronous computer-mediated conference. Table 14 displays the seven domains listed as axial codes with samples of open codes that were grouped to that domain. Table 15 is an axial code frequency display listing the number of open codes related to each domain in the synchronous computer-mediated conference

Tables 13 and 15 indicate that these team domains identified in the literature search for teams in work environments were continuous with domains found for teams in virtual work environments. The subjects were able to identify each domain in the virtual work environments quite easily; however, while these domains were constant, there were changes of degree within domain. What differed was not the kinds of domains but degrees of domains.

Tables 13 and 15 indicate that in both the phone conference and synchronous computer-mediated conference, the subjects had the most to report regarding the domains of process and decision and relationships. Both the phone and computer virtual work environments scored the highest code frequency with process and decision followed by relationships as a distant second. Tables 13 and 15 also indicate similarity with the fewest codes. Effectiveness had the least difference in degree of domain. Effectiveness

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was the lowest code frequency for both virtual conferences. This would indicate that process and decisions and relationships were the domains most strongly affected by the virtual work environment, while effectiveness was the domain least effected.

Checklist Matrixes for Indicators of Satisfaction with the Phone and Synchronous Computer-Mediated Conferences

During the course of the study, a number of open codes related to user satisfaction surfaced. As these open codes emerged, they were grouped by the axial codes displayed in Tables 16 and 17. Open codes related to user evaluation of the synchronous computer-mediated conference were identified as indicators of user satisfaction.

Phone and Synchronous Computer-Mediated Conference Open Code Frequency for Purpose

Findings

Tables 18 to 31 answers whether the team domain displayed is the same for teams in traditional work environments and teams in virtual work environments or different between teams in traditional and virtual works environments. The open codes grouped with the axial and systematic team domain codes were individually analyzed to determine if the code supported the similarity, or difference, of teams in traditional and virtual work environments. If the code indicated a difference between teams in virtual and traditional work environments, the code was counted in the "Domain is different" column. If the code indicated similarity between teams in virtual and traditional work environments, the code was counted in the "Domain is the same" column.

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Table 12

Phone Conference Checklist Matrix Grouping Open Codes by Team Domains

Team Domains						
Purpose	Roles	Leadership	Decision Processes	Relationship and Trust	Communication	Effectiveness
Good for business, not ministry	Calls can help roles	I knew what the agenda was	ASU topic was weak	Did not support relationships	Call did not support communication	Call diminished accountability
Didn't further purpose	Concerned with roles of new members	I was prepared	Facilitated simple decisions	No effect on intimacy	Communicates information	Distance diminished accountability
Didn't support resolution of value differences	Roles need face to face	Joel guided the call	Did not support process	No effect on trust	Lacks feedback	Call helped responsibility
Call can help with purpose	Roles need previous history	Were more dependent on Joel	Candidate topic was strong	Little rapport	Difficult to interact	Call supporte responsibility
Agenda reflected our purpose	I didn't know my role	Anxious about unprepared agenda	Did not support complex decisions	Intimacy shaped outside call	Difficult to initiate	
Call provided clarity	I missed playing my usual role	Call can help leadership	Fiscal topics were weak	Trust shaped outside call	Group spoke less	
Supported our job description	My role changed	I knew who would be there	Was efficient	Call was impersonal	I said the minimum	
Did not further our general purpose	There were no specific roles	I knew the agenda timing	Sometimes effective	Did not support interaction	Missed nonverbal cues	
Supported our task purpose	Call did not effect my role	Joel clarified nonverbals	Hard to process and react	Missed relationships	Missed critical subtle nuances	
		Joel clarified silence	Rushed decisions	I was relationally secure	Wondering when to talk	
		Leadership was artificial	Process was rushed	Did not connect people	Difficult to ask for clarification	
				Doesn't support relational domain	Missed greater understanding	
					Time pressure led to artificiality	
					Helped communication	
					Limited discussion	

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Table 13

Frequency of Open Codes Grouped by Team Domain for the Phone Conference

Subject	Purpose	Role	Leadership	Decision Processes	Relationship and Trust	Communication	Effectiveness
1	5	0	4	22	19	10	2
2	7	4	14	28	18	8	0
3	8	9	9	43	24	11	3
4	5	6	11	12	14	9	2
5	6	4	14	41	22	6	1
TOTAL	31	23	52	146	97	44	8

Tables 18 and 19 indicate that the subjects experienced the purpose domain to be most different in the synchronous computer-mediated work environment. The virtual environment also highlighted different purpose preferences held by team members. Subjects 1 and 4 preferred the purpose of the team to be primarily relational. As Subject 1 states, "Our purpose is not primarily business or ..information...Our purpose is....primarily relational... The limitation on relationship...effects my experience of purpose." Because the focus of the synchronous computer-mediated conference was task, and not relationship, Subjects 1 and 4 perceived the synchronous computer-mediated conference to have a different purpose. As a result, Subjects 1 and 4 indicated that the purpose was different in the synchronous computer-mediated conference. Subject 2 preferred the purpose of the team to be primarily task oriented. Thus, he did not experience the synchronous computer-mediated conference to be another purpose. Subject 5 also preferred the purpose of the team to be primarily task oriented.

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Table 14

Synchronous Computer-Mediated Conference Checklist Matrix Grouping Open Codes by Team Domains

Purpose	Roles	Leadership	Decision Processes	Relationship and Trust	Communication	Effectiveness
Violates our call	Enlarged	Needed more leadership	Complexity determined medium	Conflict not handled well	Facilitated communication	Increased responsibility
Purpose not supported	Confused	Hierarchical	Dampening	Non-secured room was awkward	More abrupt	Decreased responsibility
Doesn't support purpose	Roles limited	Less team leadership	Doesn't support complexity	Icons sent feelings	Not efficient	Needs ownership
Purpose is relational, not info	Focused on self	Leadership is relational not information	Best for simple functions	Supported data, not relations	Lacks meta-messages	Had ownership
Erodes relational value	Roles were self serving	Next step is ownership	Best for small stuff	Responses lack context	Lacks voice	Ownership was pre-existing
Changed our relational purpose	Not healthy	Low ownership	Changes processes	Only good for fun	Missed voice	No effect
Changed our informal purpose	Effected roles	I have ownership	Not efficient	Didn't worry about dress	Jumbled	Was redundant
Clarifies our purpose	Changed role perception	Protocol unchanged	Lacks momentum	Trust based on prior relationship	Was formal	Ownership needs face to face meetings
Different motivation for purpose	Roles were egalitarian	More formal protocol	Produces weaker decisions	Felt less connected	Restricted communication	Motivation comes from face to face
Doesn't carry passion	Belkin's roles don't apply	Unchanged	More linear	Felt more connected	Is information lean	Reinforced responsibility
More task than relational	Could reduce producing	Task focused	Reporting worked well	Relations not adversely effected	Was linear	Focused on responsibility
More info than relational	Some intensified	Satisfying	Voting worked well	Trust eroded	Tech problems limited	Strengthen with face to face follow up
		Enhanced	Led to conformity	Trust not built	Silence hard to interpret	Responsibility linked to process
		Affected leadership	Jumbled process	Intentional affirmation	Lacked emotion	
		Less lateral leadership	Confusing process	Trust related to membership	Lacked humor	
		Needs flexible styles			Best for mature teams	
					No nonverbal	
					Carried data	
					Slower	
					Used my imagination	

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Table 15

Frequency of Open Codes Grouped by Team Domain for the Synchronous Computer-Mediated Conference

Subject	Purpose	Role	Leadership	Decision Processes	Relationship and Trust	Communication	Effectiveness
01	7	6	10	45	21	26	5
02	3	7	13	60	47	16	7
03							
04	6	9	13	38	25	21	5
05	14	10	13	32	19	15	9
TOTAL	30	32	49	175	112	78	26

Table 16

Open Code Frequency for Indicators of User Satisfaction in the Synchronous Computer-Mediated Conference

Subjects	Generation Difference	Gender	Electronic Values	Subject Experience	Subject Personality	Technology	Bias	Phone Experience
01	3	1	16	22	6	38	8	10
02	2	1	10	22	0	22	7	16
03								
04	0	0	19	33	7	38	5	4
05	0	0	3	7	4	19	2	3
TOTAL	5	2	48	84	17	117	22	33

In the phone conference, purpose was not experienced as strongly as being a different domain, because those subjects with a relational purpose perceived the conference phone to support relationships better. As Subject 4 stated, "The phone conference was better than the phone call." Subject 1 stated, "If I were to compare the two conferences I would say more of that (relationships) with the phone than with the computer." Subject 3 stated, "The conference call supported our task, not our

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relationships." Subject 1 stated, "The conference call is good for business, not ministry." In summary, the study did not find that the domain differed, rather that it was a change of degree. The study indicated that the computer-mediated conference supported teams with a strong task purpose more than those with a strong relational purpose.

Table 17

User Satisfaction Checklist Matrix for the Synchronous Computer-Mediated Conference Grouping Open Codes by Indicators of User Satisfaction

Generation Difference	Gender Difference	Electronic Values	Subject Experience	Subject Personality	Technology	Bias	Phone Experience
Gen X more tech savvy	Comfort not related to gender	I don't like electronic mediums	Awkward with intrusions	External processor resists meeting	Time delay problems	You were more direct	I prefer the phone
Gen X resists virtual meetings		I don't like machines between people	Nervous humor	Limited my intuitive	Technology changed process	Your behavior was not different	Phone supports more complexity
Gen X values authenticity		I don't trust computers	Learned a lot	Led to different personality	Technology changed process	Outside observer would bias group	Phone has same real time
Comfort not related to age		I have never been in a chat room	Comfort of home	Good for computer people	Technical problems	Group behavior was the same	Phone misses visual cues
		I prefer face to face	Discomfort	People have different personality on computer	Machine distracted	No change in my behavior	Phone was better than virtual meeting
		It is not a conspiracy	Affirmation will increase comfort	Relational people resist meeting	Typing distracted	My behavior was different in degree	Purpose is stronger with the phone
		Why do virtual meetings	Embarrassed	Internal processors like meeting	Tech phobia limitations		Phone limited process
		Computers are frustrating	Felt frenetic		Problems connecting		Phone meeting was too long
		I am open	Liked physical movement		Problems with security		Phone connected me to people
		Long for simpler days	Was fun		Technology reduces quality		
			Motivated if the team uses it		Technology adds value		
			Did my own thing				
			Fear				

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Table 18

Purpose Open Code Frequency for the Phone Conference

Subject	Domain is the same	Domain is different
01	1	4
02	4	3
03	6	1
04	5	0
05	5	0
TOTAL	21	8

Literature Interaction

Jensen and Chilberg (1991) pointed out the role of individual goals with teams. Pepitone (1980) suggested that team goals are more than the aggregate sum of the goals of the individuals This study would seem to indicate that the team contained both individual and team goals. Some individual's goals were primarily relational, while others were primarily task related. Lewin (1944) pointed out that it is possible to correlate personal and team goals; however, Johnson and Johnson (1991a) pointed out that team goals are subservient to individual goals This study indicated that those individuals with a strong relational purpose experienced virtual work quite differently than those individuals with a strong task purpose.

Phone and Synchronous Computer-mediated Conference Open Code Frequency for Role Findings

Tables 20 and 21 indicate Subjects 1 and 4 did not experience their roles any differently in the synchronous computer-mediated conference. The researcher's role as

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the leader was quite different. Subject 1 talked about the roles being exaggerated, "I would say that they are a little bit exaggerated although I don't know if anyone played a different role. Probably degree of role, but not of kind or quality of role." Subject 4 also talked about role exaggeration, "People would be more open, or quiet, than usual." Subject 2 talked about a role change related to a change of perspective, "It is easier to be focusing on self-interest rather than group issues. It is easier to be self-focused when you cannot see the other team members. You are more aware of your issues because they are closer." The researcher felt differently as coordinator, more directive and clarifying than in traditional work environments with the team.

Table 19

Purpose Open Code Frequency for the Synchronous Computer-Mediated Conference

Subject	Domain is the same	Domain is different
01	0	5
02	1	1
03		
04	0	2
05	3	7
TOTAL	4	15

Roles define the formal structure of teams and differentiate positions from one another. This happens both informally and formally. Most individuals will play many roles simultaneously. Expected roles are roles formally assigned by the team. The perceived role is the behavior a person believes they should enact. The enacted role is the behavior the person actually carries out.

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Table 20

Role Open Code Frequency for the Phone Conference

Subject	Domain is the same	Domain is different
01	0	0
02	3	1
03	1	8
04	3	3
05	0	3
TOTAL	7	15

Literature Interaction

Johnson (Johnson & Johnson, 1991a, Merton, 1968; Jackson, et al. 1985) suggested that people learn roles from the stimuli around them and that they shift roles as they recognize need. The study indicated that the subjects were in the process of responding to the virtual stimuli and shifting their roles. This led to role exaggeration and some confusion of roles. The subjects needed more normalization in the virtual work environment to complete their role modification. This was substantiated by the work of Shonk (1982) who suggested that new teams need help in understanding the roles of its members. When a team encounters new virtual work environments, it will need help in clarifying the new roles that environment demands

Belbin (1993) differentiated between functional and team roles and suggested that teams have 9 roles: plant, resource investigator, co-ordinator, shaper, moniter evaluator, teamworker, implementer, completer, and specialist. His research suggested that these roles are dependent on environment, but his research did not include virtual work

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environments. The virtual work environment may carry different roles than those outlined by Belkin; for example, the synchronous computer-mediated conference did not work well with tasks related to choosing, negotiation, and execution. The synchronous computer-mediated conference addressed only generation tasks well. Roles related to choosing, negotiation, and execution will look different in virtual work environments. Those roles dependent on contexts of difference and discussion will be more limited.

Table 21

Role Open Code Frequency for the Synchronous Computer-Mediated Conference

Subject	Domain is the same	Domain is different
01	3	1
02	0	3
03		
04	3	3
05	2	5
TOTAL	8	12

While roles differentiate members' privileges and duties from each other, norms integrate the actions of all the group members. Norms serve as a basis for predicting the behavior of team members and serve as a basis for guiding individual behavior. Teams will not be effective unless there are norms that promote conformity in structuring effective interaction between team members (Jensen & Chilberg, 1991). The study did not allow the team sufficient time to develop new norms for virtual work. One synchronous computer-mediated conference was not enough time to support that development.

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Sherif (1936) asserted that norms cannot be imposed on teams. They emerge out of social interaction between members. This study did not allow enough time for the social interaction necessary to allow new virtual norms.

Asch's conformity studies (1956) apply in this area of norms. The case did experience some of the conformity Asch suggested. Asch found that many people will go along with an incorrect team judgement even when they know it is false. All of the case subjects talked about the dampening effect of the virtual conference and how it led to conformity. Milgram (1964) suggested that conformity is a requirement of sustained team membership. Although the study lacked the duration to support Milgram and Asch, the study did indicate some preliminary stages of conformity and membership.

Ray and Bronstein (1995) suggested that a key function in team performance is the number of interactions required of the team to learn to work together and trust each other. Ray and Bronstein suggested that it would take 650 hours of focused contact for five people to learn to work together. The study indicated that the case team was not as mature as initially expected. They had only 96 hours together prior to their synchronous computer-mediated conference. The case team did not have sufficient time together to progress far in the domain of role.

Phone and Synchronous Computer-mediated Conference Open Code Frequency for Leadership

Findings

Tables 22 and 23 indicate that Subjects 1, 4, and 5 experienced leadership differently in the virtual work environment. Subject 1 referenced his sense of ownership with the virtual meeting as a point of difference, "I'm not sure we would have done

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this...aside from your initiative...The team did not have ownership for the virtual experience." Subject 1 also was concerned about the change of context for leadership, "It lacked the context for me to understand your leadership and where you are going, to respond to that, to feel like I have the ability and freedom to participate and respond." Subject 4 talked about the difference in dependency, "I feel like it is different with your leadership because I felt like we really were depending on you to lead us to the next thing because we are not depending on each others cues or physical cues..it made us more dependent." The researcher suggested that his style of leadership changed from more participatory to more directive

Subject 2 did not sense any difference in leadership, "In both settings we look to you to lead and direct the agenda and the sense of timing...I did not see a big difference between when we were in Greeley and when we were in the virtual meeting."

Literature interaction

A number of researchers have discussed leadership in virtual work environments. Lipnack and Stamps (1997) understood organizational leadership chronologically. Authority and power have moved from the Nomadic Age to the Agricultural Age with its emphasis on hierarchy, to the Industrial Age with its emphasis on power to the Virtual Age with a new expression of power and authority as purpose. They described virtual leadership as being multiple and not vested in one individual. Parker (1991) described virtual leadership as being shared. Geber (1995) described virtual leadership in terms of conscience. The virtual leader resolved conflict on the team and served as the team's conscience. Young (1998) described virtual leadership as knowledge management. The

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leader facilitated the distribution of information. Jarvenpaa (1998) described rotating leadership in virtual teams.

Table 22

Leadership Open Code Frequency for the Phone Conference

Subject	Domain is the same	Domain is different
01	1	3
02	10	4
03	4	3
04	5	6
05	6	6
TOTAL	26	22

This study indicated that leadership became more formal, directed and less participatory. There was an increase in dependency on the leader. Due to the absence of visual cues, the leader also became more directive.

Table 23

Leadership Open Code Frequency for the Synchronous Computer-Mediated Conference

Subject	Domain is the same	Domain is different
01	1	5
02	4	3
03		
04	3	5
05	0	8
TOTAL	8	21

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The contingency theory of Hershey and Blanchard (1977) did correlate with the study. Their model of four dimensions of leadership effectiveness dependent on the situation was supported in the study. Leadership changes are dependent on context. Leadership in virtual environments looked different than leadership in traditional work environments. Effective virtual leaders need to modify their leadership style dependent on their work environment. The virtual environment in this study demanded a more telling style with more emphasis on task and less on relationship.

House (1971) assumed an individual path-goal orientation to leadership. Effective leadership involved leaders assisting their followers in accomplishing their personal goals and linking those personal goals to organizational goals. This contingency theory was also supported by the study. It became clear that the team lacked a clear central purpose but contained individual goals related to relationships and task. One function of a virtual work environment leader is to correlate individual and group goals.

Fiedler's contingency theory (1967), with its emphasis on situational factors, was also applicable in this study. Fiedler considered the trait of leaders as a given. What could be manipulated to increase leader effectiveness was task structure. An intentional structuring of virtual work environments could be tailored to fit the task structure best suited to the leader. Virtual work environments would give leaders another task structure variable to manipulate in order to increase their effectiveness.

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Phone and Synchronous Computer-Mediated Conference Open Code Frequency by Decision Processes

Findings

While there was significant difference with this domain, it was not a different domain, only a change of degree. The virtual environment significantly affected work processes. Tables 13 and 15 indicated that the domain with the highest number of codes for both the phone conference and the synchronous computer-mediated conference was processes and decisions. Tables 24 and 25 both substantiated that code frequency and indicated that the process and decision domain was experienced as a different domain. Several themes ran through all the subjects, the process was slow, linear, formal, reduced participation, did not handle negotiation and difference, led to conformity, missed passion, was confusing, was limited to data, and was frustrating. All this reduced the team's ability to make good decisions Subject 1 stated, "We accomplished about half of what we wanted...it was much more cumbersome...good decisions come out of discussion, out of us being able to hear, be convinced." Subject 2 stated, " I think that it inhibits discussion...I think that we were more formal with one another...we were overly agreeable on things...when you are typing you keep your comments short." Subject 4 stated, "It highlights the problem with conformity...it is easier to say yes than to say no...it took time for things to get typed and then up on the screen." Subject 2 liked the slower pace, "It moves slow enough that people can think about their responses...with the slower pace I did not need to respond right away."

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Table 24

Decision Processes Open Code Frequency for the Phone Conference

Subject	Domain is the same	Domain is different
01	3	20
02	7	22
03	10	28
04	7	5
05	14	25
TOTAL	41	92

Table 25

Decision Processes Open Code Frequency for the Synchronous Computer-Mediated Conference

Subject	Domain is the same	Domain is different
01	0	26
02	2	23
03		
04	2	14
05	1	12
TOTAL	5	75

Literature Interaction

Johnson and Johnson (1991a) outlined five characteristics for an effective decision. Two of those characteristics were the resources of the team being fully utilized and the problem-solving ability of the team being enhanced. The study indicated that the formal

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cumbersome process of the computer-mediated conference limited the ability of the team to focus its resources on a problem. As Johnson suggested, the computer-mediated conference was limited in its ability to make effective decisions.

Harrison (1995) suggested a six-step process for decision making. Harrison's process demanded extensive time for negotiation, definition, clarification, generating alternatives, and evaluation. The computer-mediated conference would not allow this depth of interaction and discussion. As Harris suggested, the computer-mediated conference would be limited in its ability to make effective decisions.

Gibson et al. (1997) pointed out that groups make better decisions than individuals because of the greater knowledge they possess, their greater ability to identify alternatives, and their better ability to evaluate alternatives. The computer-mediated conference process would not facilitate that exchange of knowledge and interaction on alternatives. As Gibson concluded, the computer-mediated conference was limited in its ability to make effective decisions.

Janis (1971, 1972, 1982) first used the word groupthink in the study of decision making. Johnson and Johnson (1991a) suggested some characteristics of groupthink: self-censorship, illusion of unanimity, direct pressure on dissenters, mindguards, illusion in invulnerability, rationalization, illusion of morality, and stereotyping. Several of these were characteristic of decision making in the synchronous computer-mediated conference. As Janis concluded, the synchronous computer-mediated conference was limited in its ability to make effective decisions.

Robbins (1997) approached process in terms of work design. Team effectiveness is related to the way the team tasks are designed. McGrath (1984) substantiated Robbins

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and pointed out that group task performance must be understood in context of the task. Tasks are not generic. They vary and will effect the performance of groups. If tasks are a dominant variable in the performance of groups, a task taxonomy needs to be developed in order to be more intentional and inferential with group performance.

Carter et al. (1950), Shaw (1973), Hackman (Hackman, 1968, 1976; Hackman, et al. 1967, 1978, 1975), Steiner (1966,1972), and Laughlin (Davis, et al. 1976; Laughlin, 1980) have all proposed various work taxonomies, see Table 5. McGrath (1984) has integrated their work into a work taxonomy termed the Group Task Circumplex, see Figure 3. Hackman's three types of tasks, production, discussion and problem-solving, are recast as four general work processes: Generate alternatives; Chose alternatives; Negotiate alternatives; and Execute alternatives. Generate is divided into generating ideas and generating plans. Chose is divided into intellective tasks and decision making tasks. McGrath follows Laughlin that intellective tasks are problems with a single correct answer and decision making tasks are problems for which there is no one clear answer. Chose is about solving problems with collaborative teams. Negotiate is about resolving problems with competitive teams and involves resolving conflicts of viewpoint and resolving conflicts of interest. Execute deals with physical behavior of acting on the alternatives.

The study indicated that the team functioned better on the Generate and Chose task types. Both are in the area of collaboration on teams. The team was able to generate ideas and plans. The team did better on the generation of ideas than plans. The generation of plans was complicated by the pace and sequencing of the computer-mediated interaction. The tasks related to competitive teams were not facilitated well by the computer-

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mediation. The team was not able to resolve difference in the computer-mediated interaction.

Phone and Synchronous Computer-Mediated Conference Open Code Frequency for Relationships and Trust

Findings

Tables 13 and 15 indicate that the domain with the second highest number of codes for both the phone conference and the synchronous computer-mediated conference was relationships and trust. Tables 26 and 27 both substantiate the code frequency and indicate that the relationship and trust domain was experienced as a different domain. The subjects talked about the importance of relationships and trust in virtual work environments. Some found the virtual experience enhanced trust and relationships, some did not, but both cases felt strongly that relationships and trust were a continuing domain from traditional to virtual work environments. Subject 1 stated, "I don't feel like it builds relationship...it seems for the sake of efficiency we are sacrificing other things that are of a higher value." "In the end I wasn't even primarily relating, I was just kind of experimenting for myself." Subject 2 stated, "I think the satisfying parts were mainly relational—it was another chance for us all to sort of be together...I think that trust through virtual meetings can be increased." Subject 4 stated, "I think it is more neutral or more negative too that you are not able to read that persona and so it is harder to really trust what they are saying...I think if people are giving short answers, those are sometimes harder to trust... being connected by a computer screen just makes it that much harder."

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Table 26

Relationships and Trust Open Code Frequency for the Phone Conference

Subject	Domain is the same	Domain is different
01	3	16
02	7	11
03	10	28
04	9	6
05	16	5
TOTAL	45	66

Table 27

Relationships and Trust Open Code Frequency for the Synchronous Computer-Mediated Conference

Subject	Domain is the same	Domain is different
01	7	11
02	18	8
03		
04	5	11
05	8	7
TOTAL	38	37

Literature Interaction

Whyte (1954) attempted to demonstrate the significance of status. Status is a prestige grading, position, or rank within a team. It may be informal, or formal. Anything that team members value can be status bearing. Whyte suggested that

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individuals work more smoothly if high-status personnel originate the action for lower-status personnel. This study supported Whyte's findings. While the subjects refer to the informality of the synchronous computer-mediated conference, its egalitarian flavor, and its lack of visible prestige symbols, they also refer to their technical skills, fears of technical incompetence, and typing speed. The positioning within the team changed. Status was still present, but rank was determined by a new set of criteria.

Group cohesion is, both positive and negative forces, that cause individuals to maintain their membership on the team. Group cohesion is the extent to which the influences on members to remain are greater than the influences on the members to leave the team. Behling and Schrieshiem (1976) understood these forces to be primarily relational. Behling goes on to state that high cohesion is related to member anxiety and member satisfaction. This follows Mayo (1933) and his work on cohesion related to affiliation need. As member anxiety is reduced through member affiliation, group cohesion increases, see Figure 5. Gibson et al. (1997) suggested that one way member anxiety can lead to member affiliation and group cohesion is through isolation. Those members who are isolated will have a higher degree of member anxiety, a higher need for member affiliation, resulting in higher group cohesion. The study supported this finding. Those case members who were most geographically isolated found the synchronous computer-mediated conference to be most relationally satisfying and contributing to group cohesion. Those case members who were proximate to each other had lower member anxiety and described the synchronous computer-mediated conference to damaging to group cohesion.

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Phone and Synchronous Computer-Mediated Conference Open Code Frequency for Communication Processes

Findings

Tables 28 and 29 also indicate a strong difference between traditional and virtual work environments with the domain of communication. The subjects strongly noted the lack of verbal, paraverbal, and nonverbal communication in the virtual work environment, particularly in the computer-mediated conference. Verbal communication were the words used, paraverbal communication was the tone, pace, vibrancy of the words, and nonverbal communication was body movements, posture, and gestures. Subject 1 stated, "Even on the phone you have some kind of verbal and sound cues as to whether someone is angry or joking... and you have none of that because you are just looking at words on a page....I am not interacting with anybody visually, there aren't non-verbal cues to pick up on or that kind of thing." Subject 4 said, "...just the fact that you can't see peoples faces like when everyone said yes to something, or to hear their tone when they said yes ..but it seemed like just because the fact of tones of voices not being there, there is a lot of room for miscommunication."

The computer-mediated communication was also much more jumbled and confusing. Subject 1 stated, "You ask a question and then there isn't a response for a while so you're not sure if people heard it and then a batch of responses come all together and you have to sort it all out." Subject 2 concurred, "When we hit a topic with some discussion, things really got jumbled and people's messages all piled on top of each other...the thing I liked the least bit it was sometimes we'd get out of order, and our conversation that somebody was still typing about an issue and I'd respond to something

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that was said and then somebody would bring us something, so sometimes we got out of order on stuff."

Typing instead of speaking also affected electronic communication. Subject 1 reported, "In terms of your typing, it's a lot more difficult to type, people type at different rates, answers were much shorter." Subject 2 remarked, "It made me feel like I better get my thing typed in before the other guys."

The subjects also noticed a tendency for communication to be abbreviated. Subject 1 observed, "Answers were much shorter....there was a tendency to not communicate because of the effort involved. You had to cut somebody off, take the time to type it in." Subject 2 stated, "If you had a question or you wanted to pursue something or you felt a particular way but you needed somebody maybe to bring that out a little bit, they are not reading any of the non-verbals that you are sending so they are not responding, so you just kind of let it go. I think that we chose our words a lot more carefully and were are a lot more abrupt with each other."

Subjects noticed the lack of feedback and the informational nature of electronic communication. Subject 4 commented, "I felt frustrated with the lack of feedback." Subject 1 observed, "It seemed like it might be an OK medium just for communicating information."

Subject 3 complained about the additional noise of electronic communication. The virtual medium added another level of complexity to communication. "I kind of see it as a negative thing because it adds this whole realm of dealing with this machine and this system that's kind of flakey at times and so in one part of our brain you are trying to

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manage that whole thing while you are having the conversation and trying to make decisions. And so it just gives you one more thing to think about."

Subject 2 found the electronic communication to be somewhat positive, "I think one of the things I was surprised about is just that I thought the chat room would be harder to communicate than it was...It didn't interrupt the flow of the conversation...I guess I felt like it offered a way for us to communicate with one another."

Subject 1 was quite negative about the communication aspects of the synchronous computer-mediated conference. Subject 1 reported, "But walking away from this one—I have no idea if Bob is frustrated.... if you are frustrated....we just kind of walk away from it and I feel like I'm in this vacuum There's this point you leave...and it doesn't feel like closure.. I don't want there to be lots of things left to chance...is somewhat disturbing because it introduces uncertainty and that uncertainty affects your sense of comfort."

Literature Interaction

Electronic communication and communication.

Jensen and Trenhold (1988) defined communication as a transaction when people collectively create and manage social realities. The parties involved begin to construct a social reality, a cogent sense of what is happening in their relationship. Electronic communication significantly altered the social reality of the team. The restrictions of the electronic medium introduced uncertainty and ambiguity into its social reality. The limited duration of the electronic communication did not allow the team to develop a new sense of social reality. As a result, the team reported primarily that the electronic medium had put them into a new social reality that felt unfamiliar and uncomfortable.

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Table 28

Communication Open Code Frequency for the Phone Conference

Subject	Domain is the same	Domain is different
01	0	10
02	1	6
03	5	5
04	5	6
05	0	4
TOTAL	11	31

Table 29

Communication Open Code Frequency for the Synchronous Computer-Mediated Conference

Subject	Domain is the same	Domain is different
01	1	24
02	0	14
03		
04	0	16
05	0	11
TOTAL	1	65

McGrath's (1984) communication model was supported by the study. The team's communication included the two modes of content, and influence, see Table 6. The content mode of the team's interaction did include a task and interpersonal component. The interaction between the task and interpersonal components did constitute the

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influence process for the team. It was the interaction between the task and interpersonal components that the team noticed most strongly. The electronic communication significantly changed that task and interpersonal interaction. That change then affected the influence of the communication. The electronic communication was less influential than face-to-face communication due to the reduction in the interpersonal component of the content and influence communication modes.

Team interaction and processes determine the effects of electronic communication.

The study partially supported the adaptive structuration theory of Poole, Desanctis, and their colleagues at the University of Minnesota (Poole, 1981; Poole, et al. 1990). It was not the technology alone that determined the effects of electronic communication. As Poole and Desanctis suggested, it was the team's response to that technology that determined the effects. The technology did not determine the effect; however, the technology effected the team's response. While the study team was not passive in its response to the technical formats and procedures of electronic communication and did attempt to structure the technology to support its existing interaction patterns, the technology did shape the study team. Although the team did not have sufficient time to fully contextualize the technology, the effect went both ways. The technology affected the team, and the team adapted the technology.

Like Poole and DeSanctis' (1989) theory of adaptive structuration, Hiltz and Turoff (1978) also proposed that electronic communication leads to new systems of procedures and communication process norms. The simultaneous conversational aspect of electronic communication forces new norms to avoid chaos, similar to the norms that have developed over time to avoid chaos in face-to-face conferences. The team did

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demonstrate appropriation, the active adaptation of the formats implicit in electronic communication to its own context.

Bikson, Gutek, and Eveland (1990a) maintained that much of technology's impact on organizations and groups is not a result of the technology itself, but rather from the changed organizational and group policies and practices that constitute the context for the implementation of the new technology. The resulting change in organizations and groups result not from the technology, but from evolving organizational and group policies and practices. Groups adapt electronic systems as they use them. It is in the utilization of electronic systems that the implications, meaning, and consequences are discovered.

The study team did not continue in the electronic system long enough to fully experience the impact of computer-mediation; however, the limited experience the team did have supported Bikson, Gutek, and Eveland (1990a). The larger organization has been changing to facilitate the implementation of electronic communication. The larger non-profit organization that the study team is a part of has been promoting its organizational web page as a source of human resource information, general information, financial information, promotional information, and communication. The larger non-profit organization developed the capacity for synchronous computer-mediated conferences and has encouraged their use. The larger organization has been adapting its relational organizational culture to facilitate electronic communication as a means for leadership, decision making, planning, and communication. These broader organizational changes affected the study group by creating an environment where computer-mediated conferences were possible and encouraged.

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Electronic communication and noise.

Gibson et al. (1997) highlighted the effect noise, defined as all the factors that distort the intended message, can have in communication, see Figure 6. Gibson did not conceptualize noise to be a step in the communication process, but does suggest that noise is a feature at each step in the communication process. The study indicated that noise was a significant element in electronic communication. The most significant element of noise was the technology itself. The hardware and software were distracting and anxiety producing for the team. The level of noise for the team was significantly increased resulting in a decrease in accurate communication.

Electronic communication and communication networks.

Bavelas (1948) described three common communication networks: the chain, the wheel, and the all-channel, see Figure 7. Prior to the team's virtual work experiences, the team's communication network had been primarily the all-channel. The team's face-to-face meetings featured a communication network in which all the group members could contribute freely. The electronic meetings changed the communication network of the team. The network changed from an all-channel network to a wheel network where the team was dependent on the leader to be the central channel of communication. The team relied on the leader to set the agenda, determine the pace of the meeting, handle any technical problems that arose, lead decision making, and ask for feedback and clarification. In short, the team was much more dependent on a central leader.

This change of communication network was noticed by the team and increased the dissatisfaction of the some of the team members with electronic communication. As

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Eisenberg et al. (1983) predicted, the more a group member moves away from the center of the communication network the more discontent the group member becomes.

Electronic communication and nonverbal and paraverbal communication.

All the team members noted the decrease in nonverbal and paraverbal communication with electronic communication mediums. This strongly supported the work of Hiltz and Turoff (1978). Hitlz and Turoff were among the first to empirically postulate the advantages and disadvantages of electronic communication. They recognized the restricted communication band of electronic communication. Verbal and paraverbal channels were not present. Occasionally this narrower bandwidth would facilitate decisions, sometimes it would restrict them. This paralleled the experience of the team.

Researchers have demonstrated the pervasiveness of nonverbal communication (DePaulo, 1992). Even when people try not to send nonverbal messages, they do so inadvertently (Burgoon, et al. 1990). As a result, individuals rely heavily on nonverbal and paraverbal communication to both deliver and receive messages. Robbins (1997) pointed out that whenever verbal and nonverbal messages are out of alignment, the message would be confused. Williams (1977) has also suggested that the restricted auditory channel in electronic communication significantly affects communication as had Kiesler and Sproull (Kiesler, et al. 1992; Sproull, et al. 1991). This confusion was clearly a part of the team's experience.

Hall (1966) suggested that space is also an element of nonverbal communication. His five interpersonal zones are all varying degrees of space that individuals and teams use to reinforce a message, see Table 7. When this dimension of space is violated, or

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absent, people feel uncomfortable or confused. This confusion and discomfort was also a part of the team experience. The team could not use space to clarify the electronic messages. Hall does include a remote zone in his space taxonomy. A remote zone is the space between people who are communicating electronically. In accordance with adaptive structuration theory and the appropriation process (Poole & DeSanctis, 1989), the team did not have sufficient time to appropriate this change in spatial communication. As a result, the team did not become comfortable with the new equilibrium of remote space and its nonverbal meaning.

Electronic communication and the impact of reduced known information.

The Johari window (Luft, 1961) also gives some insight into the team's virtual experience, see Figure 8. Luft suggested that communication is limited by how much information is held by oneself and others. The way to facilitate effective communication is to ensure that both the sender and the receiver have as much information as possible related to the message. The more information that is shared with feelings, data, assumptions, and skills, the more accurate the communication process will be. If there is information that the sender does not know about themselves, but is known to the receiver, blindspots, or if there is information that the sender does know about themselves and the receiver does not know, facade, communication will be garbled.

When a team has an initial electronic meeting, the amount of known information is reduced. Both the sender and the receiver have diminished amounts of information available to them. The area of both the blindspots and facades are increased. That diminished information is partly due to ignorance related to the electronic medium and partly due to the reduced flow of verbal and nonverbal communication. As the Johari

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Window suggested, the decreased amount of information available to the sender and receiver about the message and its context led to increased communication confusion for the team.

Electronic communication and its temporal effects.

McGrath and Hollingshead (1994) proposed four time-related differences between face-to-face conferences and electronic conferences that would affect communication in electronic conferences. Typing is slower than talking. Reading is faster than listening. Editing words and text is slower than speaking. Electronic conferences feature simultaneous messages leading to *production blocking* Production blocking is competition to gain the floor and center of the communication process. These temporal features of electronic meetings lead to a disrupted message sequence and a disrupted flow of communication. The process a team learns to communicate together, entraining, is disrupted (Kelly, et al. 1990). The team experienced all four of these time- related differences between its face-to-face meeting and its electronic meetings.

Hess, Werner, and Altman (1988) emphasized the temporal effects of electronic communication. They discussed scale, sequencing, pace, and salience. They suggested that the limitations of keyboarding affect the scale of communication. Sequencing is also be disrupted, decreasing predictability, user satisfaction, and increasing personal conflict. Pace is slowed due to the restriction of keyboarding and transmission time. The primary time frame of present, past and future is diminished due to the lack of social presence. The study team experienced all of these effects. Computer-mediation affected the scale, sequencing, pace, and salience of the team's communication.

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Hiltz and Turoff (Hiltz, et al. 1986; Hiltz, et al. 1991) predicted the effect of electronic communication on decision making processes. They forecast group conformity as an important dysfunctional feature of electronic communication. The majority exerts pressure on the minority to conform. Hollingshead (1993) also demonstrated the conforming influence of electronic communication media. This was also the experience of the team.

Electronic communication and status

Hiltz and Turoff proposed that computer-mediated conferences would be more egalitarian than face-to-face conferences due to the absence of status symbols among group members. Status symbols are more invisible in computer-mediated conferences. This egalitarian feature of computer-mediated conferences has been demonstrated by several other researchers (Eveland, et al. 1989); however, this was not the experience of the team. Due to its change in communication network from an all-channel to a wheel network, interaction was more participatory in the face-to-face conference.

Electronic communication and work design

Hiltz and Turoff (1978) also recommended that teams will need communication contexts to supplement computer-mediated conferences because of the narrower band of communication available in electronic communication. This recommendation has been forwarded by a number of additional researchers. Kiesler and Sproull (Kiesler, et al. 1984; 1985; Sproull, et al. 1986) suggested that face-to-face meetings be used for agendas featuring substantial negotiation. Arunachalam (1995) and Siegel, Dubrovsky, Kiesler, and McGuire (Siegel, et al. 1986) noted that face-to-face groups reach consensus more quickly than computer-mediated groups. Smith and Vanecek (1990) suggested that

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computer-mediated groups share less of the important information necessary to make a correct decision and found fewer correct reasons for avoiding wrong options than face-to-face groups. Computer-mediated groups deviated more from the correct answers than face-to-face groups (Smith, et al. 1988). Hollingshead, McGrath, and O'Conner (Hollingshead, et al. 1993) described the effects of computer-mediation and task type on team effectiveness.

For generating and decision making tasks, there was little difference between face-to-face groups and computer-mediated groups, however, for negotiation and intellective tasks, face-to-face groups were more effective than computer-mediated groups. Short, Williams, and Christie (Short, et al. 1976) use the concept of social presence to suggest which communication medium to use when faced with a variety of types of interactions. Social presence, the degree of presence of a person, is a characteristic of every communication medium. The social presence of a communication medium should be matched to the interaction required.

Daft and Lengel (1984, 1986), and et al. (1987) parallel previous researchers with their concept of *information richness*. They analyze the degree of information richness of various tasks and communication media and attempt to propose the importance of a good match between communication media and tasks, see Figure 4. These antecedents were strongly supported by the study as some tasks the team did better than face-to-face meetings. At other tasks the team did more poorly. The team did better with simple tasks or with tasks featuring difference that had already been processed in face-to-face interaction.

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Fulk, Schmitz, and Stenfield (Fulk, et al. 1990; Schmitz, et al. 1991) proposed a social influence model. Instead of relying on objective criteria for information richness with communication media, they identified the importance of the subjective assessment of individual perception related to information richness. Objective determinations of information richness do not influence individual perceptions of media richness. Additional sources of influence for individual perception are previous experience and keyboard skills. The study team supported Fulk, Schmitz, and Stenfield. The response to computer-mediation and electronic communication varied from team member to team member based on subjective criteria, not objective criteria. The group member's preferences for electronic communication were partly determined by the objective parameters of information richness related to the task the team was engaged in, but an even stronger parameter was team member personal preference. Some team members liked keyboarding and had positive previous experience with electronic communication, others did not. Those with positive previous experience had a more positive experience with electronic communication.

Nunamaker, Dennis, Valacich, Vogel, and George (1991) suggested that computer-mediated communication can overcome the process losses outlined by Steiner (1972). They proposed that computer-mediated communication can force a process structure that maximizes process, provides increased support through additional electronic communication channels, provides an outcome structure with a structured method, and provides additional information and computation. The team did not support this study. There were process losses related to confused communication.

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Kiesler and Sproull (Kiesler & Siegel, et al. 1984; Sproull & Kiesler, 1986) indicated the need for organizations that utilize computer-mediated communication to think through the psychological ramifications of electronic communication. Organizations that initiate computer-mediated work will find themselves functioning on the downside of electronic communication unless they anticipate and prepare for the impact of electronic communication. This was certainly the effect on the study team. The impact of the technology itself, the reduction in relational and interpersonal dimensions, the formats and protocols enforced by the technology, and the increase in task orientation had a negative psychological effect on the team. This negative impact could have been mediated with prior orientation and preparation and increased the user satisfaction of computer-meditation.

Rice (1989) maintained that computer-mediated communication can be more effective than face-to-face communication. Computer-mediated communication allowed for new structures, fewer constraints, and more possibilities than face-to-face communication. Computer-mediated communication can change communication patterns to facilitate efficiency and change the space, time, and social constraints of face-to-face communication. He indicated that this might be true on selected team tasks but not across the board. Rice can be optimistic and does not fully address the limitations of electronic communication. The study team did not find electronic communication to be more effective than face-to-face communication.

Electronic communication and depersonalization.

Kiesler and Sproull (Kiesler, et al. 1984, 1985; Sproull, et al. 1986) maintained that computer-mediated communication depersonalizes the communication process. This is a

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result of reduced *mental sight* between communication partners. This loss of mental sight elimates verbal and paraverbal communication and the usual signs related to feedback. This results in computer-mediated groups focusing more on the message and less on the people involved in communication. This was not the case in the study team. There was reduced mental sight, but this reduction did not result in a decreased concern for the people involved in communication. The team's strong relational orientation continued. The lack of mental sight reduced the team's ability to focus on the message, because they could not see the people involved in the communication.

Kiesler and Sproull go on to propose that reduced mental sight leads to an increased focus on the team task and a reduced focus on the personal and social elements of interaction. The depersonalization of computer-mediated communication increases the task orientation of groups. The team in the study reported that computer-mediation worked well for getting the task done. Computer-mediation pushed the team forward in the area of task accomplishment, however, some team members resented the diminished relational aspect of computer-meditation. The team members who understood the team's purpose to be primarily about relationships resisted computer-mediated communication, because the primary purpose of the team was lost.

Electronic communication and user satisfaction.

Smith and Vanecek (1988) observed that face-to-face teams perceive more progress than computer-mediated teams. This was substantiated by Daly (1993). It was also the experience of the study team. The study team felt that some progress was made in the computer-mediated interaction, but not as much progress as in their face-to-face

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interactions. The study team was unable to resolve difference in their computer-mediated interaction that they perceived could be resolved in face-to-face interaction.

Daly (1993) also found that members of face-to-face groups had less anxiety than members of computer-mediated groups. The study team experience parallels Daly's findings. The study team was much more comfortable with the face-to-face encounters. The study team had a high degree of anxiety related to the new technology, fear of failure, and embarrassment. The anxiety diminished the effectiveness of the study team.

Eveland and Bikson (1989) reported higher user satisfaction with computer-mediated interaction than face-to-face interaction. The study team did not prefer computer-mediated interaction to face-to-face interaction. The computer-mediated interaction was accepted as a necessary concession to the limits of time and space and would not have been their preferred mode of interaction.

Phone and Synchronous Computer-Mediated Conference Open Code Frequency by Effectiveness and Responsibility

Findings

Tables 13 and 15 indicate that the domain with the lowest number of codes for both the phone conference and the synchronous computer-mediated conference was effectiveness and responsibility. Tables 30 and 31 both substantiate the code frequency and indicate that the effectiveness and responsibility domain was not experienced as a different domain. Tables 30 and 31 indicate little difference between the effectiveness and responsibility domain in virtual and traditional work environments.

Subject 1 felt that responsibility was diminished with the phone and synchronous computer conference, particularly with the synchronous computer conference.

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"Responsibility is linked to process and negotiation....I would say that I felt less accountability...If you and I are face-to-face and I agree to something, I give you my word on something, I like to think I stick to my word." This led to a reduced sense of ownership for subject 1 where the computer-mediation was clearly not his idea. "My sense with why that would be different than what they say or why is that I think probably is that it is clear that you are the impetus behind this."

Subject 2 felt that responsibility was increased "I left with feeling that we got some things done that we needed to get done I left feeling like this is a way that we could possibly get some of our business done This would be a viable way for us to communicate with each other on occasion....I think that it helps me feel more accountable because it helps me to feel more connected...Their issues come to a forefront in my mind where as I can go on for weeks without event thinking about them otherwise." This led to a continued sense of ownership for subject 2. "I feel like I have a great deal of ownership already "

Subject 4 felt that responsibility was the same. "I felt a sense of closure on some of those decisions and that was good...I feel like follow through on stuff would be the same."

Literature Interaction

Social facilitation with coaction and audience tasks.

Triplett (1898) was among the first to document social facilitation, the improvement in task performance that occurs when people work in the presence of other people (Forsyth, 1999). Social facilitation has been documented repeatedly in contexts featuring physical presence, but little work has been done on the effect of virtual work

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environments of social facilitation. Social facilitation occurs in coaction and audience contexts. A coaction task is a performance context when people work individually in the presence of others such as children working on the same task in the same room without any interaction. An audience task is a performance context when people are working in front of spectators such as the increased performance of a weight lifter with the presence of spectators (Forsyth, 1999). Computer-mediated tasks are examples of audience contexts of social facilitation.

Table 30

Effectiveness and Responsibility Open Code Frequency for the Phone Conference

Subject	Domain is the same	Domain is different
01	0	2
02	0	0
03	3	0
04	1	2
05	3	0
TOTAL	7	4

Social facilitation related to dominant and nondominant responses.

Zajonc (1965) later recognized that the reason social facilitation did not always occur was related to the types of tasks in which the individuals and group were involved. Zajonc differentiated behavior into dominant and nondominant responses, see Figure 14. Dominant responses are behaviors that are easier to learn and perform. They are dominant in the sense that they are at the top of a person's response taxonomy and dominate all the other potential responses. Nondominate responses are behaviors that are

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new or complicated behaviors that a person has not used frequently or at all. The presence of others increased the ability of individuals to perform dominant tasks, but decreased the ability of individuals to perform nondominant tasks. Bond and Titus (1983) found that when individuals are involved in complex tasks, the presence of others reduces quantity and quality of performance.

Table 31

Effectiveness and Responsibility Open Code Frequency for the Synchronous Computer-Mediated Conference

Subject	Domain is the same	Domain is different
01	0	3
02	3	1
03		
04	5	0
05	5	2
TOTAL	13	6

This study supports the work of Zajonc (1965) and Titus and Bond (1983). The overall effectiveness of the study team decreased in the electronic context compared to the face-to-face context. The face-to-face environment supported social facilitation in a way that the virtual work environment did not. The difference was in the tasks performed in each context. For the face-to-face work environment, the team functioned primarily on dominant tasks. Tasks that they were used to in a way they were accustomed to. In the virtual work environment, the team functioned primarily on nondominant tasks. The electronic communication introduced a whole set of nondominant tasks that limited social facilitation.

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Reasons for social facilitation in audience dominant tasks.

Zajonc (1965) explained the presence of social facilitation, but did not clearly address why the presence of others enhances dominant responses. He proposed *compresence* to describe this phenomenon. Compresence is a form of arousal that occurs when two individuals of the same species encounter each other. Compresence is the arousal that occurs when the individual is unsure of what will happen next. Research on the effects of compresence has been mixed (Geen, et al. 1989). See Figure 15.

Cottrell (1972) suggested that it is not compresence that explains social facilitation, it is evaluation apprehension. Evaluation apprehension is the anxiety which creates concern to appear normal or competent (Forsyth, 1999). This has been demonstrated by a variety of researchers (Guerin, 1986). People prefer to perform dominant tasks when in evaluative contexts.

This study also demonstrated the evaluation apprehension causes of social facilitation. All the subjects referred to their apprehension in the computer-mediated interaction. They were concerned that they not fail or demonstrate a lower level of technical competence than their colleagues. This evaluation apprehension was applied to a nondominant task and further reduced the effectiveness of the team in a virtual work environment. The computer-mediated environment introduced new nondominant tasks to the team that, coupled with their evaluation apprehension, limited the effect of social facilitation.

Guerin (Guerin, et al.1982) suggested a distraction-conflict theory of social facilitation. The distraction-conflict theory states that social facilitation is related to people's ability to adequately process information. Guerin pointed out that individuals

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working in the presence of others must divide their attention between complex tasks and their audience. People are less able to focus on complex nondominant tasks in the presence of others because of their increased self-awareness. On complex nondominant tasks, the drive produced by social facilitation is not enough to overcome the distraction inference resulting in reduced effectiveness. People overlook aspects of a complex task when they work on it in the presence of others that they do not overlook when they work alone (Gastorf, et al. 1980).

The study also demonstrated the effect of distraction-conflict related to social facilitation. The subjects were limited in their ability to process so much information simultaneously. They had to adjust to new software and hardware, a new electronic communication medium and protocol. All these distractions reduced their ability to complete nondominant tasks. As a result, the effects of social facilitation were minimized.

Electronic performance and social facilitation.

Aiello and Kolb (1995) found social facilitation in the context of electronic performance monitoring. Business can trace the daily performance of their employees through computer information networks. Aiello has found that electronic performance monitoring affects employee performance in ways consistent with social facilitation theory. The electronic monitoring increased the performance of skilled employees when they were working on their dominant tasks. It decreased the performance of non-skilled employees when they were working on non-dominant tasks.

The study supported Aiello and Kolb's findings. The team did experience some effect of social facilitation. The effect was limited to tasks that were the simplest. Tasks

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related to simple voting and brainstorming ideas were transacted well. Social facilitation did occur in the computer-mediated environment. Its effects were limited to dominant tasks.

Social combination theory.

Steiner's (Steiner, 1972, 1976) social combination theory was also supported by the study. Steiner reduced group effectiveness to two questions. First, does the group have the resources it needs to be successful? Second, does the group combine its resources effectively?

Group effectiveness is a result of a group's resources and how it combines those resources to accomplish its task (Forsyth, 1999) Regarding the first question, researchers have looked at KSA, diversity, gender, and types of tasks. Widmeyer (1990) proposed that the group's performance depends on the KSA, knowledge, skills, and abilities, of its members. Shaw (1981) found that while diversity is helpful in group effectiveness, groups with heterogeneous personality types were less effective than groups with homogeneous personality types. Wood (1987) proposed that men do better with task related processes and women with interpersonal tasks

The study indicated that group performance is dependent on the composition of the group. As Widmeyer (1990) suggested, the KSA of a group determines its effectiveness. The KSA of the group did not support computer-mediated interaction. The team had no training in computer-mediated conferences prior to the study. The performance of the team in the computer-mediated environment would have been much stronger with a better KSA group composition, or sufficient training to increase the KSAs of the team. As Shaw (1981) proposed, personality diversity of a team can diminish group

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effectiveness. The team had a heterogeneous personality composition, which affected its effectiveness. Unlike what Wood (1987) maintained, the men were not primarily task oriented and the women relationally oriented. The orientation towards task or relationship was not dependent on gender.

Electronic performance and social loafing.

Steiner (1972) used the concept of *process loss* to explain the gap in performance between a team's potential and actual performance. Steiner's law of group productivity was that the actual productivity of a group equals the difference between the potential productivity and the losses due to faulty processes. Even groups with skilled resources well combined can be unproductive related to process losses. One common process loss is connected to the phenomenon of social loafing. Social loafing is the reduction of individual effort exerted when people work in groups compared with when they work alone (Forsyth, 1999). See Figure 16

The computer-mediated interaction appeared to display more social loafing than the face-to-face interaction. In the virtual context, the group members did not feel as indispensable, unique, and essential for the group's success. As Kerr and Bruun (1983) suggested, this could lead to an increase in loafing behavior. The novelty of the computer-mediated interaction with its related lack of goal and outcome clarity, compared to the more familiar face-to-face interaction, could also lead to an increase in loafing behavior (Weldon, et al. 1993). Some of the subjects did not own the computer-mediated interaction. It was perceived as someone else's agenda and not really relevant to them. This lack of personal vestment with the computer-mediated interaction could also increase loafing behavior (Brickner, et al. 1986). The degree of anonymity was also

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much higher in the computer-mediated interaction than the face-to-face interaction. The lack of social presence with the computer-mediated interaction allowed for a higher degree of anonymity. Sanna (1992) demonstrated a strong relationship between anonymity and social loafing.

Other researchers have suggested collective efficacy to understand social loafing (Silver, et al. 1997). The group member's expectation of the group's success determines the effectiveness of the group, see Table 32. Collective efficacy theory is related to Karau and William's (1993b) collective effort theory. Collective effort theory is related to expectancy theory. The collective effort model links reduced group effectiveness to lower expectations for goal attainment and the reduced value of those goals. The two factors that determine group member motivation are their expectations that a goal can be accomplished and their sense of value for that goal. If a group member believes that the goal is unattainable, collective efficacy theory, or that the goal is unattainable and not valuable, collective effort theory, their motivation will decrease. This decrease in motivation can result in increased social loafing behavior.

The collective efficacy theory and the collective effort theory could also explain the increased social loafing in the computer-mediated interaction compared to the face-to-face encounter. In the computer-mediated interaction, two group members had very low expectations and value related to electronic communication. This may have promoted their increased social loafing, see Table 32

Work Taxonomy Related to Phone and Synchronous Computer-Mediated Conferences Findings

The study was designed with a work agenda to reflect all four work tasks in McGrath's (1984) work taxonomy. Tables 33 and 34 display the code frequency related

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to how well that work task was accomplished in virtual work environments. During the course of the study, it became clear that some work tasks were more effective in virtual contexts than others. While the virtual work environment affected all of the work tasks, the virtual work environment had the strongest negative impact on the negotiation work tasks. Tasks that were related to generating ideas were most effective. As tasks increased in complexity, the impact of the virtual environment increased. Tasks featuring more complexity, like choosing the best idea, negotiating differences between ideas, and executing ideas did not go well in the synchronous computer-mediated conference, see Figure 3.

Table 32

Collective Efficacy Theory and Collective Effort Theories

Theory	Goal is Perceived as Attainable	Goal is Perceived as Valuable
Collective Efficacy	Yes	
Collective Effort	Yes	Yes

Subject 1 stated, " It has a dampening, pushing towards similarity and pushing toward consensus as opposed to difference ..use it for the small business stuff and things that don't have much consequence...it inhibited discussion." Subject 2 stated, "When you are typing you keep your comments short." Subject 3 stated, " Decision making was stilted...was good for information." Subject 4 stated, "It was like taking votes...it wasn't like discussion."

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Literature Interaction

This study substantiated the work of Daft, Lengel, and Trevino (Daft & Lengel 1984, 1986; Trevino, et al. 1987) along the idea of information richness (see Figure 4). Daft and Lengel suggested that different group functions need the transmission of varying amounts of richness. The richness of information contained in a communication transmission refers to how much of the information contains emotional, attitudinal, normative, and other meanings beyond the literal cognitive symbols used to express it. Tasks requiring teams to generate ideas may only require the transmission of cognitive symbols. Information related to emotion and evaluation is not needed. Other tasks require teams to negotiate and resolve conflict. These tasks may require the transmission of rich information including the facts, but also values, attitudes, affective messages, expectations, and commitments

Table 33

Work Taxonomy Open Code Frequency for the Phone Conference

	Types of Work Tasks							
Subject	Generate		Chose		Negotiate		Execute	
	+	-	+	-	+	-	+	-
01	6	3	4	4	0	12	1	0
02	1	0	3	3	0	12	0	0
03	7	17	10	17	4	18	0	0
04	3	1	3	1	1	1	0	0
05	11	3	8	4	3	10	5	2
TOTAL	28	24	28	29	8	53	6	2

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Table 34

Work Taxonomy Open Code Frequency for the Synchronous Computer-Mediated Conference

	Types of Work Tasks							
Subject	Generate		Chose		Negotiate		Execute	
	+	-	+	-	+	-	+	-
01	6	0	5	0	1	22	0	0
02	5	1	11	1	8	14	0	0
03								
04	1	4	3	6	1	8	0	0
05	2	3	4	3	0	10	0	0
TOTAL	14	8	23	10	10	52	0	0

Daft and Lengel (1984, 1986) and et al. (1987) asserted that communication media varies in the richness of information that they can transmit (McGrath, et al. 1993). Face-to-face communication is the richest with standardized written forms being the leanest. Daft suggests that a team's task effectiveness will be depend on how closely the team's task aligns with the richness of communication it utilizes. Tasks needing more lean communication, such as generating, will be successful if a communication medium is used with corresponding information richness.

Figure 4 identifies patterns of fit between forms of communication and work tasks based on the information richness of the medium of communication. The best fitting alignment is near the diagonal. Contours increasingly distant from the diagonal represent

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increasingly poor fit. Poor fit is the result of task communication mediums that are too rich or too lean for the task requirements.

The study suggested a strong relationship between type of task and medium of communication. Tables 33 and 34 indicate that the virtual work environments of the phone and computer did not provide a context for tasks related to negotiation but did for tasks related to generating and choosing. The percentage of the positive codes related to the negative codes is higher for the computer-mediated conference than the phone conference on tasks related to both generating and choosing. The code frequencies indicate alignment of communication medium and tasks related to choosing and generating is strongest with generating and choosing tasks in the computer-mediated conference. Although the synchronous computer-mediated conference was less information rich than the phone conference it was more helpful for the tasks of choosing and generating.

The study did not have many codes for tasks related to execution. While the agenda for each virtual conference included items related to execution, execution was not a major feature of the agenda. The ability of the virtual medium to support increasingly complex work tasks decreased significantly with each step of the work taxonomy. When the virtual medium was not able to support negotiation, the researcher elected not to major on execution. The majority of the agenda in both the phone and synchronous computer-mediated conference was spent on generating, choosing, and negotiating.

New Technology Domain

The study indicated the presence of a new domain. The domain of technology is not present in traditional work environments, but is present in virtual work environments.

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There are fifty-three codes related to technical problems. Table 35 illustrates that the major features of the technological domain are linked to hardware problems, software problems, and training. It took the team up to an hour to get into the conference chat room. Part of the problem was that the conference room was not set up, and another part was that people did not know how to get there. Although the team had been encouraged to practice getting to the room and learning to navigate there before the conference, none of the team had. During the conference, there were had six occasions when one of the team would be disconnected from the conference and have to re-boot the computer. The conference room was not secure, and two outsiders continued to move in and out of our meeting. The team did not know how to navigate around the conference screen. The team did not know about the need to refresh in order to get new messages, the presence and possible use of icons and different text colors.

In Table 35 there is a strong relationship between technological values and satisfaction. Those Subjects with negative values related to technology did not experience much satisfaction in the synchronous computer-mediated conference. These values could be seen in statements like, "It increased my mistrust of the electronic medium...I think that there is a general mistrust of computers...It is just a cold, hard technology, it's a machine, it's the channel with interaction as opposed to open air...Yeah and it's not 2001 and the computer is out to get us." Subject 3 stated, "I am always the last person to get stuff." Subject 4 stated, "It makes me wish I was born in the eighteenth century when it seemed like things were simpler in certain ways that you didn't have to depend on stuff like that...So I really feel torn with technology. Part of me is very frustrated with it and part of me, I don't know if I could live without it, kind of

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thing...I think I have a love/hate relationship...I kind of see it as a negative thing because it adds this whole realm of dealing with this machine and this system that's kind of flaky...I think that it has to do with pace of life and quality...I think it is more real because you are involved with more of the process...I think I have always had a caution about that because it seems to be so un-natural.,,It feels like there is a feeling of dependence on it that I don't like."

There was not a strong relationship between negative expectation and satisfaction. Subject 2 had a very low expectation for the synchronous computer-mediated conference, but also the highest frequency of satisfaction codes.

Satisfaction of Team Members with Phone and Synchronous Computer-Mediated Conferences

During the course of the study a relationship emerged between user satisfaction and user attributes. Electronic mail was used to gather additional self-descriptive user attributes. These user attributes were grouped around isolation, perception of team purpose, user individual personality, user preference of processing information, and user perception of personal team membership.

In Tables 36 to 40 satisfaction refers to user satisfaction. The open codes related to user satisfaction were tallied to yield a positive or negative value. Open user satisfaction codes that described the virtual experiences as negative received a single negative value and those that were positive a single positive value. As a result, each subject received an overall satisfaction score that was used to determine user satisfaction. A positive overall score was identified as positive user satisfaction and a negative overall score as negative

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user satisfaction. In Tables 36 to 40 an "X" in the Satisfaction column indicates a positive satisfaction score.

Table 35

Technology Open Code Frequency for the Synchronous Computer-Mediated Conference

Dimensions	Subjects				
	01	02	03	04	05
Problems					
Hardware	3	1		2	2
Software	10	1		2	1
Training	9	4		12	6
Subtotal	22	6		16	9
Values					
Positive				2	
Negative	11			16	1
Subtotal	11	0		18	1
Expectations					
Positive	0				
Negative	0	10		3	
Satisfaction	0	6		2	0

Individual Perception of Isolation and Satisfaction

Table 36 displays a relationship between geography and satisfaction. Subjects who are proximate live in closer proximity to each other and have a reduced experience of isolation. Those subjects who live at distance from the rest of the team have an increased experience of isolation. Those subjects who experience greater degrees of isolation were more satisfied with the synchronous computer-mediated conference. This is reminiscent

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of the relationship and trust domain in which Mayo's work on group cohesion with member affiliation and member anxiety (Mayo, 1933) are related to Gibson's work on isolation (Gibson, et al. 1997). As member anxiety is reduced through member affiliation, group cohesion increases, see Figure 5. Gibson et al. (1997) suggested that one way member anxiety can lead to member affiliation and group cohesion is through isolation. Those members who are isolated will have a higher degree of member anxiety, a higher need for member affiliation, resulting in higher group cohesion. The study supported this finding. Those case members who were most geographically isolated found the synchronous computer-mediated conference to be most relationally satisfying and contributing to group cohesion. Those case members that were proximate to each other had lower member anxiety and described the synchronous computer-mediated conference to damaging to group cohesion.

Table 36

User Satisfaction and Isolation

Subject	Proximate	Distal	Satisfaction
01	X		
02		X	X
03	X		
04		X	X
05		X	X

X indicates a positive satisfaction score.

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Individual Perception of Team Purpose and Satisfaction

Table 37 indicates a relationship between user purpose preference orientation and satisfaction. The preference for each subject is indicated with an "X". Those subjects with a preference for a relational orientation for purpose were not satisfied with the synchronous computer-mediated conference. Those subjects with a preference for a task orientation for purpose were satisfied with the synchronous computer-mediated conference. The study highlights the differences between individual and team goals.

Table 37

User Satisfaction and Perception of Team Purpose

Subject	Relational Purpose	Task Purpose	Satisfaction
01	X		
02		X	X
03	X		
04		X	X
05		X	X

X indicates a positive satisfaction score

There is some disagreement over whether there are only collections of individuals' goals, or if there are overall team goals. Allport (1924) is an advocate of the individualistic orientation to teams. Allport insisted that a group was only the sum of its aggregate members. Groups had no identity independent from the individuals in it. Pepitone (1980), Lewin (1944), Johnson and Johnson (1991a), and Horwitz (1954) emphasized that team goals do exist. Teams are more than the aggregate of individual members.

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The study does not resolve this debate. The study does indicate that there are individual goals present on a team. The individual goals are utilized to evaluate the actions and performance of the team. Individuals with high relational preferences for purpose prefer environments that are highly relational. They will resist any environment that threatens, or diminishes, their relational preference. Virtual work environments are not as relationally immediate and thus disliked by the subjects with a preference for a relational purpose.

Individual Personality and Satisfaction

Tables 38 and 39 are based on both the assessment of the researcher's experience with the Myers-Briggs Personality Inventory (Meyers, 1962) as a professional in social behavior assessment and on the self-assessment of the subjects. Table 38 demonstrates a relationship between introversion and extroversion and satisfaction. Subjects 1 and 3 were energized by being with others, preferred a multiplicity of relationships, were external and interactive, and were extroverts (Keirsey, et al. 1984). The virtual work environment did not support their extroverted preferences. Subjects 2, 4, and 5 were energized by being alone, preferred limited relationships, were internal and concentrated and were introverts (Keirsey, et al. 1984). The virtual work environment did support their introverted preferences.

Individual Mode of Information Processing and Satisfaction

Table 39 outlines a relationship between external and internal processors and satisfaction based on the Meyers-Briggs Personality Inventory (Meyers, 1962), the researcher's professional experience, and a self-assessment of the subjects. Subjects 1 and 3 were extroverts, see Table 38. Extroverts process information externally. Dialogue

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and conversation were essential elements of their information process (Hirsh, et al. 1987). The virtual work environment did not support their extroverted preference for processing information. Subjects 2, 4, and 5, see Table 38, were introverts. Introverts processed information internally. Introspection and reflection were essential elements of their information process (Hirsh, et al. 1987). The virtual work environment did support their introverted preference for processing information.

Table 38

User Satisfaction and Individual Personality

Subject	Extroverted	Introverted	Satisfaction
01	X		
02		X	X
03	X		
04		X	X
05		X	X

Table 39

User Satisfaction and Preference of Processing Information

Subject	External	Internal	Satisfaction
01	X		
02		X	X
03	X		
04		X	X
05		X	X

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Individual Perception of Personal Team Membership and Satisfaction

Table 40 suggests a relationship between individual membership in the team and satisfaction with virtual environments. The individual team development model developed by Moreland and Levine (1982, 1988) was used for this self-assessment. Each team member was asked via electronic mail what development stage they were in with the study team.

Moreland and Levine suggested that group members go through a linear predictable process of individual evaluation. Evaluation is a part of the prospective member and new member stages. Commitment is a feature of the full member stage. An "X" is placed in the column for evaluation or commitment dependent on what the subject reported.

Those team members who identified with the team had higher satisfaction than those team members who did not identify with the team. Subject 1 stated, "My sense, like if we had done this a year and a half ago when I was first coming on the team, is that it would have been very negative...it would have been detrimental in terms of my perception of the team and my sense of feeling like I belong."

McIntosh-Fletcher (1996) suggested that individuals select teams. Moreland and Levine (1982, 1988) look at team development through the window of individual membership. This study supports the work of Moreland and Levine. Teams with individuals in an evaluative posture towards the team should avoid virtual work environments. Teams need their individual members to become committed to the team before any virtual work contexts will be satisfying.

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The researcher expected to find variation in user satisfaction related to gender and generational differences. No relationship was found between gender and generation and user satisfaction.

Research Bias

Table 41 indicates that the subjects detected no research bias. They did not detect any difference in the behavior of themselves, their group members, or the researcher.

Table 40

User Satisfaction and Perception of Individual Team Membership

Subject	Evaluating	Committed	Satisfaction
01	X		
02		X	X
03	X		
04	X		X
05		X	X

X in the satisfaction column indicates a positive satisfaction score.

Subject 1 stated, "I don't think I was a different person because of that dynamic...I didn't notice any difference with anyone in the group...It was natural for you to lead and that's part of your role so that's not an unusual thing." Subject 2 stated, "I think that if an outside person was there making the observations, we would be more conscious to staying on task and to keeping ourselves from any kind of distractions...I didn't notice any change in our relating to each other at all." Subject 3 added, "I didn't think that there was anything different...In fact I wasn't even thinking about the fact that you were

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monitoring this because I couldn't see you...You seemed like you were there at our meeting doing what you would normally do."

Table 41

Bias by Frequency of Open Codes

Subject	Bias	No Bias
01	2	5
02	1	5
03		
04	0	3
05	2	0
TOTAL	4	13

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CHAPTER FIVE

Discussion

Introduction

Until recently, only high technology firms or global business units worked in virtual work environments. Meetings and conversations were postponed until all the participants could be in the same room. Changing philosophic and work contexts coupled with technology have created new work environments where teams can communicate and collaborate across the former barriers of time and space. In many contemporary organizations, most teams work virtually. It is increasingly rare to find teams consisting of team members all located in one place. People have become, regardless of preference, members of virtual teams.

Although changed philosophic and work contexts supported by new technology have allowed the development of virtual teams, success with virtual teams demands more than computers and technology. The dream of leveraged technology resulting in increased market advantage is still in the process of unfolding. New competencies and practices are needed to allow this dream to become real. Success, or failure, in today's changed philosophic, work, and technical environments is dependent on the ability to be competent with virtual teams. What are the practices that facilitate the optimal performance of virtual teams?

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This study attempted to answer that question using prior research on traditional teams as a baseline. Seven domains of characteristics were identified for traditional teams that were compared against a virtual team. How were successful virtual teams and successful traditional teams the same? How were they different? What was unique to successful virtual teams that was not a part of successful traditional teams? What, regarding these seven domains, was the same and different for virtual and traditional teams?

In the following chapter, the results from Chapter Four are discussed. Keeping in mind that the seven team domains were continuous in both traditional and virtual work environments, the impact of the virtual work environment on each team domain are explored. Also discussed are the member attributes related to user satisfaction, work design, and the technology domain all introduced in Chapter Four

First Research Question and Findings

The first research question in the study was, "What domains of successful teams in traditional work environments must be present to ensure success in the virtual work environment?" Figure 23 displays the finding that the seven domains of team characteristics were the same for teams in both virtual and traditional work environments. The presence of the seven team domains was continuous. The subjects were always able to identify the presence of these domains regardless of work environment; however, the team domains had differences of expression in each work environment.

The Multiplying Effect of the Communication Domain

The team domain most affected by virtual work environments was the communication domain. Through the impact of the virtual work environment on the

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domain of communication, all the other team domains were affected. Figure 24 displays the impact of communication on the other team domains. All the team domains were connected and expressed through the communication domain. If there was a significant adjustment in the communication domain, its effect was felt throughout the remaining domains.

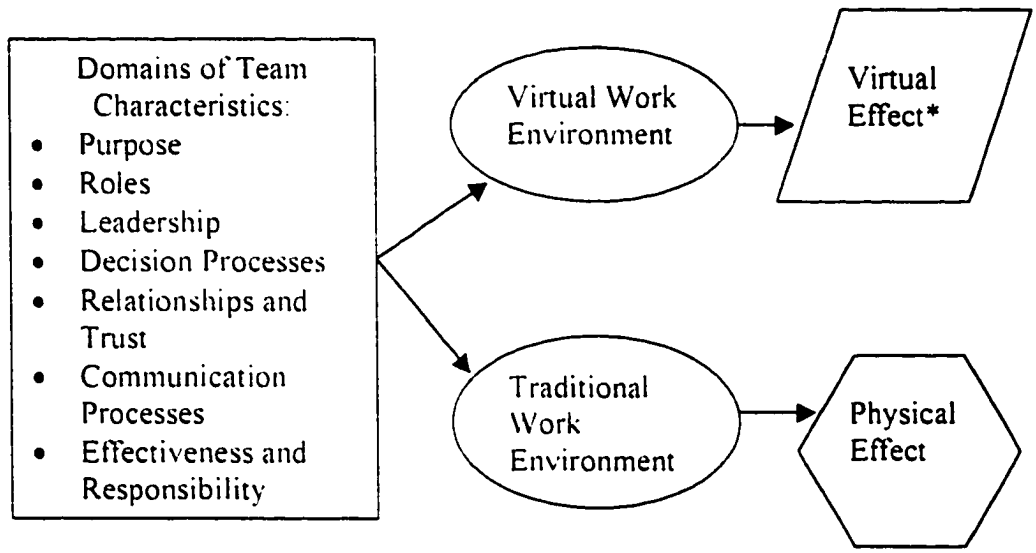

Figure 23. Virtual Effect on Team Domains

Figure 25 displays the impact of communication on the other team domains from the perspective of reduced communication channels. Face-to-face had the richest communication. It included verbal, nonverbal, and paraverbal communication. This rich band of communication facilitated a wider band of potential team behaviors related to team domains. The reduced bands of communication in the virtual work environment restricted team behavior and team domains. The areas outside the cone of communication restrictions represent the increasing limitations on the remaining team domains that accompanied the decreasing communication channel bands of virtual work environments. Thus, a significant change in the communication domain of a team effected all the other domains.

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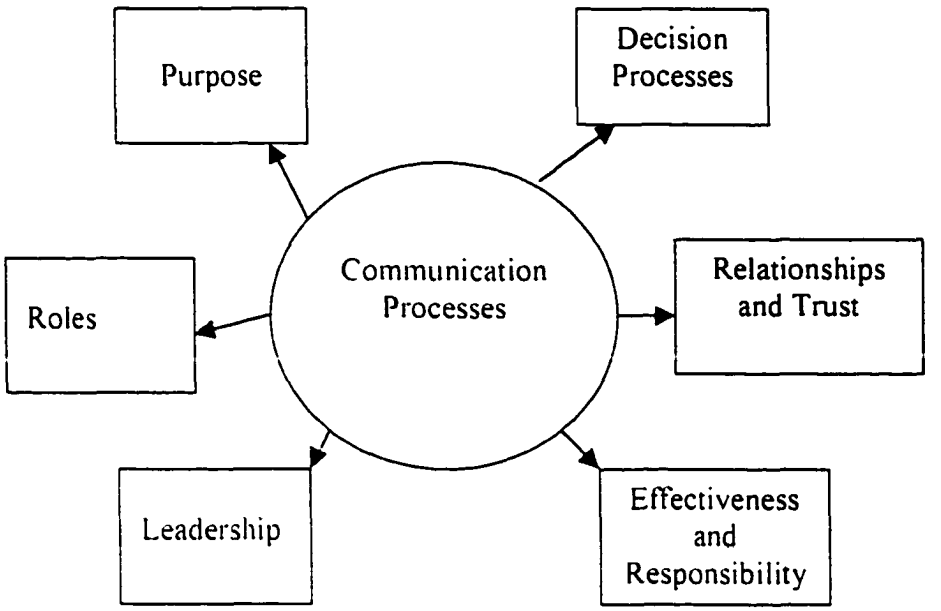

Figure 24. Centrality of the Communication Domain

A system is a gathering of components that individually establish relationships with each other and that interact with their environment (Cavaleri & Obloj, 1993). Another way to visualize the impact of virtual environments on the communication domain and that domain's effects on the remaining six domains is the perspective of systems, see Figure 13. The impact of the virtual work environment on the communication domain is displayed in Figure 26 in system terms. A team with its seven characteristic domains was the input. The team entered the virtual work environment. The team's interaction and behavior in the virtual work environment was the process. A primary distinction in the virtual work environment was the reduced channels of communication. The effect of the virtual work environment on the team with its seven characteristic domains was the output. The asterisked domains indicate that the virtual environment affected all the team domains. The multiple asterisked communication domain indicated that it was the most

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strongly affected. The team interacted with itself and its environment as the feedback element of the system. As the altered domains entered the system again, its communication processes were the most dramatically affected by the virtual work environment. The team experienced the virtual environment again with reinforced communication changes and began to establish a new equilibrium.

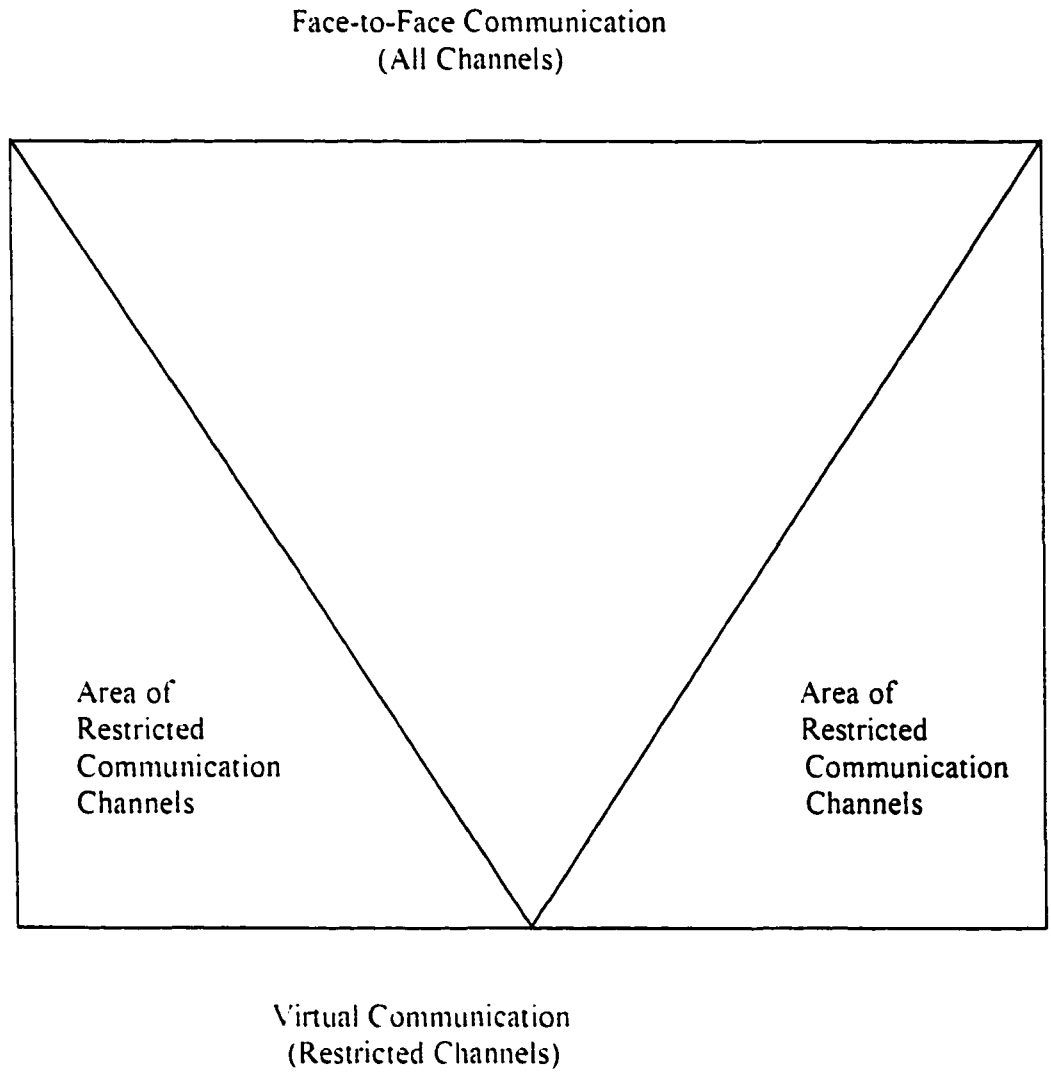

Figure 25. The Effect of Restricted Communication on Team Domains.

What was the basis for the finding that the communication domain was the domain most strongly affected by virtual work environments? Table 42 displays the frequency of

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team domains for the phone and synchronous conferences. Notice that the three domains gathering the most codes, and the most subject comments, were the team domains of decision processes, relationships and trust, and communication processes. The subjects made the most comments regarding these three domains in relation to face-to-face conferences and the virtual conferences.

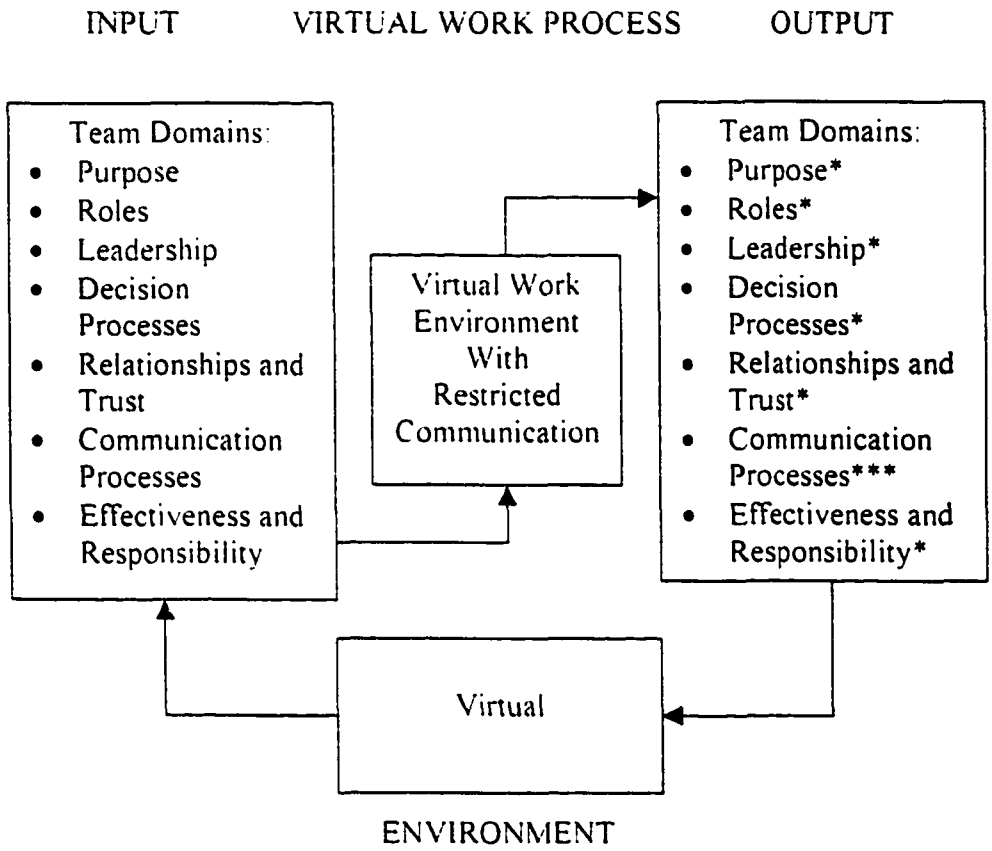

Figure 26. A Virtual Work Process System.

The subjects not only made the most comments regarding these three domains related to face-to-face conferences and virtual conferences, but their comments were largely noting the differences between these three domains in face-to-face and virtual conferences. Table 43 displays the frequency of codes related to subject comments differentiating the phone and synchronous computer conferences from the face-to-face

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conference. These are calculated on a per subject average to level the difference in the number of subjects between the phone and synchronous computer-mediated conferences. Some of the codes indicated that the phone and synchronous computer conference was the same as the face-to-face conference and some of the codes indicated that the electronic conferences were different. Notice that the largest perceived differences were between the processes of decision making and communication. Table 44 is a similar display. In order to highlight the perceived difference between the decision making and communication processes with the face-to-face conference and the electronic conferences, only the differences are shown by team domain. These are also calculated on a per subject average to level the difference in subjects between the phone and synchronous computer-mediated conferences.

Notice that the domain that was most strongly affected by the change from face-to-face to phone conference to synchronous computer conference was the domain of communication. While the decision making process domain had the most codes related to difference, it was the communication process that was most strongly affected by the difference between the phone and synchronous computer conferences. It was the communication process domain that was most strongly effected in virtual work environments. The more the virtual work environment restricted the bands of communication available, the stronger the impact. As a result, the more virtual the work environment, the stronger the effect on the communication domain.

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Table 42

Frequency of Team Axial Codes by Phone and Synchronous Computer-Mediated Conferences

Team Domains	Phone Conference	Computer Conference	Total
Purpose	31	30	61
Roles	23	32	55
Leadership	52	49	101
Decision Processes	146	175	321
Relationships And Trust	97	112	209
Communication Processes	44	78	122
Effectiveness And Responsibility	8	26	34

What was the basis for the finding that the effects of virtual work environments were spread to the other team domains primarily through the communication domain? Not only did the domains of decision processes, relationships and trust and communication processes receive the most subject comments related to their difference in face-to-face and virtual conferences, but the more virtual the conference, the stronger the difference. Table 44 also displays this accumulative effect of electronic conferences. The noted differences between the face-to-face conference and the electronic conferences increased from the phone conference to the synchronous computer conference for all the team domains.

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Table 43

Comparison of Face-to-Face, Phone, and Synchronous Computer-Mediated Conferences

Team Domain	Compared to Traditional Team Domains	Phone Conference	Computer Conference
Purpose	Same	4.2	.8
	Different	1.6	3.75
Role	Same	1.4	2
	Different	3	3
Leadership	Same	5.2	2
	Different	4.4	5.25
Decision Processes	Same	8.2	1.25
	Different	18.4	18.75
Relationships and Trust	Same	9	9.5
	Different	13.2	9.25
Communication Processes	Same	2.2	0
	Different	6.2	16.25
Effectiveness and Responsibility	Same	1.4	2.6
	Different	.8	1.5

The primary difference between the phone and synchronous conferences was the communication bandwidth. The agendas were similar, the group composition was similar, the time of the day was similar and the primary difference was the means of technology. The phone conference allowed for verbal, but not nonverbal or paraverbal communication. The synchronous computer conference excluded nonverbal and

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paraverbal communication, but also excluded verbal communication. It was the narrowed communication bandwidth between the phone and the synchronous computer conference that led to the increased subject perception that the seven team domains were different in traditional and virtual work environments.

Table 44

Differences Between Face-to-Face, Phone, and Synchronous Computer-Mediated Conferences

Team Domain	Phone Conference	Computer Conference
Purpose	1.6	3.75
Role	3	3
Leadership	4.4	5.25
Decision Processes	18.4	18.75
Relationships and Trust	13.2	9.25
Communication Processes	6.2	16.25
Effectiveness and Responsibility	8	1.5

This finding is anchored to the work of other researchers. Jensen and Trenholm (1988) defined communication as the process when people collectively create and manage social realities. The parties involved construct a reality, a sense of what is happening in their relationship. When the process that create and manage that reality between people is altered their social realities are altered. If the other dimensions are unchanged, but communication is changed, the group will experience a change in social reality. Communication provides perspective on the reality of the interpersonal relationships, behaviors, and activities between people. This parallels the effect that

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virtual work environments had on the study team's communication domain, and through it, all the remaining team domains. An impact on one domain, if it was the correct one, multiplies that impact throughout the team domains. The communication domain was the one domain with that degree of impact.

One of the primary challenges of virtual teams is how to maximize the advantages and avoid the disadvantages that accompany virtual communication. The resulting reduced band of communication can be both an advantage and a disadvantage. The next group of findings describes how these seven team domains were effected by the impact of virtual work environments on the communication domain.

Effect on the Communication Domain

Virtual work environments radically affected the communication domain. Many of the study's communication domain effects substantiated the work of previous researchers. Synchronous computer conferences led to new systems of procedures and communication norms (Hiltz & Turoff, 1978). The simultaneous conversational aspect of the synchronous computer conference created chaos. The team had no norms to govern the interaction, similar to norms that the team had developed to avoid chaos in its face-to-face interaction. The primary effect of the technology on team communication was not the technology itself, but the team's response to that technology. The team was not passive in its response to the technology presented in the synchronous computer conference. The team did attempt to structure the technology and its communication restraints to support its existing communication patterns. Although the study was not long enough to allow the fuller development of adaptive structuration theory and the

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process of appropriation, the team began moving in that direction (Poole & DeSanctis, 1989, 1990).

The team noticed a significant shift in communication content in the virtual work environments. The team frequently observed that the virtual work environment favored task related communication. The team lamented the loss of the interpersonal aspect of virtual communication. In order for this team to continue functioning in a virtual work environment, it would be essential to discover ways to counter the erosion of the interpersonal component of communication in virtual environments. McGrath (1984) noticed the same effect. He discussed communication in terms of both influence and content modes, see Table 6. Both modes have the components of task and interpersonal communication. Sustainable communication requires input in all four communication quadrants. If the interpersonal component of both the influence and content modes of communication are restricted, communication will be restricted McGrath suggested that the reduction of the interpersonal component in virtual work environments would have both a content and influence effect on virtual teams

Communication in virtual work environments depersonalizes communication (Kiesler, et al. 1984; Sproull, et al. 1986) The loss of mental sight between communication partners leads to depersonalization. The lack of mental sight leads to an increased focus on team task and a reduced focus on the personal and social elements of interaction. This was also true of the study group The subjects were not content with this aspect of communication in virtual environments. Most of the subjects indicated that they would not favor continuing in virtual work environments unless this feature of

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communication in virtual work environments could be balanced. The subjects felt strongly that the personal and social aspects of interaction must be present.

As Gibson et al. (1997) suggested, noise can affect communication, see Figure 6. The study indicated that the noise introduced into the communication process in virtual work environments affected communication. The hardware and software were distracting and anxiety producing for the team. The technical warning messages and illegal procedures message intimidated the team. The level of noise for the team was significantly increased resulting in a decrease in accurate communication in the virtual work environment.

Bavelas' work (1948) was also a part of the team's virtual work environment experience. The team experienced a changed communication network from the all-channel to the wheel communication network in the virtual work environment, see Figure 7. Instead of all the subjects being able to contribute freely, the team was constricted by the confusion of both the simultaneous interaction and the new work environment being dependent on the leader of the team. The team became more centralized and was more dependent on its leadership.

All the team members noted the decrease in nonverbal and paraverbal communication in the virtual work environments. This supported the work of Hitlz and Turoff (1978) who were among the first to postulate the restricted bandwidth of electronic communication. As Hiltz and Turoff forecast, the restricted communication bandwidth directly determined the advantages and disadvantages of electronic communication. Sometimes electronic communication facilitated decisions, and sometimes it restricted them.

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McGrath and Hollingshead (1994) and Hess et al. (1990) discussed the temporal effects of electronic communication. These temporal effects were strongly felt by the team members. McGrath and Hollingshead pointed out that typing is slower than talking, reading is faster than listening, and that editing words and text is slower than speaking. These temporal differences were true for the study team and effected their communication.

McGrath and Hollingshead (1994) also suggested that the temporal effects of electronic communication would lead to a phenomenon they termed production blocking. Production blocking is the competition a team encounters in electronic communication in attempting to be heard, gain the floor, and be the center of the communication process. The study team did not experience this as a strong effect due to the wider behavioral context of collaboration; however, there were times when the team was blocked as team members attempted to ensure that they were heard on a topic of value to them.

The Hess et al. (1990) discussion of temporal effects of electronic communication were also true for the study team. The scale, sequencing, pace, and salience of the team's communication process was effected. Scale is the limiting effect keyboarding has in the exchange of communication. Sequencing is the disrupted flow and predictability of electronic communication. Pace is the reduced flow of interaction due to keyboarding and transmission in electronic communication. Salience is the impact of reduced social presence.

Hiltz et al. (1986) and Hollingshead (1993) also pointed to a dysfunctional feature of electronic communication. Decision making in virtual work environments has a team conformity effect. The majority will exert pressure on the minority to conform to their

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opinion. The lack of social presence increases this tendency towards conformity. This was also a feature of the study team's experience. Team members noticed a much stronger tendency towards conformity in the virtual work environment than in their face-to-face environments. Unlike Siegel et al. (1986) demonstrated, the study team reached consensus more quickly in the virtual work environment than traditional work environments. The consensus was a part of the tendency towards conformity in the virtual work context. As Smith et al. (1990) discussed, the study team did not share as much relevant information related to the decisions they reached in the virtual work environment, as they did in the traditional work environment. It also led to a stronger group conformity influence for the study team.

Daft and Lengel. (1984, 1986) recommended that when teams work in a virtual work environment, virtual teams analyze the degree of information richness of various tasks and communication media and match those tasks to those communication media, see Figure 4. The virtual work environment with its limited communication did not support all the study team tasks equally. The study team performed well with simple tasks when the team was collaborative, and performed more poorly with tasks that were complex and featured competition between team members. The study team would have benefited from the matching of information richness and task that Daft and Lengel proposes.

Effect on the Purpose Domain

The virtual work environment affected the domain of purpose primarily through its effect on the domain of communication. As noted before, the reduced mental sight of the virtual work environment depersonalized the communication process. The team focused

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more on the message and less on the people in the communication process. As Kiesler et al. (1984, 1985) pointed out, this depersonalization led to an increase in the task orientation of the team. The purposes and goals of the group began to change. The group became less relational in its purpose and orientation and became increasingly task focused and driven. Team members in the study team noticed this changed alignment of team purpose and resisted it.

Effect on the Roles Domain

The virtual work environment also affected the domain of roles through its impact on the communication domain. Belbin's work (1993) focused on roles in traditional teams. He acknowledged that roles are dependent on environment, but his research did not include role development in virtual work environments. As a result, Belbin's roles were specific to traditional work environments.

Daft and Lengel (1984, 1986) proposed that the restricted communication bandwidth of virtual work environments effects task performance. Tasks need to be linked with communication mediums able to carry the degree of information richness necessary to effectively accomplish those tasks. Tasks related to competition, difference, and complexity are not supported well with the communication restrictions of the virtual work environment. Thus, roles related to negotiation and execution will be different on teams in virtual work contexts.

Several of Belbin's roles (1993) require a work context that allows for complexity, detail, and difference. The completer will be limited with detail orientation, because the restricted communication limits detailed interaction. The teamworker who bridges conflict and is diplomatic will be limited because of the reduced relational dynamic

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featured in electronic communication. The plant needs complexity in order to be at their best, and does not communicate well even in face-to-face contexts.

Effect on the Leadership Domain

The virtual work environment also affected the leadership domain through its impact on the communication domain. Many researchers have found teams in virtual work environments to be more participatory and egalitarian than teams in traditional work environments (Eveland & Bikson, 1989); however, the study team did not find that to be true. The study team's communication network was altered by electronic communication. Instead of functioning with its usual all-channel communication network with its equal participation, the study team shifted to a wheel communication network with its reliance on the leader to be the hub connecting the spokes. The absence of status symbols in the virtual work environment did not offset the unfamiliarity of the new work place and the study team's increased reliance on its leader.

Effect on the Decision Process Domain

The virtual work environment also affected the decision process domain through its impact on the communication domain. Although the virtual work environment provided the potential opportunity to increase the amount of relevant information the study team had access to through electronic databases, the communication restrictions of the virtual work environment prevented the actualization of that opportunity. The temporal aspects of electronic communication reviewed earlier limited the team's ability to access that available information (Hesse, et al. 1988; McGrath,1990). Although the virtual work environment facilitated the linking together of people irrespective of time and space, the restrictions on communication in the virtual work environment prevented the

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actualization of that linkage (Daft & Lengel 1984, 1986). The study team found that only decisions related to generating ideas and choosing the one clear best idea in an environment of collaboration was possible in virtual work environments. Decisions that featured difference, or competition, or when there was not one clear obvious solution were not possible in virtual work environments. Electronic communication was limited in its ability to support complexity and difference

The study team also noticed a strong conforming tendency for decision making in virtual work environments (Hiltz & Johnson, et al. 1986; Hollingshead, 1993). Janis (1971, 1972, 1982) was the first to use the word groupthink in the study of decision making. The lack of social presence in virtual work environments created a context susceptible to groupthink. Stereotyping, self-censorship, and illusion of unanimity were all increased in virtual work environments. Stereotyping occurred when there is no visual person to interact with. Self-censorship happened as a result of the production blocking phenomenon when individuals competed to gain the floor.

Study group members referred to times of self-censorship when they would not enter the electronic interaction in order to keep it from getting too jumbled and disjointed. The illusion of unanimity occurred when it was not possible to read the nonverbal and paraverbal signals people send to communicate dissention. The study team found groupthink to be a stronger feature of its virtual work environment than its traditional work environment.

Effect on the Relationships and Trust Domain

The virtual work environment also affected the domain of relationships and trust through its impact on the communication domain. Jarvenpaa et al. (1998) noticed that

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trust is higher in virtual work environments than in traditional work environments. When individuals gather virtually, the lack of social presence leads them to notice more about their similarities than their differences. Differences that they would notice in face-to-face encounters are hidden. What is known in the virtual work environment is what brought people together. They notice their common interests and values. In the face of those commonalties, people assume that they have more in common with the individuals they encounter virtually than they actually do.

While this may be the case for newly formed teams, teams with a pre-existing history, like the study team, have already had face-to-face encounters when the differences between team members can be more easily seen. As a result, this increased trust effect on virtual teams was not a feature of the study team's experience. In fact, the study team found that trust was eroded in the virtual work environment.

This erosion occurred because of the communication limitations of electronic communication. First, without visual sight of the team members, it was easy for team members to stereotype each other based on previous interactions. The comments of individuals were understood in the context of their last face-to-face encounter. If there was a difference in that encounter, that difference was assumed to be a part of the virtual interaction, whether or not it actually was.

Second, Jarvenpaa et al (1998) stated that trust is based on four factors, propensity, benevolence, ability, and predictability, linked to rational self-interest. Propensity deals with the person involved in doing the trusting. It is the individual tendency of an individual to trust another. The other three factors refer to how the person doing the trusting views people asking for their trust. These factors are easily understood in terms

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of the questions the person being asked to trust asks. Will that person act benevolently towards me, even when I cannot observe their actions? Does that person have the ability to do what I require from them? Can I count on that person to do what they say they will, see Figure 1?

Virtual work environments are limited in their ability to provide substantial input in trust factors related to others. Face-to-face interaction and observation provide richer information related to benevolence, ability, and predictability. It is easier to measure these factors when you have a daily context to evaluate behavior. Likewise, it is easier to restore erode trust through the demonstration of these factors when they can be evaluated on a daily visual basis. Once again the communication restrictions of the virtual work environment can effect another team domain.

The study team did not believe that the virtual work environment would reinforce trust. The team relied on its face-to-face interaction to determine trust and trust levels. The team did not rely on the virtual interactions as a primary vehicle to build trust. The virtual environments were limited to eroding trust, not building trust. The team expected that trust building would happen primarily around their interactions in traditional work environments.

Effect on the Effectiveness and Responsibility Domain

The virtual work environment also affected the domain of effectiveness and responsibility through its impact on the communication domain. The study team did not experience the effect of social facilitation as strongly in the virtual work environment as it did in the traditional work environment.

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Zajonc (1965) observed that social facilitation did not always occur because of the types of tasks in which team members and the team were involved. Zajonc understood that groups failed to experience the social facilitation effect based on the differentiation between dominant and nondominant tasks. When individuals were expected to perform dominant tasks, tasks with which they are familiar, in the presence of others, their performance was enhanced. Social facilitation occurred; however, when individuals were expected to perform nondominant tasks, tasks with which they were not familiar, in the presence of others, their performance was diminished. Social facilitation did not occur. Increasing task complexity reduced social facilitation. The more complex the task, the more adverse the effect of an audience, see Figure 14.

The study team paralleled Zanoj's (1965) hypothesis. The overall effectiveness of the team decreased in the virtual work environment. This decrease was primarily due to the team functioning with nondominant tasks in the virtual environment. The technology and complexity of electronic communication introduced the study team to a new set of tasks that were nondominant. The virtual work environment limited the effect of social facilitation.

The face-to-face traditional work environment was more effective for the study team than the virtual work environment. In the traditional work environment the study team experienced social facilitation. The difference was primarily in the types of tasks done in each environment. The interaction and communication in the traditional work environment were dominant tasks for the team. They were tasks with which they were familiar, confident, and experienced. The tasks and the medium of communication were known. The technology and reduced communication bandwidth in the virtual work

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environment introduced the study team to new nondominant tasks. The presence of these new nondominant tasks reduced the effect of social facilitation in the virtual work environment.

The reduction in social facilitation related to dominant and nondominant tasks for the study team was more related to evaluation apprehension and distraction-conflict theory than Zajonc's (1965) theory of compresence. The reduced individual performance in the study team was not primarily the result of interspecies arousal (Zajonc 1965, 1980). The reduced individual performance was more a function of evaluation apprehension (Cottrell, 1972). The team members were self-conscious of the new tasks and feared looking inept. This fear reduced their overall effectiveness. The fear showed up as humor, limited dialogue, and withdrawal, see Figure 15.

Another aspect of the decreased performance of study team members in the virtual work environment was their limited ability to adequately process information. Distraction-conflict theory indicated that social facilitation will only occur as individual team members have the resources and ability to adequately process information (Guerin, et al. 1982). When the study team members needed to both process their basic work tasks and work through the mediation of a computer, the task became increasingly complex. The resulting complexity resulted in decreased performance, even though they were working in the presence of an audience. The increasing task complexity was related to the limitations of the study team members to adequately process information. The computer-mediated environment forced the study team members to divide their attention between the task at hand, the people involved, the electronic communication medium, and the

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technology represented in their computer. This divided attention reduced the ability of the study team members to focus on the work task.

Another reason social facilitation did not occur in the virtual work environment for the study team was that there was an increase in the social loafing behavior of the study team, see Figure 16. Researchers have found that teams functioning in virtual work environments with computer-mediated communication display more social loafing than in face-to-face traditional work environments. In virtual work environments, team members do not feel as indispensable, unique, and essential for the team's success. Kerr et al. (1983) suggested that this decreased team member perception of individual value led to increased social loafing. Weldon et al. (1993) suggested that the novelty of computer-mediated interaction, with its related decrease of goal and outcome clarity related to face-to-face interaction, could also lead to an increase in social loafing. Brickner et al. (1986) suggested that the increased social loafing behavior in computer-mediated teams was due to the lack of personal ownership team members perceived with computer-mediated interaction. This lack of personal vestment with the computer-mediated interaction could contribute to the rise in social loafing. Sanna (1992) connected anonymity in computer-mediated interaction to social loafing. The higher degree of anonymity in computer-mediated interaction compared to face-to-face interaction resulted in increased social loafing in the computer-mediated context.

Other researchers have attempted to explain the increased social loafing in computer-mediated work contexts through collective efficacy or collective effort theories and their connection to expectancy theory, see Table 32. Guzzo et al. (1993) and Silver et al. (1996) suggested collective efficacy theory to explain the increased social loafing

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behavior of virtual teams. The team member's expectation of team success will determine the effectiveness of the team. The reduced goal and outcome clarity of computer-mediated interaction reduced the team member's expectation that the team would be successful. The Karau et al. (1993b) theory of collective effort takes the work of Guzzo et al. (1993) and Silver et al. (1997) further by linking the reduced expectancy of team members to a reduced value that team members hold for team outcomes. If a team member believes that the goal is unattainable, collective efficacy theory, or that the goal is unattainable and not valuable, collective effort theory, their motivation will decrease. This decreased motivation could result in an increase in social loafing behavior.

The study team did experience several of these effects. The study team members did not feel as indispensable, unique, and essential for the team's success. Instead of recognizing the ability they brought to the team, the individuals noticed their inability. The lack of familiarity with the medium and the technology itself reduced the team members' confidence. The virtual work environment marginalized their perception of their value and contribution to the work process.

The study team also experienced a decreased sense of goal and outcome clarity. While the agenda and work process had been anchored in previous face-to-face meetings, the virtual work context did not contribute to that sense of focus. It was the face-to-face meeting that provided the clarity of goal and outcome. The novelty of the computer-mediated interaction distracted from the interaction, reducing the goal and outcome clarity. The altered temporal aspects of the virtual work environment with its change of

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sequence, pace, and transmission time also jumbled the work process, reducing goal outcome clarity.

Some members of the study team were not supportive of the team's venture into the virtual work environment. There was a marked decrease among some team members in ownership between the traditional and virtual work environments. This lack of personal ownership also increased social loafing in the study group. The team members who were not vested in the virtual work environments tended to be more withdrawn and critical.

The increased anonymity of the study team increased social loafing. In a traditional work environment featuring visual contact, it was more difficult to take a passive posture toward the team's work process, outcomes, and goals. It was more difficult to remain hidden when everyone can see you and will include your nonverbal communication in the work process. In a virtual work environment it was much easier to remain hidden. The silence of nonverbal communication was not as clearly understood and responded to. The study team assumed that silence meant concurrence, or that the team member had encountered some technical problem. The silence was not interpreted negatively and allowed team members to withdraw from the process. It was much easier for team members to be observers in the virtual work context.

The study team also experienced the effect of expectancy theory. Some team members did not value the goal of becoming a virtual team or expect that the virtual work experience would be profitable. They did not value the goal or expect that the goal would be accomplished. Some team members perceived the virtual team experience to be a concession or a personal favor, as opposed to an advantage to increase team effectiveness. As a result, their expectations and valuation were quite low. They made it

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clear that the virtual experience was not their idea, and that, if it were to be pursued any further, they would want to process that decision.

Second Research Question and Findings

New Technology Domain

The study team indicated the presence of a new domain, the domain of technology, which is not present in traditional work environments, but is present in virtual work environments. During the course of the study 134 codes emerged related to the new team domain of technology, see Table 35. Almost one-third of the codes, fifty-three, were related to technical problems.

The major emerging problems were technical, hardware and software, and training. It took the team an hour to get into the conference chat room. Although the presence of the conference room had been established and confirmed prior to the synchronous computer conference, when the synchronous computer-mediated conference began, the organizational webmaster had not actually set up the conference room. This delay, plus the inability of the team member's to find the room once it had been established, led to the lengthy delay. Although the team had been encouraged to find the conference room and practice prior to the synchronous conference, no one on the team had.

During the conference, there were six occasions when one of the team would be disconnected from the conference and have to re-boot their computer. These were accompanied with screen warnings about performing illegal operations and being shut down as a result. The screen warnings left the individual team members feeling rebuked and punished.

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The conference room was not secure. Two outside strangers kept moving in and out of the conference further destabilizing communication and confidence.

The team did not know how to navigate around the conference screen. The team did not know about the need to refresh the screen in order to get new messages. The team did not know about the use of icons and different text colors. These were all discovered as the team explored the communication medium in the midst of the synchronous computer-mediated conference.

Fear is a characteristic of this technology domain. All of the team members had codes related to the experience of fear. The strongest fear was a fear of the unknown. None of the team members had participated in a synchronous computer conference before. They were not sure what to expect, there was also a fear of failure. The team had not utilized computer-mediated technology before and had a fair degree of accompanying uncertainty.

There was a slight relationship between team members with negative technological values and lower satisfaction with the synchronous computer conference. Subjects 1 and 4 had pronounced negative values related to technology. These negative prior values reduced their overall satisfaction. Their satisfaction was lower than the subjects who had neutral values related to technology. This finding could have implications for virtual team membership. Membership of virtual teams should be limited to individuals with a positive view of technology. Individuals who were suspicious of technology or were threatened by technology were less likely to value their virtual team experience than those who had a neutral or positive value for technology.

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There was also a slight relationship between subjects who had prior negative experiences with technology and reduced satisfaction. All but one of the subjects described previous negative experiences with technology. Technology often takes longer to implement than expected and can take more time than it gives. The subjects with the lowest negative experience code frequency also had the highest frequency of satisfaction codes. This could also have implications for virtual team membership. Those individuals who have found technology to be frustrating and disappointing would be less likely to be satisfied with virtual teams.

An unusual finding was the lack of relationship between expectation and satisfaction. The subject with the highest frequency of low expectation codes was also the subject with the highest number of satisfaction codes. If the expectations of the virtual team member are low enough, the only direction is up; the lower the expectation for the virtual interaction, the more likely it was that the virtual interaction will exceed the expectation resulting in increased satisfaction.

Emergent Findings

Satisfaction Related to Individual Perception of Isolation

During the course of the study, several relationships emerged related to member characteristics and member satisfaction with the virtual work environment, see Tables 36 to 40. The first is a connection between the individual perception of isolation and satisfaction, see Table 36. The higher the individual perception of isolation, the higher the team member's satisfaction was with the electronic conferences. The team members who lived proximate to each other, where they could have face-to-face interaction

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whenever they wanted, were not as satisfied with the virtual work experiences as those team members who were more geographically distant from each other.

The variation in satisfaction could be related to the expectancy approach of Guzzo (Guzzo, et al. 1993), Silver (Silver, et al. 1996), and Karau (Karau, et al. 1993b). These researchers used expectancy theory to understand the behavior of social loafing in computer-mediated work contexts. The more individual team members perceive themselves as being isolated, the more they will value contact with their team, even if that contact is virtual instead of face-to-face. Given the choice between no contact and virtual contact, the individual team member with a high self-perception of isolation will value virtual contact. They may prefer face-to-face contact, but they will also value virtual contact when face-to-face contact is not geographically possible. Thus, as individual team members increasingly value contact with their team and believe that these interactions will be positive, their satisfaction for virtual work environments increases, see Table 32.

Mayo (1933) and Gibson et al. (1997) suggested a connection between member affiliation, member anxiety, and isolation. As member anxiety is reduced through member affiliation, group cohesion increases (Mayo, 1933). Gibson later suggests that isolation can increase member anxiety leading to increased member affiliation and group cohesion. The more isolated individual members of the study team appeared to parallel Gibson's hypothesis. Their isolation increased their member anxiety and increased their satisfaction with the virtual work environment, because it was a perceived way to increase member affiliation and group cohesion, see Figure 5.

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Satisfaction Related to Individual Perception of Team Purpose

The second emergent finding was a connection between individual perception of team purpose and virtual work context satisfaction, see Table 37. Kiesler et al. (1984) described the effect of virtual work environments in dehumanizing communication. The loss of mental sight led to an increased focus on task and a reduced focus on the personal and social elements of interaction. Those individuals who perceived the team's purpose to be primarily relational will be more likely to be dissatisfied with virtual teams than those individuals who perceive the team's primary purpose to be task related.

Satisfaction Related to Individual Personality

The third emergent finding was a connection between individual personality and virtual work satisfaction, see Table 38. The more introverted team members were more satisfied with the electronic conferences than the extroverted team members. See the discussion under the following heading entitled, Satisfaction Related to Individual Mode of Information Processing.

Satisfaction Related to Individual Mode of Information Processing

The fourth emergent finding was a connection between individual mode of processing information and virtual work satisfaction, see Table 39. The team members who were internal processors were more satisfied with the electronic conferences than the team members who were external processors

The satisfaction relationships between individual perceptions of team purpose, individual personality, and mode of information processing can all be understood in relation to Zajonc's work on dominant and nondominant work tasks (Zajonc, 1965). While Zajonc differentiates work types based on group tasks, dominant tasks may also be

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connected to individual difference. The primary activities of a team form its dominant tasks. They become simple for the team because of their frequency. Those tasks that are non-frequent for a team become the team's nondominant tasks.

The same could be true for individuals. Individuals who are introverted, process information internally, and are more task oriented will find the tasks involved in the virtual work environment to be closer to their preferred practices. These preferred ways of perceiving and interacting serve as dominant tasks for introverted, internally processing, task-oriented individuals. As such, the virtual work environment engages them in their dominant tasks

For those individuals who are extroverted, externally processing, and relationally oriented, the virtual work environment will engage them outside their dominant tasks. The performance of nondominant tasks leads them to lower levels of satisfaction with virtual work environments.

Guerin's et al. (1982) distraction-conflict of social facilitation also provided some insight with the relationships to individual satisfaction. Guerin asserted that social facilitation is related to an individual's ability to process information. When individuals have their attention divided, they will be less able to focus on their tasks, goals, and outcomes, resulting in a decrease in their effectiveness. This effect is magnified when they have an audience.

Applied to this study, when extroverts, external processors, and relationally oriented people were placed in virtual work environments, their usual way of perceiving, processing, and providing information was disrupted. Their attention was divided,

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resulting in their diminished ability to focus on tasks, goals, and outcomes. Diminished ability also increased their dissatisfaction with the virtual work environment.

Satisfaction Related to Individual Perception of Team Membership

The fifth emergent finding was a connection between individual perception of team membership and virtual work satisfaction, see Table 40. The team members' who did not perceive themselves to be mature team members were less satisfied with the electronic conferences than the team members who perceived themselves to be mature team members. Moreland and Levine (1988) built a team development model based on individual membership. They suggested that individuals chose teams, teams do not chose their individuals. Their model of individual group development is a linear process involving prospective member, new member, full member, marginal member, and ex-member. Central in their model is the individual process of evaluation and commitment. Evaluation is characteristic of the prospective member and new member stages. Commitment is characteristic of the full member stage.

The findings indicated that virtual interaction would be less satisfying for individual team members who were in the midst of evaluation. Teams that developmentally are in a stage of evaluation may want to limit their virtual work contexts until the team moves to the commitment of the full member stage.

Work Design

The virtual work environment also effected the domain of effectiveness and responsibility through its impact on the communication domain. As a part of the study the work agenda for both the phone conference call and the synchronous computer conference reflected all four work tasks in McGraths' (1984) work taxonomy, see Figure

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3. During the course of the study, it became clear that some of the work tasks were processed better in virtual contexts than other work tasks. The virtual work environment affected all of the work tasks through its impact on the domain of communication. The changed communication domain had the strongest negative impact on the negotiation work tasks. Tasks that were related to generating ideas were the most effective. Tasks completed in a context of collaboration went well and those where the team had competition did poorly. As tasks increased in complexity, or competition, the impact of the changed communication domain was increased.

The study team collaborated the work of Daft and Lengel (1984, 1986) who asserted that communication media varies in the richness of information that they can transmit and result in the need to align team tasks with communication media, see Figure 4. Teams need a variety of contexts in order to be effective. Some tasks should be done best face-to-face, and others can be addressed well in virtual contexts. Wise managers of the future will use a variety of communication mediums to support team effectiveness.

Hypotheses

There are three possible research objectives built on decreasing levels of abastraction. Basic research seeks knowledge as an end in itself. The end is to discover truth. Its primary contribution is to theory and is broadly generalizable. It focuses on discovering theory. Applied research attempts to contribute to existing theories that can be used to formulate interventions and problem solving. Generalizability is more specific within limited applications. Summative research focuses on the effectiveness of theoretical interventions. The focus is to increase the effectiveness of proven theories (Patton, 1990).

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This study focused on basic research. It intended to suggest hypotheses related to successful teams collaborating in virtual work environments; that is, teams characterized by individuals interacting interdependently who are more than fifty feet from each other collaborating primarily through electronic means. During the course of the study several hypotheses surfaced related to the effectiveness of these virtual teams.

The preceding discussion, related to the centrality of communication and its impact on all the remaining team domains, suggested six hypotheses for additional study:

1. Social loafing behavior is higher with teams collaborating in virtual work environments than in teams collaborating in traditional work environments.

2. There is a lower social facilitation effect on teams collaborating in a virtual work environment than teams collaborating in a traditional work environment.

3. Roles in teams collaborating in virtual work environments are different than the roles team develop in traditional work environments.

4. The virtual work environment reduces trust and diminishes relationships for pre-existing teams.

5. The virtual work environment centralizes leadership for pre-existing teams.

6. Communication bandwidth determines all team domains.

The discussion related to the impact of technology on teams collaborating in virtual work environments also suggested a hypothesis for additional study. Teams collaborating in virtual work environments will be most strongly affected by (a) their previous electronic experiences, (b) their values related to technology, (c) the degree to which they have been trained, and (d) the limitations of the hardware and software itself.

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The previous discussion also suggests three hypotheses related to member attributes and general team development theory:

1. The member attributes of teams collaborating in virtual work environments determine how satisfied the members are with teams collaborating in virtual work environments. Team members who are (a) introverted, (b) have a sense of isolation, (c) process information internally, (d) who perceive themselves as full members of the team, and (e) perceive the team purpose to be primarily task oriented will be more satisfied on teams in virtual work environments that individuals who are not.

2. The individual approach to team development is more relevant for teams collaborating in virtual work environments than the team approach.

3. Recurring theoretical team development is more relevant for teams collaborating in virtual work environments that the sequential theorists.

Limitations

Given the complexity of teams and people it was important to outline the limitations of this study to provide the reader the necessary context to determine what aspects of this study are applicable. The study team was part of a non-profit organization. As such, its primary orientation was not economics. It was a service organization oriented around the care and support of people. As a result, it had a high relational value. Given the dichotomy between task and relationships, most individuals within the organization chose relationships as being primary. Relationships were how the task gets done.

The study team was not a mature team. One of the criteria in the selection of the team was its mature stage of group development. During the course of the study it

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became clear that the team was not as mature in its development as was initially assumed. The team had recently added three team members who were still in the process of evaluating the team.

The study team was a long-term management team from one division within the nonprofit organization. It was not a project team or a cross-departmental team. The team met for face-to-face meetings four times a year. The primary work environment for collaboration was the virtual work environment. Most of its work was done through electronic mediums of communication. Its primary means of communication was electronic. The team was scattered from Montana to Arizona. Leadership was established with a director. The director's style was participatory and decisions were made most frequently by consensus. The director led all the meetings in both the traditional and virtual work environments. Membership on the team was established by position, not skill. The study team consisted of all the state directors in one region. The work was primarily conceptual and based on information. The team used concurrent work on specific project tasks. The study team had no sense of physical home.

The team had been discussing whether it was a group or a team. Some on the study team considered themselves to be in a group with relationships being the central feature of the group. Others on the study team considered themselves to be on a team. The difference was related to the core purpose of the group. For some it was relationships and for others it was the task. For those who focused on relationships, the group was a group. For those who focused on task, the group was a team. The individuals who perceived they were in a group did not want to use the term team to describe who they were.

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Implications and Applications for Human Resource Development

The world continues to change, but people continue to be people. The success of any human endeavor is tied up with the success of the people contained in that endeavor. As the world changes from an industrial to a post-industrial, or information age, people are what will determine success in that new age. As the world changes from a modern to a post-modern age, it is again people who will determine the success of the age.

How will these changing work environments affect people and their organization? What does effectiveness look like in virtual work environments? What is the same about teams in traditional and virtual work environments? What is different? Human Resource professionals will want to continue studying the impact of changing environments on individual and organizational effectiveness.

This study has several implications for Human Resource Development. First, virtual work environments call for new team roles and membership criteria. Widmeyer (1990) proposed that a group's effectiveness is dependent on the knowledge, skills, and abilities, KSA, of its group members. Thus, the membership selection for any group will be an important element in the success of any group. In order for the group to be effective, it is critical that the members of the group have the KSA that the group will need to be effective.

This study suggests some KSA criteria for teams that perform in virtual work environments. As Shaw (1981) suggested, the study implies that homogeneous personality types will increase the effectiveness of a team. Individuals who are introverted, process information internally, and are task oriented will be more satisfied with working in virtual work environments. This increased probable level of satisfaction

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will increase the level of expectancy of the group members. The group members value the virtual work more and have higher expectations related to the success of the group in virtual contexts. This increased value and expectation of success would also increase the effectiveness of both the group members and the group.

Another implication for Human Resource Development is in the team domain of roles. Given that a narrower profile of KSA may increase the effectiveness of teams functioning in virtual work environments, the taxonomy of team roles may be different in virtual work environments. As Johnson and Johnson (1991a), Merton (1968), and Jackson et al. (1985) pointed out, people learn roles from the stimuli around them and shift roles dependent on recognized need. The stimuli in virtual work environments will be different than the stimuli in traditional work environments. This change in stimuli will result in a change in role development on virtual work teams.

The impact of virtual work environments on work design will also affect team roles. The synchronous computer conference did not work well with tasks related to choice, negotiation, and execution in competitive environments or where there was more than one acceptable solution. As a result, team roles related to these work tasks and group dynamics will not be as required on virtual teams that avoid these types of work tasks. A changed work design will affect the roles and KSA profile for teams working in virtual work environments.

Work design in virtual work environments is another implication for Human Resource Development. The virtual work environment dramatically changes the team domain of communication. This change affects all of the other six team domains. In order for teams to be effective in virtual work environments, the impact of changed

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communication must be considered. The work of Daft and Lengel (1984, 1986) regarding information richness must be included in work design for teams functioning in virtual work environments, see Figure 4. The research of McGrath and Hollingshead (1994) and Hollingshead et al. (1993) on work taxonomy related to information richness provides a valuable palette for the design of effective work in virtual work contexts.

Work design for teams performing in virtual work environments must also include intentionality with face-to-face work contexts. In order for teams to be at their best in virtual work environments, the virtual work environment must be supplemented with the face-to-face interaction of traditional work environments. Work design is not an either-or thing. It is not either virtual work, or traditional work. Effective team performance will require a work design that includes the advantages of both environments in such a way that the disadvantages of each are intentionally minimized. Kiesler et al. (1984) and Sproull et al. (1986) have suggested that face-to-face meetings be used for agendas featuring substantial negotiation and difference. This parallels the work of Daft and Lengel (1984, 1986), Trevino et al. (1987), and McGrath and Hollingshead (1994).

The increase of social loafing in virtual work environments is another implication for Human Resource Development. In order for the opportunities provided by virtual work environments to be fully capitalized on, it is important to maximize the effect of social facilitation in virtual work environments. The degree to which social facilitation does not occur will be related to the degree to which virtual work environments compromise team performance.

The virtual work environment features concurrent work in which each team member works in parallel to other team members. Work is done simultaneously by each

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individual as opposed to the serial nature of work in the traditional work environment when team member A must wait for team member B to complete their segment of the work task. As such, the virtual work environment features coaction tasks and audience tasks. Coaction tasks are used when people work individually in the presence of others without interaction. Audience tasks are used when people work in a performance context in the presence of spectators, see Table 45

The effect of social facilitation is felt with both coaction and audience tasks and can be experienced in both traditional and virtual work contexts. Aiello and Kolb (1995) demonstrated the effect of social facilitation in virtual teams on coaction tasks when the actions of the team member are electronically logged and recorded. This electronic presence may substitute for the social presence required for the social facilitation effect. In order for virtual teams to experience social facilitation, it is important for teams to creatively address the prerequisite social presence in both its coaction and audience tasks.

Table 45

Coaction and Audience Tasks

Work Environment	Type of Work	Description
Traditional	Serial Work	Work proceeds linearly with B following A
Virtual	Concurrent Work	Work proceeds in parallel with A working simultaneously with B
	Coaction Work	Concurrent work done in the presence of others without their interaction
	Audience Work	Concurrent work done in the presence of others with their interaction

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Other researchers have demonstrated the impact of virtual work environments on social facilitation that Human Resource professionals will want to accommodate. It is important to deter the effect virtual work environments have to reduce the uniqueness of team members, reduce goal and outcome clarity, reduce member ownership, reduce anonymity, and reduce member expectation. If steps are not taken to minimize these effects of the virtual work environment, virtual teams will not be as productive as their traditional work environment counter-parts.

Human Resource Development professionals will also want to consider the temporal effects of electronic communication mediums on communication in the virtual work environment. Hess et al. (1990) discussed the temporal effects of scale, sequencing, pace, and salience on electronic communication. McGrath and Hollingshead (1994) also reviewed the temporal impact of electronic communication of virtual teams and related it to the process loss outlined by Steiner (1972). McGrath and Hollingshead (1994) described the effect of electronic communication as production blocking for virtual teams.

Kelly et al. (1990) labelled the process a team learns to communicate together entraining. Traditional teams are entrained in order to learn how to communicate together. This entraining process is more familiar for individuals in traditional teams. The entraining process occurs by default and without a great deal of intentionality. The entraining process for virtual teams will not be as familiar for team members. Human Resource professionals will want to understand the entraining process to facilitate the communication of members of virtual teams. Entraining will involve unlearning some of

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the default communication patterns of traditional teams as well as learning new communication patterns.

Lastly, Human Resource professionals will want to be aware of the psychological ramifications of electronic communication on virtual teams. Kiesler et al. (1984) and Sproull et al. (1986) reviewed the depersonalization of communication in virtual work environments. The loss of mental sight between communication partners eliminated nonverbal, paraverbal, and feedback communication. This resulted in an increased task focus on virtual teams. All these changes affected the psychology of group members.

These changes in communication will affect how the group members understand themselves and their team members. Human Resource professionals will want to be proactive with psychological effect to help virtual teams be at their best.

Recommendations for Further Study

The impact of technology on a group is dependent on a number of variables. It will be dependent on the nature and characteristics of the task, the time and space distribution of the work, and the characteristics of the group and its membership. The most important effects are probably interactive in nature between the simultaneous interaction of these variables. It is unlikely that virtual teams will be more effective than traditional teams in every context, and also unlikely that they will be more ineffective in every context. What is likely is that the interaction of these variables will determine group effectiveness. The appropriate question is not which team context is best, but rather which set of variables will determine which team context to utilize

It is useful to construct a model, see Figure 27, that integrates these variables and prescribes future research directions to understand the impact of technology on groups

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(McGrath & Hollingshead, 1994). The question of technology's impact on group work involves the input factors of member attributes, group attributes, tasks, technology, and contextual factors. Member attributes are the properties of the individual group members. Group characteristics are the properties of the group itself, its heterogeneity, cohesion, status hierarchy, and norms. Task characteristics are the properties of the group task. Technological attributes are the properties of the hardware and software used by the group for communication, information input, and task support. Context characteristics are the contextual properties of time, deadlines, physical comfort, and general cultural norms.

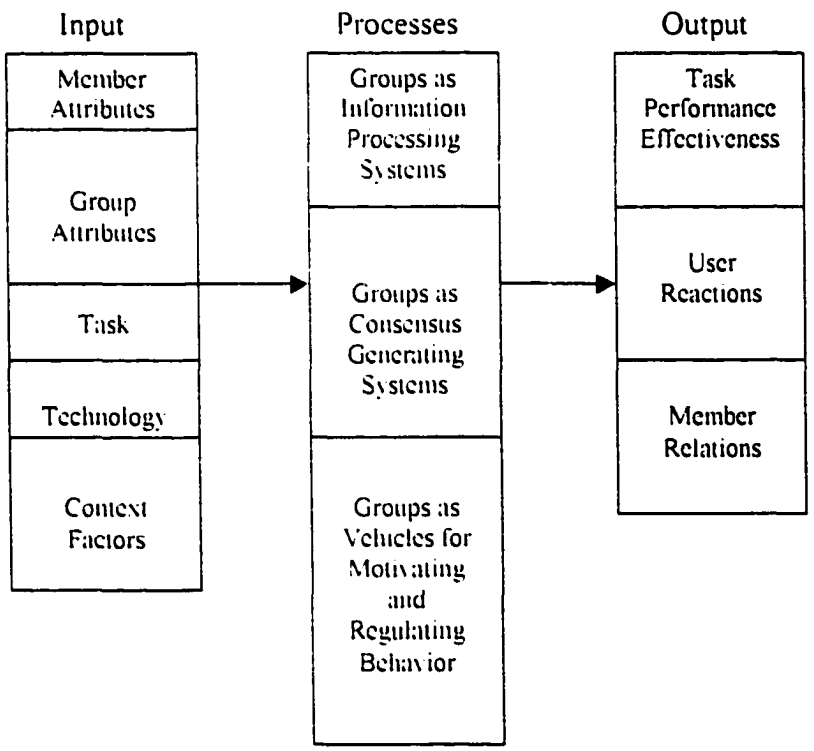

Figure 27. Conceptual Model for Future Research.

One dimension of member attributes needing additional research is the effect of the virtual work environment on the team domain of roles. Most role research has been

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conducted in the context of teams collaborating in traditional work environments. Little research has been done on the impact of electronic communication on teams in the virtual work environment. The limited ability of virtual teams to be effective with tasks featuring difference, complexity, and competition may have an effect on the types of roles present in virtual teams. The impact on roles would be important in determining the membership of virtual teams. Effective virtual teams will require the KSA to be successful. Proper role distribution and presence will be critical KSA criteria for effective virtual teams.

A final recommendation related to research in member attributes is related to KSA and comes from the emergent satisfaction findings of the study team. In addition to key (KSA), additional research is needed to determine a membership profile for virtual teams related to personality, team development, and individual perception. The study indicated that some people would prefer virtual teams and others would not. What are those preferences and how can they be used to determine the membership of virtual teams in such a way that their effectiveness can be enhanced?

The study indicated a possible connection between individual perception of isolation, individual perception of team purpose, individual personality, individual mode of processing information, and individual perception of team membership. How valid are these relationships? Is it true that introverted and internal processing people will be more satisfied with virtual teams? Is it true that individuals who feel isolated will be more satisfied with virtual teams? Is it true that individuals who are not full members of virtual teams are not as satisfied with them? Is it true that individuals who perceive group purposes to be about relationships will not be as satisfied with virtual teams? What are other variables that might effect the performance of teams in virtual work environments?

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The effect of virtual work environments on the process of social facilitation is a group attribute needing additional research. The effectiveness of groups depends on their experience of social facilitation. If there is no increased productivity related to individuals working in groups, there are reduced reasons to engage groups in work. More research is needed to clarify the impact of virtual environments on social facilitation with coaction and audience tasks. What impact does a virtual work environment have on the performance of people working without interaction in the presence of others, coaction, and on the performance of people working as they interact with an audience, audience? Why does virtual team effectiveness decrease in some virtual work environments? Is the decreased effectiveness related to dominant and nondominant tasks in the virtual work environment? How does virtual work environments effect coaction and audience tasks when the individual team member's only sense of presence is electronic? How does the lack of social presence effect social facilitation in virtual work environments?

Related research is needed in the area of social loafing in virtual work environments. Social loafing may be a primary factor in the decrease of social facilitation on teams functioning in virtual work environments. Computer-mediated interaction appears to display more social loafing than face-to-face interaction. Several researchers have demonstrated that social loafing does occur in virtual work environments (Karau, et al. 1993b). Research is needed not only to demonstrate the social loafing effect but to clarify how to limit this effect. Now that it has been shown that social loafing is likely, virtual teams need to know what to do about it. How can social loafing be diminished in virtual work environments? How can the virtual effects of

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increased anonymity, lack of social presence, lack of personal vestment, reduced clarity of goal and outcome, and reduced perception of personal contribution be reduced?

Not only is research needed into the impact of each of these inputs related to the impact of technology on work groups, but research is also needed on the impact of these inputs as they interact with each other. There are also variables that result from the connection of these five input variables. These joint variables also need additional research. For example, member-group attributes would be the length of time an individual has been a member of the team. Member-task attributes would be the task experience of individual team members. Member-context attributes would be the status of individual team members within the embedding organization (McGrath & Hollingshead, 1994).

Research on member and group attributes has not included the impact of technology on groups or real life groups. Research is needed on continuing groups that parallel work groups in real life. Much of the research in member and group attributes not only excludes the impact of technology on groups, but is also limited to laboratory groups. Research is also needed on groups that mirror the complexity and dynamic of real life teams (McGrath & Hollingshead, 1994).

There are many ways that group and member attributes could be studied. A set of individual member attributes may affect how a team will behave and perform. Those individual attributes could be task competency or be related to the homogeneity of the group. They could also include symbols of status, culture, experience, values, age, gender, education, attitudes, and many others (McGrath & Hollingshead, 1994).

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Group attributes could also affect team performance in virtual environments. Group size may have an effect on the processes of decision making and communication. Group structure and leadership may have a strong bearing on the key processes of decision making and communication. Group history, previous experiences, group values, and group training could also strongly influence team performance in virtual environments (McGrath & Hollingshead, 1994).

Task attributes needing additional research are related to Daft and Lengel's work on the information richness of various communication mediums and their connection to different types of work tasks (Daft & Lengel 1984, 1986). See Figure 4. While some research has been done to substantiate this effect (Hollingshead, 1993), more is needed. Hollingshead's work featured studies of groups with different communication media for a single meeting. Additional studies in this area with groups using difference communication media for a series of meetings, or throughout an extended period of time might be helpful (McGrath & Hollingshead, 1994)

There are a number of technological factors that need additional research. The interaction of task and technology along the lines of information richness has already been described. This interaction is typical of the interactions that take place between these five input variables. In addition to the research connecting task and technology, more research is needed in the areas of technological hardware and software. What are the hardware configurations and equipment that are most cost effective in increasing the performance of virtual teams? What are the software programs that are most cost effective in increasing the performance of virtual teams? What are the critical

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dimensions of hardware and software that will increase performance? What are the critical dimensions that, if present, will decrease performance?

The processing variables to further research are related to types of virtual teams (McGrath & Hollingshead, 1994). There are virtual teams that function as information processing systems, that function as consensus generating systems, and that function as vehicles for motivating and regulating behavior. These are the types of functions that work teams perform. A group that functions as an information processing system is primarily concerned about production. A group that functions as a consensus-generating system is primarily concerned about the well being of the group. Groups that function as a vehicle for motivating and regulating group behavior are primarily concerned with supporting its group members.

Some researchers have already begun to work on groups as information processing systems, but more remains to be done (McGrath & Hollingshead, 1994). Malone has worked on the impact of technology on the patterns of information processing groups (Malone, 1988; Malone, et al. 1990). Stasser et al. (1992) has worked on the joint effects of technology on patterns of information distribution and information sharing in information processing groups. Wegner (1986) has worked on the use of transactive memory in groups. Groups were approached as information processing systems with information scattered across a multiperson memory. Issues of cognitive information encoding, processing, storage, and retrieval were examined. It assumed that incoming information was encoded to only one person in the group, not everyone, forcing the group to keep a directory of who has what information. Levine et al. (1991), who regarded

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groups as socially shared cognitions, had a sociocognitive approach to groups as he combined these research themes.

Research on group problem solving has neglected to examine conflict and political processes in groups (McGrath & Hollingshead, 1994). When they have been examined, they have been understood to be examples of process loss (Steiner, 1972) or groupthink (Janis, 1971, 1972, 1982; Janis, et al. 1977). These processes have not been approached as being normative for groups and, perhaps, even beneficial for group effectiveness. More research needs to be done on the understanding that these processes are essential for rational systems. Conflict and political action are not distinct from the rational task functioning of groups and should be included in future research as a wholistic dimension of groups and understood to potentially enhance the performance of groups.

While the effect of groupthink may be a natural process in work groups, it is still an effect that needs closer examination. It effect limits the effectiveness of teams. Teams in virtual work environments will want to minimize this effect. More research needs to be done on the tendency of teams working in virtual work environments to demonstrate the effect of group think. How does the virtual work environment enhance the effect and what can be done to limit it? The study team did experience some of the characteristics of groupthink and would benefit from this line of research.

The third way to approach group functions is as vehicles for the operation of social influence processes among group members. It addresses how technology changes the temporal and spatial dimensions of group participation to facilitate the development of virtual teams. The different effects on team dynamics variation in amounts of knowledge individuals have about each other in virtual and traditional work environments needs

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study. The effect of technology on communication norms, communication practices and processes, pace of interaction, distribution of participation, increased task interaction, and reduction of personal interaction on work groups all need more study (McGrath & Hollingshead, 1994).

Key output factors to research, for teams working in virtual work environments, are task performance effectiveness, user reactions, and member relations (McGrath & Hollingshead, 1994). These are three ways to evaluate the impact of technology on work groups. The impact of technology on team performance must include input from each of these three perspectives. The evaluation should include empirical evidence of technology's direct impact on team performance, evidence of technology's effect on team interaction and processes, and evidence of technology's effect on the users.

User reaction must deal with member satisfaction of the group, the members' satisfaction with group performance, the members' satisfaction with the communication medium utilized, and changes in members' perceptions of other group members. User reaction should also be measured within the embedded organization. How do the team's performance and process affect other stakeholders?

Another angle of user reaction needing additional research is the impact of technology on the individual. Tools always shape their users. What is the shaping influence of technology on individuals? What impact does the increased depersonalization of technology have on individuals? What impact does electronic communication have on individuals? Research needs to be expanded to include the effect of technology not only on work groups but also the individuals who comprise those work

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groups. As technology affects the individuals of groups and their individual effectiveness, those individuals will also affect group performance.

Task performance effectiveness must use several perspectives. Task performance is not a single variable. It includes dimensions of quantity, quality, cost, speed, and time. Virtual work environments will facilitate performance in the areas of speed and time, but these are not the only indicators of task performance. Effectiveness also includes making the right decision or meeting design specifications. Future studies in the area of task performance effectiveness will want to investigate all the dimensions of task performance.

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APPENDIX A

PROJECT APPROVAL FROM HUMAN RESEARCH COMMITTEE, OFFICE OF REGULATORY COMPLIANCE

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RECEIVED

Colorado State University Human Research Committee
Application to Use Human Subjects (H-100, Rev 4/98)

Complete Part A and Part B. On separate pages, list all questions from Part C and respond to each as applicable. Part C should be replicated on your computer. For full review protocols, return the ORIGINAL (with original signatures) and 11 copies (each with all attachments except proposal/dissertation/thesis) to Regulatory Compliance, 410 University Services Center. Assistance is available on our web page at http://www.research.colostate.edu/regulatory/.

Action of the CSU Human Research Committee

☐ Approved as EXEMPT research Approval number: _____
Period: _____

☒ Approved as NON-EXEMPT research Approval number: 98-367H
Period: 11/30/98 - 11/30/99

☒ Conditions: use of approved consent form
☐ Other (*see attachment for details*)

☐ Cannot be approved as currently submitted (*see attached memo for details*)

☐ Tabled (*see attached memo for details*)

HRC Authorization: _____ Date: 11/30/98

Part A. COVER SHEET

☑ New Protocol ☐ Resubmission

1. Project Title: What Domains Must Be Present To Ensure Effective Virtual Team Performance?

2. Principal Investigator (PI): Dr. Gary Geroy
3. Telephone: 970.491.5097
4. Department: School of Education
5. E-mail: geroy@lamar.colostate.edu
6. Co-Principal Investigator: Joel Olson
7. Telephone: 303.521.8180
8. Department: School of Education
9. E-mail: joelolson@aol.com
10. If Co-PI is a student, is this project for a: ☐ Thesis ☐ Dissertation ☐ Neither
    (Attach thesis/dissertation prospectus, abstract, or methodology chapter.)
11. Date project activity to begin: December 1, 1998
12. Will this project be supported by external funds? ☐ Yes (answer 13-15)
    ☑ No (go to signatures)

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13. Funding Agency (attach proposal or methodology section):

14. Grant/contract number:

15. Proposal deadline:

As the PI submitting this proposed research and signing below, I agree to conduct the research involving human subjects as presented in the protocol or modifications to it and as approved by the Department and the Human Research Committee; to obtain and document informed consent and provide a copy of the consent form to each subject unless this is waived by the HRC; to present any proposed modifications in the research to the HRC for review and approval prior to implementation; to retain records for the mandated lengths of time; and to report to the HRC any problems or injuries to subjects.

PI Signature: _____ Date: 11/17/98

Department Chair/Head or Acting (circle which) Signature

My signature below confirms that I have read this protocol and approve of this research:

Signature: _____ Date: 11/17/98

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RETAIN THIS PAGE WITH YOUR APPROVAL NOTIFICATION

Colorado State University

Office of Regulatory Compliance
Office of Vice President for Research
and Information Technology
Fort Collins, CO 80523-2046
(970) 491-1563
FAX: 491-2293

IMPORTANT REQUIREMENTS REGARDING YOUR HUMAN SUBJECTS APPROVAL

☐ This project is approved with no conditions.

☒ This project is approved with the condition that the attached consent form is signed by the subjects and each subject is given a copy of the form. It is the investigator's responsibility to obtain this consent form from all subjects. No changes may be made to this document without first obtaining the approval of the Committee.

☐ This project is approved with the condition that all subjects must receive a copy of the approved cover letter printed on departmental letterhead. Because of the nature of this research, it will not be necessary to obtain a signed consent form.

☐ This project is approved with the following additional condition(s):

This project is approved for the following number of subjects: 4

It is the responsibility of the investigators to

- immediately inform the HRC of any serious complications, unexpected risks or injuries resulting from this research;
- notify the HRC of any changes in experimental design, participant population, or consent procedures. This can be done with a memo which completely describes the changes and their consequences (new consent form, or altered survey instrument, for example).

A status report of this project will be required within a 12-month period from the date of approval. The necessary form (H-101) will be mailed to the Principal Investigator prior to that date. The Principal Investigator will report on the numbers of subjects who have participated this year and project-to-date, about problems encountered, and provide a verifying copy of the consent form or cover letter used.

Students serving as Co-Principal Investigators may not alter projects without first obtaining PI approval. The PI is ultimately responsible for the conduct of the project.

Any questions about the Committee's action on this project should be directed to

Celia S. Walker
Administrator, Human Research Committee
Regulatory Compliance Office
410 USC Campus 2046
Telephone: 970-491-1563
e-mail: cwalker@research.colostate.edu

Information on human subjects research is available on the web at *www.research.colostate.edu/regulatory/*

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COLORADO STATE UNIVERSITY
INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT

TITLE OF PROJECT: *What Domains Must Be Present to Ensure Effective Virtual Team Performance?*

NAME OF PRINCIPAL INVESTIGATOR: *Dr. Gary Geroy, Colorado State University*

NAME OF CO-INVESTIGATOR: *Joel Olson*

CONTACT NAME AND PHONE NUMBER FOR QUESTIONS/PROBLEMS:

Joel Olson 303.521.8180

SPONSOR OF PROJECT: *None*

PURPOSE OF THE RESEARCH:

The purpose of the research is to develop hypotheses related to effective virtual team performance. This study will not test any hypotheses, but will intend to distill your experiences with virtual tasks and virtual work environments to hypotheses which may be tested in subsequent studies. Your part of the study would involve six weeks from January 1, 1999 to February 15, 1999.

PROCEDURES/METHODS TO BE USED:

The study calls for the Rocky Mountain Regional Staff Director team to take two steps towards increasing its performance through the use of electronic communication. The team will be involved in a telephone conference call for 90 minutes in early January. Following that telephone conference call, you will be asked to complete an electronic diary recording your feelings, thoughts, and impressions of the conference call. In mid-January the team will participate in a 90 minute electronic conference (a computer chat room). Following that conference meeting I will interview you either in person, or on the phone, to again record your experience and impressions. It will take you about 90 minutes to complete the electronic diary and 90 minutes to do the interview with me. The interview will be audiotaped. After the audiotape is reduced to written text, it will be destroyed.

RISKS INHERENT IN THE PROCEDURES:

There are no known risks for this study. However, it is not possible to identify all potential risks in an experimental procedure, but the researcher has taken reasonable safeguards to minimize any known and potential, but unknown, risks.

BENEFITS:

The Rocky Mountain Regional Staff Director team has wanted to explore increasing its performance through the use of electronic communication for some time. This study will help the team to actualize those intentions. The study will also increase your understanding of virtual teams. This understanding will help you lead your own virtual teams more effectively.

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CONFIDENTIALITY:

Although I will know who the participants are and what their responses are, your name will not be used in the study. The name of the organization and the organizational team will also not be used in the study. Any quotations from your recorded experiences on the electronic diary or interview, will be made anonymously.

LIABILITY:

The Colorado Governmental Immunity Act determines and may limit Colorado State University's legal responsibility if an injury happens because of this study. Claims against the University must be filed within 180 days of the injury.

Questions about subjects' rights may be directed to Celia S. Walker at (970) 491-1563.

PARTICIPATION:

Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing __2__ pages.

_____
Participant name (printed)

_____ _____
Participant signature Date

_____ _____
Investigator or co-investigator signature Date

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APPENDIX B

COLORADO STATE UNIVERSITY INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT FORM

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COLORADO STATE UNIVERSITY
INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT

TITLE OF PROJECT: *What Domains Must Be Present to Ensure Effective Virtual Team Performance?*

NAME OF PRINCIPAL INVESTIGATOR: *Dr. Gary Geroy, Colorado State University*

NAME OF CO-INVESTIGATOR: *Joel Olson*

CONTACT NAME AND PHONE NUMBER FOR QUESTIONS/PROBLEMS:

Joel Olson 303.521.8180

SPONSOR OF PROJECT: *None*

PURPOSE OF THE RESEARCH:

The purpose of the research is to develop hypotheses related to effective virtual team performance. This study will not test any hypotheses, but will intend to distill your experiences with virtual tasks and virtual work environments to hypotheses which may be tested in subsequent studies. Your part of the study would involve six weeks from January 1, 1999 to February 15, 1999.

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RISKS INHERENT IN THE PROCEDURES:

There are no known risks for this study. However, it is not possible to identify all potential risks in an experimental procedure, but the researcher has taken reasonable safeguards to minimize any known and potential, but unknown, risks.

BENEFITS:

The Rocky Mountain Regional Staff Director team has wanted to explore increasing its performance through the use of electronic communication for some time. This study will help the team to actualize those intentions. The study will also increase your understanding of virtual teams. This understanding will help you lead your own virtual teams more effectively.

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CONFIDENTIALITY:

Although I will know who the participants are and what their responses are, your name will not be used in the study. The name of the organization and the organizational team will also not be used in the study. Any quotations from your recorded experiences on the electronic diary or interview, will be made anonymously.

LIABILITY:

The Colorado Governmental Immunity Act determines and may limit Colorado State University's legal responsibility if an injury happens because of this study. Claims against the University must be filed within 180 days of the injury.

Questions about subjects' rights may be directed to Celia S. Walker at (970) 491-1563.

PARTICIPATION:

Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing __2__ pages.

_____
Participant name (printed)

_____ _____
Participant signature Date

_____ _____
Investigator or co-investigator signature Date

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APPENDIX C

INTERVARSITY CHRISTIAN FELLOWSHIP LETTER OF APPROVAL

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4725 Middaugh
Downers Grove, IL 60515
November 24, 1998

Celia Walker
Colorado State University
Office of Regulatory Compliance
410 University Services Center
Ft. Collins, CO 80523-2046
FAX: 970.491.2293

Dear Ms. Walker:

Just a short letter to assure the Office of Regulatory Compliance that InterVarsity is aware of the study project that Joel Olson is doing for his dissertation with the Rocky Mountain Staff Director team this January and February.

We are confident that our personnel are adequately protected in the study and have no concerns related to the risk of the study.

Sincerely,

Doug Stewart

Doug Stewart
National Field Director
InterVarsity

4725 Middaugh Ave. Downers Grove, IL 60515 • Tel/Fax: (630) 960-1917 • E-mail: dwstewart@aol.com

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APPENDIX D

PARTICIPANT CONTACT LETTER

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Colorado State University

December 11, 1998

School of Education
Fort Collins, Colorado 80523-1588

Bob Coughlin
504 Minnesota
Belgrade, MT 59714

Dear Bob,

As you know, I am working on a Ph.D. in Human Resource Development at Colorado State University. This week I presented my dissertation proposal to my graduate committee. Thankfully, they accepted the proposal. I am now in a position to do some original research.

I am working in the area of teams; more specifically, with the phenomenon of virtual teams. I have done a literature review looking at the characteristics of teams including definitions of teams, types of teams, characteristics of effective teams, developmental stages of teams and team models. There has not been much research done on the phenomenon of virtual teams, so I am starting with what is known about traditional teams and hoping to extrapolate from there.

I am hoping to use our existing Rocky Mountain Regional Staff Director team as the team for this study. Our team fits the criteria for the study in that it is a virtual team in the performance stage of development.

Enclosed you will find a consent form. Before I can include you as a participant in the study, I need you to review, and sign, the consent form. The consent form lets you know what you are getting into, what the risks are, what the procedure will be, how much time it will take, and what the benefits are. Please initial each page and then use the enclosed stamped envelope to return the consent form to me.

I would appreciate it if you could return the consent form to me by December 12.

We will set up the timing of the virtual tasks, diaries and interviews described in the consent form during our team meetings in December.

I will be giving you a telephone call in the next week to answer any questions that you might have.

Thanks for your help with this!

Sincerely,

Joel Olson

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APPENDIX E

NOTEPAD

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Notepad

December 31, 1998

The purpose of the notepad is to help you record your experience as it occurs. I would recommend that you make a hard copy and keep it handy during the conference phone call to make short notes on your experience. The headings are related to feeling, thinking, behavior/doing, sensory experiences of seeing/tasting/touching/smelling, and values. If the notepad becomes an obstacle in your participation in the phone call, please disregard it. Feel free to add you own headings.

1. What am I feeling?

2. What am I thinking?

3. What am I doing?

4. What am I seeing, tasting, touching, smelling?

5. What am I valuing?

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APPENDIX F

ELECTRONIC DIARY

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Electronic Diary

December 31, 1998

The intent of this diary is to help you record your experience of the conference phone call you just participated in. It looks at your experience, opinions, knowledge, feelings, background, sights and behavior. The diary attempts to attach these to the team domains of purpose, roles, leadership, processes and decisions, relationships and trust, communication, and responsibility. Teams are always dynamic, never static. Please answer the questions related to team domains in light of where you perceive the team presently to be.

1. Describe your prior experiences with conference phone calls.

2. When you walked into the room where you took the conference call, what did you see?

3. If I had been with you during the conference phone call, what would I have seen you doing?

4. What did you know about this conference phone call before it started?

5. To what extent did the conference phone call make you feel anxious, happy, afraid, intimidated, or confident? Why?

6. What is your opinion of conference phone calls?

7. Tell me how the conference phone call effected your experience of the team's purpose (Purpose is the reason for cooperation.).

8. Tell me how the conference phone call effected your experience of the team's roles (Roles create interdependence and demand cooperation.).

9. Tell me how the conference phone call effected your experience of the team's leadership (Leadership is the structure for cooperation.).

10. Tell me how the conference phone call effected your experience of the team's processes and decision-making (The process of cooperation.).

11. Tell me how the conference phone call effected your experience of the team's relationships and trust (Relationships and trust are the climate for cooperation.).

12. Tell me how the conference phone call effected your experience of the team's communication (Communication is the means for cooperation.).

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13. Tell me how the conference phone call effected your experience of the team's responsibility (Responsibility is the accountability of cooperation, getting things done.).

14. Which agenda items were best addressed in the conference phone call and why?

15. What did you learn about yourself and the team from the conference phone call?

16. What domain (The domains are purpose, roles, leadership, processes and decisions, relationships and trust, communication, and responsibility.) would you like to see the team better develop and how would conference phone calls be helpful in that development?

17. Which domains are best suited to conference phone calls and why?

18. Which domains are most ill suited to conference phone calls and why?

19. What did you miss most during the conference phone call?

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APPENDIX G:

INTERVIEW QUESTIONS

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Interview

January 27, 1999

Target: What is involved in building a successful virtual team? What is the same and what is different?

*What did you like most about the computer conference? Why?

*What did you like the least? Why?

*How did these virtual experiences effect you?

*How did they effect our team?

*What was the same/different in your experience of purpose (reason for cooperation), leadership (structure for cooperation), roles (create interdependence and demand cooperation), process/decisions (the process of cooperation), relationship/trust (climate for cooperation), communication (the means for cooperation), responsibility (accountability of cooperation) from the Greeley meetings compared to the virtual meetings? Why?

*How does electronic communication effect the domains? What is enhanced or diminished?

*Are the team domains the same? Are they the same, but expressed differently? If so, how?

*Based on these experiences, how would you build a virtual team?

*What would be the next steps for this virtual team?

*Some people said, "better than nothing," or "they would rarely chose a conference call," or "technology is an intrusion." Why? Did the computer conference carry the same experience?

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*Would your behavior, experience, of the phone call or computer conference have been different if John Smith was doing the study? An outside observer?

*What did you notice about changes in my behavior? My behavior was effected by the virtual medium, what was different from what you might have expected my behavior to be in virtual mediums? What was different, what was the same?

The diaries indicated that the biggest difference was with relationship/trust and communication. Why?

The literature indicates that trust can be built in virtual settings. How do you respond to that? (ability—able to do the job; benevolence—the heart; integrity—the follow through). Overattribution: virtual teams have more intimacy than physical teams because with increased individual communication there are increased assumptions about similarities. That assumption is reinforced as the topics gather similar material. This results in an increased sense of care and perceived benevolance.

The literature indicates that leadership in virtual settings is more participatory, rotates, and is less hierarchical. How do you respond to that?

The literature indicates that the final stage of a team is individuation. How could that be avoided with virtual teams?

How could discussion and difference be handled virtually?

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