THE ROLE OF INFORMATION TECHNOLOGY SUPPORT MECHANISMS IN COORDINATION MANAGEMENT FOR VIRTUAL TEAMS

DISSERTATION

Presented to the Graduate Council of the

University of North Texas in Partial

Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Susan Elizabeth Yager, A.S., B.S., M.B.A.

Denton, Texas

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The purpose of this research is to examine virtual team members' use and perceptions of information technology (IT) support mechanisms. The study identifies the IT support mechanisms currently in use and focuses on differences between virtual and non-virtual teams in control and coordination, IT acceptance, and IT adoption.

A multiple-company, multiple-team field survey research strategy was utilized. Ninety individuals from eighteen firms participated in the research – thirty-five non-virtual and fifty-five virtual team members. Five IT support mechanisms were used by a majority of the team members: telephone conferencing, presentation support software, project management software, calendar management for groups, and computer-supported audio/video teleconferencing.

Hypothesized differences in intra-team management for virtual teams were not manifest. The ways in which teams control and coordinate their group efforts were not different due to geographic location, industry focus, or level of dependency on others.

Results concerning hypothesized differences in IT adoption were inconclusive. Adopting and making innovative technology a part of an organization did not differ between virtual and non-virtual teams. Whether a new technology becomes part of an

organization's standard operating environment depends on the industry in which the firm operates; and implementation of innovative technology is more likely in organizations with a higher dependency between work groups.

User acceptance of IT did not differ by industry focus or dependency level. Computer self-efficacy did not differ among respondents. However, virtual team members are more inclined to use IT support mechanisms and believe these mechanisms are easier to use and more useful than those operating in non-virtual teams.

The absence of differences between virtual and non-virtual teams encourages organizations to utilize their in-house expertise based on project goals and constraints, rather than concentrating on management structure and computer self-efficacy. User acceptance of IT may be an important consideration in forming virtual teams and in tailoring training for newly implemented technology.

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TABLE OF CONTENTS

TABLES

ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Growing complexity in business environments has rendered "business as usual" ineffective (Keen 1991). Globalization requires communication and coordination across time zones and locations. Time stresses drastically reduce reaction time, driving business to just-in-time inventory, orders, scheduling, payments, manufacturing, distribution, and so on (Keen 1991). The way in which business is conducted is also changing at a rapid pace. Groups, not individuals, have become the fundamental unit of work in modern organizations (Finholt and Sproull 1990). These groups and their behaviors affect organizational performance and the individual group members. Information technology (IT) can enable the fast adaptation necessary to accommodate these constant and rapid changes (Keen 1991) and may affect these groups and their behavior (Finholt and Sproull 1990).

Virtual enterprises are emerging largely because of demands for a new kind of product: the virtual product (Bleecker 1994). Virtual products mostly exist even before they are produced (Davidow and Malone 1992). These goods and services deliver instant customer gratification in a cost-effective way, can be produced in diverse locations and offered in a great number of models or formats, and ideally are produced instantaneously and customized in response to a customer request (Davidow and Malone 1992).

Overnight package delivery, prescription eyeglasses in one hour, high-quality photograph developing in less than an hour, instant movies from tiny camcorders, and custom-made tacos in 20 seconds are just a few examples of the array of virtual products leading the way (Bleecker 1994). A new kind of company is necessary to produce and distribute this new kind of product, one that can control ever more sophisticated types of information and master new organizational and production skills — the "virtual organization" (Davidow and Malone 1992).

Virtual organizations are: reliant on cyberspace (the medium in which electronic communications flow and software operates), enabled by new computing and communications developments, and initially will exist only across conventional organizational structures (Barnatt 1995). Currently, four different versions of the virtual organization have been identified: telecommuting, hot desk environment, hotelling, and virtual teams (Barnatt 1995).

This research examines current use of IT support mechanisms designed especially to support group activities. Specifically, this research addresses the use and perceptions of currently available IT support mechanisms by both virtual and traditional, face-to-face team group members.

Purpose of the Research

The purpose of this research is to examine virtual team members' use and perceptions of IT support mechanisms by: (1) identifying distinguishing characteristics of

virtual teams that set them apart from traditional, face-to-face teams; (2) identifying IT support mechanisms utilized within virtual teams; and (3) evaluating the adoption of IT support mechanisms within organizations that utilize virtual teams. Organizations invest substantial amounts of money, personnel, and training time in IT support mechanisms, hoping to increase product quality and the efficiency and effectiveness of their people. However, merely providing these tools cannot ensure a successful implementation. Unused and underutilized technology wastes valuable resources and can cause frustration at all levels of the organization. In addition, an individual's characteristics and past experiences may create pre-conceived ideas of the usefulness and ease with which they can use the tools. Individuals with low computer self-efficacy may feel frustrated and not attempt to utilize computer-based tools. Past experiences in education, with team members, and with other technologies may influence an individual's perception of the IT support mechanisms and their willingness to make the tools an integral part of their group work.

Organizations cannot afford to invest additional resources for the sake of boasting rights to the latest and greatest technology. Identifying the IT support mechanisms currently in use may be helpful for future acquisition planning. Since the frequency of use may be different than how important the mechanisms are believed to be in completing group work, separate rankings are collected in this research. Realizing that no group or team works in a vacuum or with unlimited resources, this research examines what extent the team's work performance depends on others by examining four typical dependencies:

(1) shared resources, (2) producer/consumer relationships, (3) simultaneity constraints, and (4) decomposing tasks into subtasks.

An individual's acceptance of technology hinges on several factors identified in previous research. Individuals differ in their comfort and ability to deal with computer technology, and self-efficacy has been found to play an important role in shaping an individual's feelings and behaviors. This research evaluates computer self-efficacy, which measures an individual's level of confidence in dealing with new and unknown computer applications. However, confidence alone is not sufficient to predict the use of technology. Perceived ease of use, intention to use, and perceived usefulness of group work IT support mechanisms also play key roles in technology acceptance.

Problem Definition

The problems addressed by this research are the identification of the IT support mechanisms currently being utilized by teams to accomplish their work in organizations and the determination of how coordination, IT adoption, and IT usefulness are affected by team structure, industry focus, and intra-organizational dependencies.

Technology offers real potential for changing the way in which people work (Daniels 1995). For perhaps the first time, people may be able to build organizations in the way they want, not constrained by information requirements and availability (Daniels 1995). Previous research has explored the use of IT support mechanisms in group work (e.g., Johansen 1988, Keen 1991, DeSanctis and Jackson 1994, Barnatt 1995). However,

there has been little agreement on the technologies explored. This research uses Johansen's (1988) seventeen IT Support Mechanisms and measures their utilization in organizations which use teams in their group operations.

To remain competitive in today's business environment requires new levels of cooperation and coordination both within (intra-) and between (inter-) organizations. No longer can firms afford in-house expertise for all facets of the business. The most knowledgeable expert may work for a customer, a supplier, or even a competitor. Taking advantage of strengths and abilities, regardless of physical locations or formal organizational ties, may be necessary to succeed in the global business environment. The virtual team takes advantage of the amoeba-like structure of the new virtual enterprise. However, coordination of IT practices presents a challenge to these dispersed, decentralized teams (DeSanctis and Jackson 1994). While this decentralization may bring flexibility and fast response to changing business needs, it also makes integration difficult (DeSanctis and Jackson 1994).

Organizations must adopt technology and incorporate it into their operations to receive any benefit. This research uses two measures of technology incorporation at the organizational level: Yin's (1979) routinization and Zmud and Apple's (1992) infusion. In addition, individuals must accept and embrace these technologies to gain benefits in accomplishing their group work. Venkatesh and Davis's (1996) Technology Acceptance Model measures computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness measures to evaluate user acceptance of technology.

The primary research question is: Which IT support mechanisms play a role in coordination management for virtual and non-virtual teams? The secondary question is: Are there differences in organizational and individual acceptance of technology between virtual and non-virtual teams?

Significance of Problem

Modern organizations confront a turbulent environment requiring rapid, flexible response to changing conditions; and organizations must develop mechanisms to support their response to those changes (DeSanctis and Jackson 1994). Companies are shifting from hierarchies to networked organizations (DeSanctis and Jackson 1994) in which both intra- and inter-organizational coordination is needed. IT is a critical force in the transformation of firm structures and boundaries (Kambil and Short 1994).

The virtual organization creates new challenges for management and coordination; and this type of organization will be more common in the future as a variety of forces, from child care to air pollution, demand fewer centralized workplaces due to the commuting necessary for such a physical workplace (Lucas and Baroudi 1994). Coordinating mechanisms are needed (DeSanctis and Jackson 1994) to assure that efforts to manage IT are synchronized, so that diverse business practices are allowed to operate as an integrated whole and the goals of the organization are realized.

Creating the virtual products of today and tomorrow is usually the result of interaction between multiple and often unrelated technological advances (Davidow and

Malone 1992). Managers in these environments must select and build suitable governance mechanisms to effectively coordinate and integrate the activities of the firm with those of its customers, its suppliers, and other organizations in the environment (Kambil and Short 1994). In virtual organizations, this task becomes even more complicated and creates new management and coordination challenges (Lucas 1996b). However, companies are finding "bottom line" results from the move toward a virtual work world. For example:

- AT&T found that reduced commuting and use of home offices allowed its sales force to spend 15% to 20% more time with customers.
- Compaq Computer Corporation moved its sales force into home offices. Sales and administrative expenses dropped from 22% to 12% of revenue, partly due to this change.
- Scientific equipment manufacturer Perkin-Elmer based 300 sales and customer service representatives in their homes, which allowed the firm to close 35 branch offices.

(Lucas 1996b)

Practitioner Research Issues

Lucas (1996b) estimates that one in three U. S. workers uses a computer in one way or another, and that 30% to 50% of capital investment in the U. S. is for IT. Computer-based systems have the potential to reduce coordination costs (Clemons and Row 1991, Daft 1992), enable more rapid and responsive communication across time and space (Fulk and Boyd 1991), and bring structure to otherwise unstructured dialog between coordinating parties (DeSanctis and Gallupe 1987). Understanding the effects of electronic integration strategies at the business level of analysis is increasingly important

(Kambil and Short 1994). Ching, Holsapple, and Whinston (1996) pose questions concerning: (1) what IT can and should do to support and exploit new organizational forms, and (2) what needs and opportunities exist for new kinds of computer-based systems devised specifically to facilitate management and coordination in organizations. Reports, papers, and books about virtual companies, factories, offices, and corporations exhibit little agreement on term definitions, but all are concerned with how developments in technology will allow remote individuals to work together (Barnatt 1995).

The sharp upswing in telecommuting presents new challenges to already overburdened information systems (IS) departments struggling with new technologies and the rapidly changing workplace (Blodgett 1996). Virtual organizations face the same challenges as the new hybrid of "centrally decentralized" IT management. These hybrid forms of organizing would seem to be a reasonable strategy for balancing relative advantages of centralized and decentralized management (DeSanctis and Jackson 1994). A critical issue facing managers of IT today involves how to respond to the emergence and growth of these new organizations (Ching, Holsapple and Whinston 1996). Both inter- and intra-organizational IT management share the same concerns of linking together IT activities of otherwise independent or loosely coupled units, each of which may have its own IT function (DeSanctis and Jackson 1994). Much remains to be discovered about how organizations choose among possible coordination mechanisms, situations where these mechanisms are seen as being effective, and steps taken so as to maximize benefits and minimize coordination costs (DeSanctis and Jackson 1994).

The integration of IT with organizational strategy and structure is recognized as being of paramount concern to managers (Allen and Boynton 1991). Companies are rapidly moving toward a distributed work force that uses electronic technology to link workers and functions at scattered sites. This change is rapidly altering the nature of work and the growth of the virtual organization will be fueled by three factors: 1) rapid evolution of electronic technologies, which facilitate digital, wireless transfer of video, audio, and text information; 2) rapid spread of computer networks; and 3) growth of telecommuting, which will enable companies to provide faster response to customers, reduce facility expenses, and assist workers to meet their child- and elder-care responsibilities (Barner 1996).

Academic Research Issues

The complexity of political, regulatory, and technological changes confronting most enterprises in the 1990s makes organizational change and adaptation a central research issue (Greenwood and Hinings 1996). Computer-based technology is in widespread use to form common telecommunications infrastructure, networks, and data exchange across divisions or business units (Allen and Boynton 1991; Richardson, Jackson and Dickson 1990). However, the use of computer-based systems for organizational coordination management has not been studied across organizations and industries. While virtual organizations may sound like the latest in a long litany of concepts peddled by consultants, they are real, not a simple fad; and many companies are

already operating without significant investment in infrastructure while producing successful products and profits (Beckham 1995).

IT has become a frequently studied organization design variable in the organizational research literature (Lucas and Baroudi 1994). Keen (1991) believes that basic assumptions of modern organization theory and practice are being invalidated as organizations are redesigning through IT. IT is seen as a critical force in the transformation of competition, firm structures, and firm boundaries (Kambil and Short 1994).

Many of the organizational possibilities enabled by IT have either been overlooked or not well understood in the academic literature (Lucas and Baroudi 1994). Both technological and structure factors are purported to affect levels of cooperation and conflict in systems (Alter 1990). There is a need to know more about how to evaluate systems and what constitutes success as well as understanding the design and use of systems in broader contexts (Bly, Harrison and Irwin 1993). IT is seen as an enabler of coordination when used with cross-functional teams (DeSanctis and Jackson 1994), but the need for further development is great. Much of the previous research has been one-site case analysis and lacked a multi-industry, multi-firm, multi-team view.

General Limitations

Limitations are an inherent part of any research study. Generalizability of results depends upon the willing participation of organizations in a variety of industries and with

varying size and scope of operations. A random sample of subjects from the universe of virtual organizations was not possible, and self-selection by participants is a major consideration. Inference is made from the responses of one team member to the team itself. There is no assurance that the opinions expressed by the population surrogates in this study necessarily match those of other team members or all teams in the marketplace. This one-shot survey does not reflect changing views and opinions during the initial development, implementation, modification, and maintenance of IT support mechanisms. Widely differing implementations of IT exist, even within firms. Differences in IT support mechanisms differ between organizations in both the level of use of technology and the level of support for the technology in place.

As with any research done in the field, only partial control is possible and there is no ability to accommodate extraneous variables (Buckley, Buckley, and Chiang 1976). Personnel have vastly different levels of experience and familiarity with both specific IT and combinations of IT support mechanisms, even within the same organization. Virtual team members have widely varying past experiences in other aspects of their backgrounds as well. Factors that may influence a respondent's replies include previous and current team associations; educational training; career history; industry and organizational background; relationships with previous and current team members; and social, cultural, and political indoctrinations.

Key Terms and Definitions

Information Technology

Information Technology (IT) refers to the technological side of an information system, including hardware, databases, software networks, and other devices and can be viewed as a subsystem of an information system (Turban, McLean, and Wetherbe 1996).

Virtual Organization

A temporary network of companies that come together quickly to exploit fast-changing opportunities and disband quickly after exploiting an opportunity (Coyle and Schnarr 1995). This allows a firm to conduct business activities without a building as its home (Handy 1995). This type of organization consists of project-focused, collaborative networks uninhibited by time and space; provides the benefits of a high degree of focus on a common purpose; allows for the assembly of the right skills to accomplish that purpose precisely; and offers a level of productivity unattainable in traditional organizations (Richman 1995).

Virtual Product

According to Davidow and Malone (1992), a virtual product, whether a good or a service, is one that is produced instantaneously and customized in response to customer demand. A virtual product mostly exists before it is produced. Its concept, design, and

manufacture are stored in computers, flexible production lines, and the minds of cooperating teams (Davidow and Malone 1992).

Virtual Teams

Virtual teams consist of people collaborating closely but in a variety of locations (Barnatt 1995).

Organization of the Paper

This paper is organized into six chapters. Chapter 1 presents the purpose, problem, practitioner and academic significance, general limitations, and key terms pertaining to this research. Chapter 2 includes a summary of the literature and prior research in the area of organizational change, Institutional Theory, Coordination Theory, Organizational Complexity Model, Technology Acceptance Model, IT Routinization and Infusion, and Organizational Assessment Instruments. Chapter 3 presents the theoretical framework and model on which the research is based and describes the research methodology, including a pilot survey of virtual and non-virtual team members and technology infusion determination by a panel of experts. Chapter 4 presents the results of the data analysis, and Chapter 5 discusses these results. Chapter 6 summarizes this research effort and offers suggestions for further research.

CHAPTER 2

PRIOR RESEARCH

The search of previous literature contains related material in various disciplines. It is necessary to understand intra-organizational dynamics in order to understand radical organizational change (Greenwood and Hinings 1996). This chapter highlights previous work in organizational change, including: development of the network organization; advent of virtual offices, virtual organizations, virtual teams, and interorganizational systems; and adoption of innovative IT, such as computer-supported collaborative work and groupware. The common thread of these areas is researchers' interest in the effects of IT and IT as an enabler of change. The theoretical framework for this research draws from several sources. This chapter concludes with a brief discussion of Institutional Theory, Coordination Theory, IT Support Mechanisms, Organizational Complexity Model, Technology Acceptance Model, IT Routinization and Infusion, and Organizational Assessment Instruments.

Organizational Change

According to organization theory, achieving sustainability for the firm requires adaptation, which can range from very specific responses to switches in general strategy (Jennings and Zandbergen 1995). Leavitt and Bahrami (1988) recapped this adaptation in

corporate focus as follows. In the late 1950s and the 1960s, organizations became increasingly viewed as "open systems," drawing resources such as people and raw materials from their environments and exporting goods and services back. In the 1970s, senior managers' attention was increasingly drawn to the external environment. The interdependencies between organizations and their environments grew exponentially and were reflected by more interdependency among an organization's own loosely-coupled parts. In recognition of growing interdependence in the 1980s, each organization paid much more attention to issues outside the boundaries of the organization, to how the organization interacted with its environments, and to those external forces that affected its behavior. New management theories considered the sources of organizational dependence on the environment, whether those sources were people, resources, markets, or information, and whether and how they could be controlled and influenced. The 1990s ushered in an evolutionary age of IT in which the very nature of the technology, business applications of computers, people who come into contact with this new technology, and information in use are all going through profound changes (Tapscott and Caston 1993).

Cravens, Shipp, and Cravens (1994) examined changes in the traditional organization structure, stating that deciding how to reform traditional organizations or guide the development of new entrepreneurial units is a complex challenge. They saw a general model that evolved as a network of corporate units, independent organizations, and entrepreneurs. They characterized the resulting new organization forms as lean, flexible, adaptive, and responsive to customer needs and market requirements; and the

key features were understanding customer needs and offering value to their customers. Dervitsiotis (1998) concurs that coping with increasing rates of change and turbulence in the business environment requires management to change to an organizational form that is responsive, flexible, adaptable, and value-adding.

Organizational, managerial, and sociological theorists have been intrigued by the potential effects of IT on the organization since development of the first business applications over 40 years ago (Schwarz and Brock 1998). Applegate, Cash, and Mills (1988) considered the role that IT has played in this evolution of the firm. IT was once a tool for organization expansion and became a tool for downsizing and restructuring. Computer systems have assumed many of the communication, coordination, and control functions that middle managers previously performed. Once managers had to choose either a centralized or decentralized structure. Today there is another option — technology-driven control systems that can support the flexibility and responsiveness of a decentralized organization, as well as the integration and control of a centralized organization. Managers no longer just react to technology — they use it to shape the organization. Companies can have the benefits of small scale and large scale simultaneously, and even large organizations are able to adopt more flexible and dynamic structures. The focus has changed to projects and processes, rather than tasks and standard procedures.

In a study evaluating the introduction of electronic groups within an organization, Finholt and Sproull (1990) observed that at least a few of the electronic groups studied

behaved like real social groups, even though: (1) they shared no physical space, (2) their members were invisible, and (3) their interactions were asynchronous. Their research focused on groups within an organization and resulted from an increased interest in how electronic group communication could possibly augment or change existing patterns of coordination and performance in small, face-to-face work groups (e.g., Kraemer and King 1988). These research interests and observations may be the groundwork for understanding the effects of technology interaction and coordination in the virtual corporation of today.

Network Organizations

Network organizations were one of four broad forms of organizations to emerge in U. S. business history (Miles and Snow 1992). A network organization is formed by separate firms, each retaining its own authority in major budgeting and pricing matters, who function as integral parts of a greater organization (Ching, Holsapple and Whinston 1996). Miles and Snow (1995) posited that the traditional pyramid metaphor for organizational structure does not apply to network organizations. Instead, observations of how these agile, market-driven companies rotate resources to meet customer needs suggest a different, spherical-type structure. A new management agenda has been constructed to evaluate the effectiveness and appropriateness of these organizations for the future, specifically the development of various types of network organization forms,

implementing strategic alliances and inter-organizational collaborations and partnerships (Piercy and Cravens 1995).

The classic, vertically integrated, multidivisional organization, so successful in the 20th century, is unlikely to survive the knowledge rich and very turbulent environment of the 21st century (Achrol 1997). Radical changes in the worldwide competitive arena have caused a large number of firms to restructure their operations into a network organization, allowing a firm to build on existing foundations but typically requiring wrenching changes in organizational structure, culture, and human resources policy (Biemans 1996). The challenge in transforming a company is to improve the quality of attitudes, behaviors, and relationships, harnessing relevant expertise by all available means in such a way that it can be applied to add value to customers (Coulson-Thomas 1994). New forms of relationships have emerged within the network organization, resulting from cross-functional and interorganizational processes (Coulson-Thomas 1994).

Barnatt (1995) identified an even more flexible organizational pattern that emerged in the 1980s — the "dynamic network." Its structure consists of a controlled interlinkage of only those parties required for the production of a particular product at a particular point in time. This highly flexible arrangement is capable of adapting rapidly to changing markets, technologies, and demand levels by coupling agents into or out of its web. Individual agents are highly specialized and the concept of flexible specialization results.

Virtual Office

Advocates for Remote Employment and the Virtual Office (AREVO) (1996), defined the virtual office as the operational domain of any business or organization whose work force includes a significant proportion of remote workers. Remote employment is any working arrangement in which the worker performs a significant portion of his/her work at a fixed location other than an employer's central office or plant — typically at the worker's home (AREVO 1996). Caldwell and Gambon (1996) pointed out that the virtual office is more than a fantasy for the future or a few scattered trials involving a mere handful of workers, and certainly more than a fancy term for taking work home at day's end. Instead, the virtual office is a reality now at hundreds of companies, made possible by new IT and innovative ideas about the office and the way people work.

Flexibility of work hours, reduced travel time, elimination of the commute to an office, less sick time, and avoiding miscellaneous conversations and distractions of an office environment are among the benefits for both employees and companies (Watkins 1998). The virtual office can result in maximum customer service and high retention levels, maximum employee productivity, and improved employee morale by increasing both quality and quantity of output while reducing employee stress (Zinkewicz 1997).

Virtual Organizations

Finholt and Sproull (1990) predict that computer-based technology could lead to new or different forms of group organization with organizational consequences beyond

mere efficiency changes, allowing organizations to create more flexible structures so that the experience and expertise of employees can be available wherever it is needed. They see the advent of the "virtual" organization as the current organizational manifestation of this prediction (Finholt and Sproull 1990).

In their book, The Virtual Corporation: Structuring and Revitalizing the Corporation for the 21st Century, Davidow and Malone (1992) propose that virtual organizations are the result of a competitive push to deliver the new virtual products. According to the authors, for an entity or object to be virtual used to mean that it possessed powers or capabilities of another entity or object. They extend the term to reflect the current situation, with previously well-defined structures beginning to lose their edges, seemingly permanent components starting to change continuously, and products and services adapting to match our desires. Virtual products, whether goods or services, can be made available at any time, in any place, and in any variety, but they can only be offered because of the latest innovations in information processing, organizational dynamics, and manufacturing systems. A new kind of company is necessary to produce and distribute this new kind of product — the "virtual organization."

> As the rapid gathering, manipulating, and sharing of information become a preeminent process and as company boundaries grow increasingly fluid and permeable, established notions of what is inside or outside a corporation become problematic, even irrelevant. Also becoming irrelevant are the once obvious differences among suppliers, manufacturers, distributors, retailers, customers, even competitors. At any one time, an enterprise or an individual may play multiple roles (Davidow and Malone 1992, p. 140).

The virtual organization had its beginning fifteen to twenty years ago as people began to see the possibility of using technology for work at home (Lucas and Baroudi 1994). According to Davidow and Malone (1992), what began as a vision of futurists has become a possibility for business theorists and an economic necessity for corporate executives. All of this occurred in little more than a decade, underscoring the inevitability of this new business model as well as hinting at the speeded-up sense of time that characterizes it. The virtual organization carries the concept of flexible specialization a step further than the dynamic network organization, because it is not limited by physical locations of brokers and agents or by complex contractual arrangements required between them (Barnatt 1995).

Corporations are evolving into virtual enterprises, using integrated computer and communications technologies, and linking hundreds, thousands, even tens of thousands of people together (Bleecker 1994). These collaborative networks are not defined by concrete walls or physical space, but make it possible to draw upon vital resources as needed, regardless of where they are physically located and regardless of who "owns" them (Bleecker 1994). This does not mean that these organizations have no physical space that they occupy, merely that the physical location need not be a fixed site (Dixon 1995). Durutta (1995) observed that solid, traditionally defined, and sharply delineated companies are evolving into virtual organizations with structures and systems that are loose and fuzzy so they can assume whatever form is needed to respond to a rapidly changing marketplace. In response to the changes turning their enterprises into virtual

corporations, many IS organizations are becoming virtual IS departments, as they are being asked to implement the same application for multiple operating companies that have different architectures (Moad 1994). Recent developments in IT capabilities, such as the World-Wide Web and artificial intelligence, allow for development of new implementations of the virtual organization (O'Leary, Kuokka, and Plant 1997). In fact, virtual organizations may prove to be the first large-scale industrial application of artificial intelligence — using agents, facilitators, and knowledge query and manipulation languages to provide a workable, reliable, and flexible base of systems to create platforms for virtual organizations (O'Leary, Kuokka, and Plant 1997).

Virtual organizations present new challenges to management in areas such as role definition, clarification of boundaries, accountability and measurement of results, and impact on teams while unleashing the power of information (Richman 1995). According to Byrne and Brandt (1993), the virtual corporation is a temporary network of independent companies (i.e., suppliers, customers, even competitors) linked by IT to share skills, costs, and access to one another's markets. They envision this new, evolving, corporate model as fluid and flexible — a group of collaborators that quickly unites to exploit a specific opportunity and more often than not, once the opportunity is met, disbands. They see IT's role as helping far-flung companies and entrepreneurs link up and work together from start to finish, a partnership based on electronic contracts and a level of trust necessitated by a sense of "co-destiny" where the fate of each partner is dependent on the other (Byrne and Brandt 1993). Firms realize they must deliver best-of-

breed capabilities in every aspect of their business and so they are forming virtual organizations — focusing resources on the tasks they do best while relying on networks of strategic alliances and partnerships to perform other necessary functions (Mazon 1997).

Berendt (1998) focuses on two drivers that move companies toward a more virtual working environment: reducing costs and the ability to work in the global environment. She points to Groupe PSA Peugeot Citroen's implementation of a virtual private voice network connecting 67 sites and subsidiaries in Europe that will produce savings of up to 40%. Another example of cost reduction is BT Conferencing's estimate for sending 10 managers to a meeting 90 miles away of around $1,020, compared to a conference call at around $120. As companies increasingly do business outside their own country, roaming facilities to access company information and communications services become essential. In addition, the use of remote work services can assist in setting up branch offices in untested markets without having to make a huge investment in dedicated facilities. Additional drivers toward a virtual form include a growing acceptance of the need to balance employee working and home lives and the impact that environment policies may have in coming years, particularly on the use of the company car.

Virtual Teams

Finholt and Sproull (1990) point out that groups, not individuals, have become the fundamental unit of work in modern organizations, with nonroutine and new work most

often being accomplished through teams, committees, or ad hoc work groups. Their research indicates that groups and group behavior are consequential for both organizational performance and individual group members; and computer-based technology may affect these groups and their behavior.

Two-thirds of American companies employ teams (Lipnack and Stamps 1997), and many organizations are forming virtual teams – groups of geographically distributed knowledge workers collaborating on a variety of workplace tasks (Warkentin, Sayeed, and Hightower 1997). Virtual teams are the new production units of knowledge and can free international organizations from the constraints of working time and staff availability, allowing them to operate 24 hours a day (Young 1998). Dow Chemical Co. reports that virtual teaming has cut international travel costs for its growing global organization by reducing the number of trips, and workers have shortened by 15% the time it takes to edit and pass on conventional electronic-mail documents to other team members (Hamblen 1998).

Like every team, a virtual team is a group of people who interact through interdependent tasks and guided by a common purpose (Lipnack and Stamps 1997). "Unlike conventional teams, a virtual team works across space, time, and organizational boundaries with links strengthened by webs of communication technologies" (Lipnack and Stamps 1997, p. 7). Virtual teams allow the harnessing of expertise within an organization across functional and geographic boundaries (Venkatraman and Henderson 1996). For example, British Petroleum connected 2,000 PC's worldwide, which allowed

them to fix a drilling problem in four hours with a virtual team (Henderson 1997). Virtual teams at Buckman Labs constantly form and dissolve, with global teams coming together to solve customer problems without anyone chartering it and including anyone in the company who chooses to participate on a particular topic (Lipnack and Stamps 1997).

Interorganizational Systems

Cooperation is believed to be a predominant behavior of organizations in complex societies (e.g., Gray 1985). The terms cooperation and coordination have been used interchangeably in the interorganizational research literature (Alter 1990). Coordination is the means by which organizations undertake difficult goals and manage uncertainty (Thompson 1967), thereby increasing their ability to deal with environmental turbulence and solve problems that no single organization acting alone could solve (Mulford and Rogers 1982). Coordination in interorganizational systems controls and integrates work activity across organizational boundaries (Alter 1990). This boundary-spanning aspect implies a level of cooperation and coordination well beyond that of the traditional relationship that exists between organizations acting as free-agents (Kumar and van Dissel 1996).

Technology Adoption

Along with the accompanying changes to organizational structure, IS must also make adjustments to the current business environment, which requires extremely fast

cycle times and instant adaptability to market changes (Davidow and Malone 1992). Davidow and Malone believe we have reached the age of virtual IS, which must bring crucial information instantly to the right decision maker and then transmit the resulting decision back through the network just as quickly.

Companies are forming international collaborative arrangements as the basis for developing competitive advantage from technology (Bailetti and Callahan 1993). Coordination of IT management presents a challenge to these firms with dispersed, decentralized IT practices (DeSanctis and Jackson 1994). DeSanctis and Jackson point out that while decentralization may bring flexibility and fast response to changing business needs, it also makes systems integration difficult, presents barriers to standardization, and acts as a deterrent for achieving economies of scale. As a result, they urge firms to balance decentralization of IT management with centralized planning for technology, data, and human resources.

DeSanctis and Jackson (1994) explore three major mechanisms for facilitating interunit coordination of IT management: structural design approaches, functional coordination modes, and computer-based communication systems. The authors present a three-dimensional model (Figure 1) consisting of: Coordination Structures (cross-functional teams, task forces, designated liaison roles, direct contact, reporting requirements), Coordination Modes (information sharing, procedural, structural, task outputs, task dialogue), and IT Support Mechanisms (document sharing, bulletin

boards/E-Mail, computer conferencing, electronic meeting software, discussion databases).

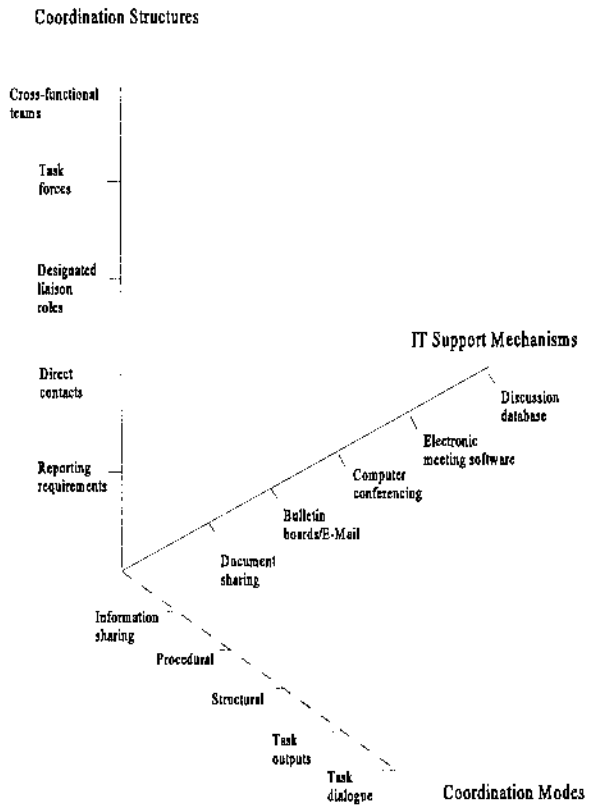

Figure 1. Three-Dimensional Model of Horizontal Coordination Management (DeSanctis and Jackson 1994)

DeSanctis and Jackson's (1994) one-site case analysis is based on corporate documents; observation of conferences, meetings, and other forums where IT planning matters were discussed; unstructured interviews with IT business representatives who

serve on interunit planning teams; and observation of electronic business databases devoted to IT planning. A next logical step in developing their work includes expanding its coverage to ongoing and ad-hoc intra-organizational groups represented by team members. In addition, further development is needed for each dimension of the proposed three-dimensional model.

Zmud and Apple (1992) have done extensive research on technology adoption. For a technological innovation to be valuable, it must be incorporated within the adopting organization's operational and managerial work systems. They have developed two different, distinct measurements of technology adoption. Routinization of technology is a permanent adjustment of an organization's governance system, while infusion of technology is the embedding of the full potential within an organization's operational or managerial work systems. Usually the success of technology implementation is measured as routinization, while measurement of the rate of infusion or bonding within the adopting organization is necessary to evaluate the success of technology use.

Thorelli (1986) posited that inter-organization peer networks or "innovation poles" (Rogers and Larsen 1984) promote awareness, problem solving, and peer pressure to adopt a technological innovation. For small businesses, the Internet can provide a way to create a virtual organization for projects (Blotzer 1995).

Computer-Supported Collaborative Work

The new economic frontier is the knowledge economy, and about 97% of all

employment growth is coming from knowledge work (Moyer and Fierheller 1994). Wealth today is generated primarily by the value people add through new ideas (Moyer and Fierheller 1994) and what members of these workgroups do is known as collaborative work (Stuck 1995). Stuck observes that workgroup members must often overcome barriers of time zones and geography to document what has been accomplished. Communications networks and IT are the tools that make possible this "working together apart," and telecommuting or homeworking is making workgroups more productive (Stuck 1995). However, there must be a solid foundation of IT, including high-speed communications links and a widespread network of connections, for telecommuting to be effective (Moyer and Fierheller 1994). With technological support, a working group can collaborate effectively as a single entity even though they are geographically separated (Bly, Harrison and Irwin 1993).

Groupware

Computer-based coordinating mechanisms that facilitate inter-personal computing are referred to as group support systems (GSS) or groupware (Vinze 1996). According to Vinze, groupware has been defined in numerous ways, including: intentional group processes plus the software to support them; a co-evolving human-tool system; and computer-mediated collaboration that increases the productivity or functionality of person-to-person processes. These definitions of groupware indicate systems supporting

collaborative work (e.g., Ashton 1998) and workgroup communication (e.g., Tsay 1997), and as such, groupware is the basis for the IT support mechanisms in this research.

Strom (1995) identified the primary benefit of groupware as the ability to reduce turnaround time for decisions and meetings so that corporations can become more responsive to their customers. He illustrated how improved delivery of client reports and other information can make a business more competitive; and he discussed groupware's appropriateness for those business processes that lend themselves to collaborative work, especially when the project team is located in different cities and must coordinate efforts. Dennis et al. (1997) suggested that group support systems may have useful application in strategic planning, assisting communication aspects of group meetings by providing process support to improve interaction among participants and process structure to direct the pattern or content of the discussion.

Institutional Theory

The concepts of the institution and institutionalization have diverse definitions, and approaches taken by researchers have shown substantial variation (Scott 1987). As a result, Scott identified several variations in the development of institutional theory. While those variations contain little agreement on specifics, they do exhibit underlying similarities (see Figure 2).

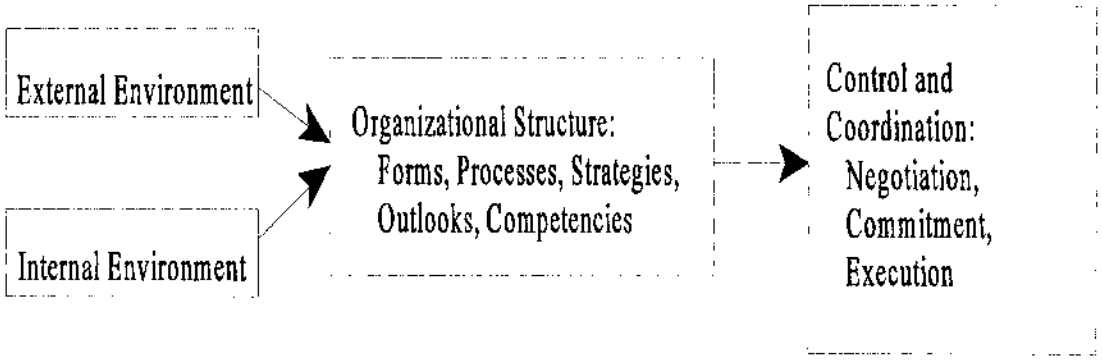

Figure 2: Institutional Model

Selznick (1996) examined both internal and external forces of institutional theory. When an organization is institutionalized, it tends to take on a special character and achieve a distinctive competence. Institutional theory traces the emergence of distinctive forms, processes, strategies, outlooks, and competencies as they emerge from patterns of interaction and adaptation of organizations. These patterns must be understood as responses to both internal and external environments.

Gupta, Dirsmith, and Fogarty (1994) proposed that an organization's need to demonstrate conformity to institutionalized expectations of rational practice influences its choice of control and coordination mechanisms. Expectations regarding appropriate organizational forms and behavior are expressed in the wider social environment and promote the development of an organization's structure. Organizations gain legitimacy by conforming to external expectations of acceptable practice, rather than by focusing on internal activities (Gupta, Dirsmith, and Fogarty 1994). The process by which business practices are legitimated is central to institutional theory and essential to understanding an organization's behavior (Lamertz and Baum 1998).

John R. Commons (1970) was instrumental in expanding the scope of institutional theory. Commons provided a pragmatic and volitional theory of institutions that addresses: (1) the process of institutional change, (2) the micro-macro link of how the purposes and actions of individuals are constrained by collective action, and (3) how institutional change emerges from resolutions to strategic problems in social relationships between willful and conflicting individuals. Commons developed a more dynamic, encompassing, process view of transactions by examining the actions of parties as they negotiate, make commitments, and administer their deals. The scope of transactions include both a stage or time sequence (negotiations, commitment, and execution) and a type or status of participants (bargaining between legal equals, managerial between legal superior and inferior, and rationing between legal superior and inferior).

The negotiations stage includes inducements, intentions, and purpose. In this stage, joint (not individual) valuations are made through persuasion, argumentation, and threat in evaluating alternatives. The commitment stage includes agreement, contracts, and obligations. In this stage, there is a meeting of wills of the involved parties by agreement on terms, conditions, and rules of the relationship. The execution stage includes administration, management, and sovereignty. In this stage, the rules of action are put into effect.

In bargaining transactions between parties who are equal before the law, reasonableness relates to how much coercion and disparity in social or economic power is tolerable. Managerial and rationing transactions occur between parties in a legally

superior and inferior relationship. In managerial transactions, the superior has the legal right to hire and fire, while the inferior has the right to serve or quit. Reasonableness focuses on the protection and enforcement of collectively defined rights for inferiors by imposition of duties on the superior, and vice versa. On the other hand, rationing transactions pertain to benefit and burden distributions among legal inferiors by command of a superior without specific individual consent and bargaining. Reasonableness is based on equitable distribution of rewards and enforcement of responsibilities, such as taxes, budgets, and levies imposed by a state or its delegate agency. This research focuses on the execution stage and transactions between equal parties.

According to Greenwood and Hinings (1996), the term neo-institutional is used to capture developments to institutional theory that have taken place over the past decade, a coming together of the old and the new institutional theory. The focus of neo-institutional theory is not upon the individual organization, but upon a category or network of organizations. Although institutional theory has been utilized to explain similarity, the theory can also be used to account for change by providing a definition of radical (as opposed to convergent) change and by signaling the contextual dynamics that precipitate the need for adaptation in an organization. Organizations are considered heterogeneous entities composed of functionally different groups pursuing goals and promoting interests. Radical change occurs when an organization moves from one "template-in-use" to another, or breaks the mold, while convergent change occurs within

the parameters of an existing template. This research focuses on virtual teams, considered a fundamental change within the organization (Bahrami 1992) .

Coordination Theory

According to Malone and Crowston (1994), coordination can be defined as simply as managing dependencies between activities. There is no widely accepted definition for the emerging interdisciplinary study of coordination; and Malone and Crowston use the term coordination theory with hesitation, since the degree of rigor and coherence necessary is not yet present. Coordination theory may help to answer the question: How will the widespread use of IT change the ways people work together? The authors point to the timeliness of this question for two reasons. First, due to the large numbers of people with direct access to computers, we have the opportunity for much larger numbers of people to use computing and communications capabilities to help coordinate their work. Second, improvements in cost and capability of IT are changing the constraints on how certain kinds of communication and coordination can occur. Table 1 shows four common types of dependencies and examples of coordination processes used for managing them.

Table 1. Examples of Common Dependencies between Activities and Alternative Coordination Processes for Managing Them (Malone and Crowston 1994)

Dependency	**Examples of coordination processes for managing dependency**
Shared Resources	"First come/first serve," priority order, budgets, managerial decisions, market-like bidding
Producer/Consumer Relationships	Notification, sequencing, tracking, inventory management (e.g., just-in-time), standardization, ask users, participatory design, concurrent engineering
Simultaneity Constraints	Scheduling, synchronization
Task/Subtask	Goal selection, task decomposition

Bailetti and Callahan (1993) discussed a method for developing a representation that leads to a system level understanding of coordination structure, based on recent advances in coordination theory. The method was applied to represent four international collaborative arrangements, and the resulting representations were then used as data to identify five basic modules of the coordination structure: strategic management, intra-firm management, joint management, technology exchange, and customer interaction. Their proposed method leads to increased organizational learning about the coordination processes, for which managers were responsible when establishing international collaborative technology arrangements. This research examines virtual teams, which exhibit characteristics similar to the international collaborative technology alliances: they may or may not involve equity positions between the groups, alliances could last a

relatively long time, and distance and time affect both the reason for establishing the collaboration and its operational form (Bailetti and Callahan 1993).

Lynn, Reddy, and Aram (1996) studied the coordination of activities, functions, roles, and contributions as being performed through organizations or relationships that are very complex in nature. Coordination, on the other hand, can simply imply an efficient flow of information. New technology can be viewed as forming a bounded structure encompassing: (1) a superstructure of coordinating organizations, (2) a substructure of organizations producing key components of the commercialized technology, and (3) linkages between the substructure and superstructure and among various actors. Their framework allows a view of interactive evolution involving organizational relationships and technology which have not yet been adequately studied.

IT Support Mechanisms

Turban, McLean, and Wetherbe (1996) explain that IT plays a fundamental role as a support mechanism for critical activities, enabling the business to make efficient and effective changes in the manner in which work is performed. They state that IT, in its narrowest sense, refers to the technological side of an IS and includes hardware, software networks, databases, and other devices. This research focuses on current use of IT support mechanisms, including all hardware, software, and other components necessary to allow them to function.

Keen (1991) identified video conferencing, electronic data interchange, business television, laptop computers, and CD-ROM (compact disk-read only memory) as representative of the IT tools available to address organizational and environmental complexity. DeSanctis and Jackson (1994) evaluated document sharing, bulletin boards/E-Mail, computer conferencing, electronic meeting software, and discussion databases as IT support mechanisms in their research. Barnatt (1995) identified electronic mail, groupware, and video-conferencing as cyberspace tools. Johansen (1988) identified seventeen types of technologies that could support group works, ranging from coordinated writing software to sophisticated group decision support system technologies. Regardless of the specific tools, the real benefits from using IT include managing documents electronically and facilitating fast, natural, and simple communication (Keen 1991).

Johansen's (1988) seventeen IT support mechanisms were adopted for this research. A complete listing, including definitions, was provided to every research study participant and is included in Appendix D.

Organizational Complexity Model

Keen (1991) explained how IT fits into organizations with his Organizational Complexity Model (Figure 3). By allowing location- and structure-independent organizations, IT no longer merely supports the business. IT becomes a force for organizational invention and enables entirely new, productive business forms. IT

mechanisms that can be used to reduce organizational complexity include video conferencing, which provides simple face-to-face communications; team technologies, such as organization-wide use of electronic mail and groupware; and other IT that eliminates delays, intermediaries, and redundancy in transactions and improves access to information, such as EDI. For example, telecommunications has allowed the use of electronic mail, facsimile, video conferencing, and access to shared information resources to link geographically separate organizational units.

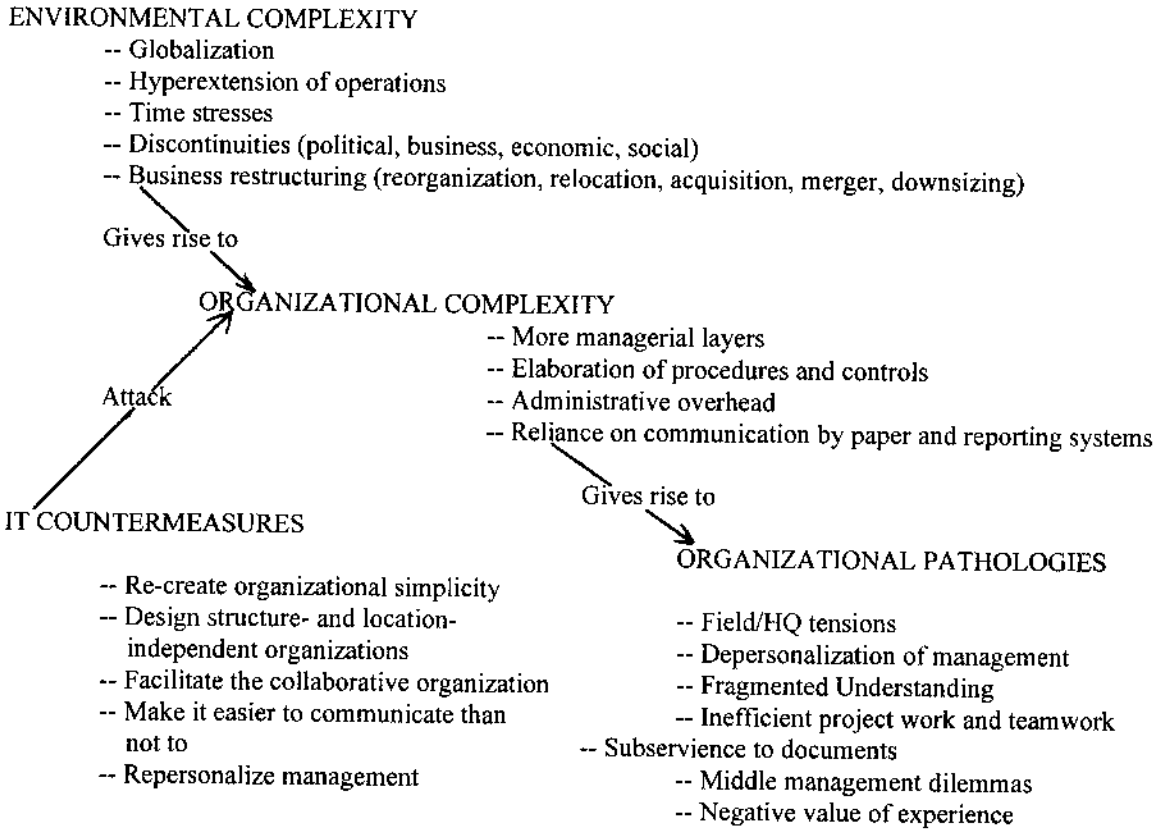

Figure 3: Organizational Complexity: Causes, Consequences, and Solutions through IT (Keen 1991)

Collaborative organizations now span previously separate boundaries, across functional areas, locations, companies, and even countries. Team-based structures and processes are the norm; and the quality of team performance relies on the quality of the interactions, communication, and coordination among team members. IT tools of electronic mail, video conferencing, groupware, and decision rooms can be instrumental in enabling joint commitment to the target output, while team members share authority and responsibility as needed at different stages and for different tasks.

Business TV and video conferencing can be valuable tools in the move to repersonalize management, allowing managers to communicate virtually face-to-face instead of trying to motivate by memo, communicate across time zones, and convey their own values and personality instead of just reciting abstract mission statements and reports. IT allows the opportunity to build the "relational" organization — an organization defined by ease of relationships, not fixed structures. IT can make communication simple, flexible, and natural, but an organization cannot just assume the necessary IT resources will be in place. In Keen's view, the corporate IT platform determines the enabling IT mechanisms; and these mechanisms become the effective organization structure.

Technology Acceptance Model

Davis (1989) presented and validated scales for the constructs of perceived usefulness and perceived ease of use — fundamental determinants of user acceptance of

IT (Adams, Nelson and Todd 1992). The initial instrument developed for the two scales was constructed, pretested for content validity, and tested for reliability and construct validity in two studies involving 152 users and four application programs (Davis 1989). The results of the two studies indicate high reliability scores (Cronbach's alphas of .98 for perceived usefulness and .94 for perceived ease of use) (Davis 1989) and high scores on measures of convergent and discriminant validity (Vandenbosch and Higgins 1995). Adams, Nelson, and Todd (1992) replicated Davis' work in two studies, and their results demonstrated reliable and valid scales for measurement of perceived usefulness and perceived ease of use. Their results suggested that the relationship of perceived usefulness and perceived ease of use to usage of IT may be more complex than previously postulated. However, according to Segars and Grover (1993), these findings in no way diminish the value of Davis' original scales or the value of identifying measures that explain technology acceptance. Instead, these results challenge the IS community to further explore the nature and influences of factors that may alter the user perception/usage equation. Subramanian (1994) also replicated Davis' work and found perceived usefulness a determinant of predicted future usage. Hendrickson, Massey, and Cronan (1993) indicated test-retest reliability of Davis's instrument. Their results were consistent with previous test-retest results for instruments measuring the success of IS (e.g., Galletta and Lederer 1989, Torkzadeh and Doll 1991).

In recent years, the Technology Acceptance Model (TAM) has been widely used by IS researchers to gain a better understanding of the adoption and use of IS (Straub,

Keil, and Brenner 1997). TAM is one of the most influential research models in studies of the determinants of IT acceptance (Chau 1996), and support has been found for the use of TAM in explaining factors concerning technology acceptance in firms of varying size (e.g., Chau 1996, Fenech 1998, Ghorab 1997, Igbaria et al. 1997, Straub et al. 1997). In addition to the perceived usefulness and perceived ease of use measures mentioned above, behavioral intention was also measured to validate TAM in three experiments conducted by Venkatesh and Davis (1996). These experiments spanned 108 subjects and six different systems. Venkatesh and Davis suggest that users strongly base perceived ease of use on their computer self-efficacy. Preliminary empirical evidence and experimentation results support the hypothesis that computer self-efficacy acts as a determinate of perceived ease of use, both before and after hands-on use of a computer system (Venkatesh and Davis 1996). The computer self-efficacy measure was developed by Compeau and Higgins (1995). The ten item survey found that self-efficacy plays an important role in shaping an individual's feelings and behaviors. Those individuals who reported high self-efficacy used computers more, experienced less computer anxiety, and derived more enjoyment from their use (Compeau and Higgins 1995). The 1,020 responses showed high reliability of the scale, with a Cronbach's alpha of .94 (Vandenbosch and Higgins 1995), even though convergent validity tests were absent (Compeau and Higgins 1995). This research uses the computer self-efficacy measure, perceived ease of use, intention to use, and perceived usefulness scales as presented by Venkatesh and Davis (1996) to measure user acceptance of IT.

IT Routinization and Infusion

Zmud and Apple (1992) expanded the existing measure of incorporation of technology to include two components: routinization and infusion. They defined routinization as a permanent adjustment of an organization's infrastructure to incorporate IT. Yin (1979) identified routinization of an innovation as when that innovation becomes part of the common services routinely provided. Yin suggested examining organizational passages (significant changes in organizational procedures or structure that reflect increased organizational support for an innovation) and cycles (repeated events that occur as part of an organization's operations and that may affect an innovation). The number of organizational passages and cycles are evaluated for five types of resources or operations: budgetary resources, personnel resources, training programs for service personnel, organizational governance, and supply and maintenance operations budget (Yin 1979). Yin considers an innovation more routinized the more passages or cycles it has achieved.

Infusion, on the other hand, is considered the extent of adjustment in work and social systems (Zmud and Apple 1992). These authors see infusion as following a succession of technological configurations leading to a new work reality. In other words, IT is seen as an evolution from simplest to most complex. This research evaluates information regarding both routinization and infusion of IT.

Organizational Assessment Instruments

Van de Ven and Ferry (1980) addressed the issue of measurement in assessing

organizations. The resulting organizational assessment instruments (OAI) measure the context, structure, and behavior of the overall organization, work groups, and jobs. The OAI underwent three revisions over a seven year period and were administered in two major organizational settings — one with 30 local offices, 334 organizational units, and 1700 employees; the other consisting of 14 organizations. Statistical properties of reliability and validity are reported for each level (organizational, work group, and job) and show "good" indications of reliability and validity (Van de Ven and Ferry 1980). Content validity involved 18 researchers from 13 universities over a 4 year time period. Hypothesis testing, coefficient alpha, median correlations, and correlations with parallel measures were conducted to evaluate intrinsic validity. Extrinsic validity was evaluated in three ways.

> First, OAI indices were interrelated to determine how well observed correlations corresponded with the theoretically expected pattern of relationships among the dimensions. Second, analyses of variance on the OAI indices were computed to determine how well the OAI indices detect and discriminate between different types of organizational units, jobs, and interunit relationships. Third, correlation and multiple regression analyses were used to determine the percentage of variation in performance that was explained by the OAI indices (Van de Ven and Ferry 1980, pp. 81-82).

Results from these psychometric methods are reported by the authors in the discussion of each section of the OAI instrument. This research adopts and adapts items from the OAI Unit Supervisor Questionnaire and Unit Member Questionnaire.

Summary

It has been demonstrated in this review of the literature supporting this research that: (1) work groups predominate business efforts; (2) virtual forms operate today, with encouraging results; and (3) researchers are interested in the effects of IT and IT as an enabler of change. Furthermore, Institutional Theory, Coordination Theory, and Organizational Complexity Model have been shown to focus on organizational structure, dependency structure, control and coordination efforts, and the adoption and success of IT. TAM elements of computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness have been proven individually and collectively to be significant influential factors leading to the successful use of IT. Routinization and infusion have been shown to measure the incorporation of technology within an organization.

The following chapter examines each of the constructs in the formation of a theoretical model to test the research questions and describes the specific methodology employed in the research.

CHAPTER 3

THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

This chapter develops the theoretical and research frameworks for the study, presents the variables and surrogates for testing the research questions, and states the main hypotheses. Next, the research methodology is described in detail. Closing this chapter is a presentation of the statistical hypotheses.

Theoretical Framework

The theoretical model for this study combines factors taken from institutional theory, coordination theory, and Keen's (1991) organizational complexity model (see Figure 4). In the model, external and internal environments from institutional theory and IT simplification tools from Keen's model are shown to affect organizational structure. Keen's model also indicates that organizational structure/complexity gives rise to organizational pathologies (e.g., tension between headquarters and field locations, fragmented understanding, and inefficient teamwork). The theoretical model reflects this influence.

The organizational structure is characterized in institutional theory by the emergence of distinctive forms, processes, strategies, outlooks, and competencies. Institutional theory states that the organization's structure influences the selection of

control and coordination mechanisms. Coordination theory proposes that the type of dependency also influences the appropriate control and coordination mechanisms. As a result, both organizational structure and dependency are shown affecting control and coordination in the theoretical framework.

IT adoption and usefulness are viewed as factors in determining the choice of control and coordination mechanisms, as well as resulting from the choice of these mechanisms. IT adoption and usefulness represent a consideration of technology feasibility and Keen's (1991) solution to organizational complexity through IT, and they demonstrate that IT is necessary to implement the choice of control and coordination mechanisms.

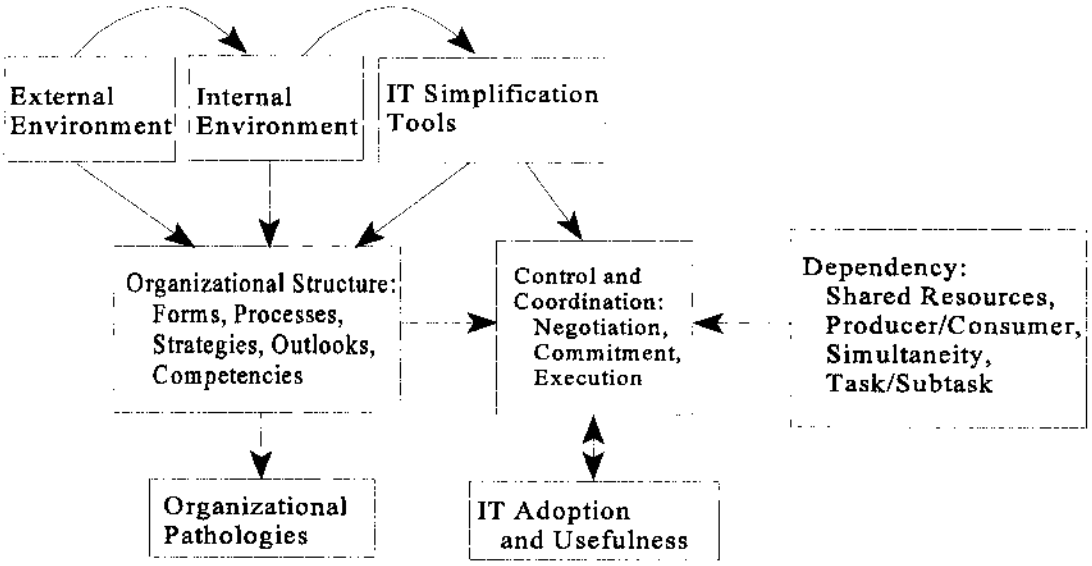

Figure 4: Theoretical Framework

Research Model

The research framework for this study concentrates on a portion of the theoretical framework (see Figure 5). The existence of virtual organization forms within and between organizations is an area of increased interest to both academics and practitioners (Palmer 1997). Palmer states that virtual forms present new and different organizational challenges; and that IT has been the "linchpin," facilitating the existence of the virtual form. This research focuses on what is considered a critical research issue: developing further understanding of the virtual form and the IT used to support this form (Palmer 1997).

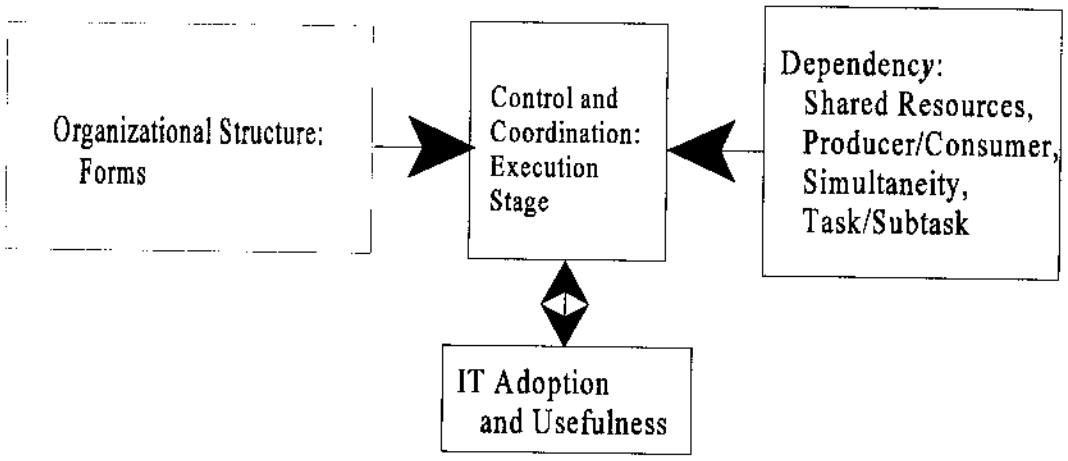

Figure 5: Research Framework

Coordination theory proposes dependencies between groups. Malone and Crowston (1994) identify four common types of dependency: shared resources, producer/consumer, simultaneity, and task/subtask. It is posited that the success of a

virtual group relies, in part, on parallel, simultaneous progress toward project completion by all members. This coordination effort represents a significant challenge. Since all four types of dependency may be critical to the successful completion of a project, this research identifies the extent to which each type of dependency exists in the virtual group.

Control and coordination mechanisms are utilized in three time sequences or stages: negotiation, commitment, and execution. Institutional theory defines the negotiation stage as including inducements, intentions, and purpose and focusing on joint valuations in evaluating alternatives. The commitment stage involves agreement on obligations, and during this stage participating parties arrive at a contract concerning rules of the relationship. While IT may be of assistance in communicating alternatives and finalizing agreements, this research is not concerned with the first two time sequences of control and coordination mechanisms. The execution stage, when the rules of action are put into effect, includes administration and management of the agreement. Throughout its history, IT has been especially appropriate in affecting these kinds of procedures, but little is known about what technologies are being used to support this stage of control and coordination (Palmer 1997). This study identifies the use of IT support mechanisms in the execution of business projects, as well as the effect of IT adoption and usefulness on that process. Differences in the choice of IT support mechanisms are examined, and perceptions of those mechanisms are elicited.

Variables and Surrogates

Appendix B contains a variable analysis table which provides a visual representation of the constructs, variable types, variables, and surrogates used in the research. This study treats organizational structure as an independent variable indicating whether the organization utilizes virtual or traditional, face-to-face teams. Based on the definition of virtual organizations, simply utilizing virtual teams does not make an organization virtual. Both virtual and traditional teams may conduct face-to-face meetings, and they may both utilize similar or identical IT support mechanisms. However to facilitate this research project, each organization elicited responses from either virtual team participants or traditional, face-to-face team participants. No company representation includes both virtual and non-virtual team member responses. Organizational information of interest includes use of teams, the industry in which the organization operates at both the location (location focus) and division (division focus) levels, and routinization of IT support mechanisms. Team information focuses on team status (temporary or permanent), team size, orientation and training received, and team member educational background.

This study also considers dependency structure an independent variable. Dependency serves as the surrogate for this variable. Since few, if any, organizations have access to unlimited resources, work groups within each organization can expect to vie for a portion of those limited available resources. While not an exhaustive list, four common types of dependencies between the work group and other units of the

organizations were evaluated. Team members were asked the extent to which the team must: compete for shared resources, operate under a producer/consumer relationship, perform under simultaneity constraints, and decompose projects into task/subtask activities.

Coordination structure is represented by the dependent variable of intra-team management. Surrogates for this variable are control and coordination and IT support mechanisms utilized by virtual team members to complete their group work. Team members were asked to identify the extent to which the team utilizes automated equipment, machines, or computerized devices; the basic operating rules, policies, and procedures used to coordinate and control the work of the team; and how well these rules, policies, and procedures identify the way in which the work is coordinated and controlled. In considering IT support mechanisms, each team member was asked about their frequency of use of, perceived importance in coordinating team activities by, and months of experience with various IT support mechanisms.

IT adoption and IT usefulness are dependent variables in this study. IT adoption is represented by two variables: IT implementation and IT use. Surrogates for these variables are routinization and infusion, respectively. Routinization information was collected from top IT/IS management. Infusion was determined by an expert panel, consisting of both private industry and academic representatives. These experts were asked to identify the evolution of IT support mechanisms from the simplest to the most

complex. The IT support mechanisms used by the team members were then compared to determine the rate of IT infusion.

IT usefulness is represented by user acceptance of IT. Surrogates for this variable are computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness. Each virtual team member was asked to complete questions regarding their computer self-efficacy and perceptions and intentions to use three types of IT support mechanisms. The three types include those providing support for same time/location meetings, between meeting support, and support for electronic meetings.

Main Hypotheses

The hypotheses for the research concentrate on three different areas of results– the three dependent variables of: coordination structure, adoption of IT, and usefulness of IT among teams (Figure 5). Each of these three areas are examined three ways: between virtual and non-virtual teams, among virtual teams grouped by industry, and by dependency structure.

Hypotheses 1 through 3 compare virtual and non-virtual team results. The first hypothesis examines the relationship between organizational structure and control and coordination, comparing differences in the coordination structure during the execution stage between organizational structure forms of virtual and non-virtual teams. The second hypothesis explores differences in IT adoption, examining data on routinization and infusion of IT between virtual and non-virtual teams. The third hypothesis examines

differences in IT usefulness by organizational form, evaluating computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness collected from team members.

H_1: **There is a significant difference in the coordination structure/execution by different organizational structures/forms.**

H_2: **There is a significant difference in IT adoption by different organizational structures/forms.**

H_3: **There is a significant difference in IT usefulness by different organizational structures/forms.**

Hypotheses 4 through 6 compare results among virtual teams by industry. The fourth hypothesis examines the relationship among virtual teams' control and coordination, comparing differences in the coordination structure during the execution stage by industry. The fifth hypothesis explores differences in IT adoption, examining data on routinization and infusion of IT by industry. The sixth hypothesis examines differences in IT usefulness among virtual teams, evaluating computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness collected from virtual team members.

H_4: **There is a significant difference in the coordination structure/ execution among virtual teams.**

H_5: **There is a significant difference in IT adoption among virtual teams.**

H_6: **There is a significant difference in IT usefulness among virtual teams.**

Hypotheses 7 through 9 compare results between dependency structures. The seventh hypothesis examines the relationship between dependency structure and control and coordination, comparing differences in the coordination structure during the execution stage between dependency structures. The eighth hypothesis explores differences in IT adoption, examining data on routinization and infusion of IT between dependency structures. The ninth hypothesis examines differences in IT usefulness by dependency structure, evaluating computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness collected from team members.

H_7: **There is a significant difference in the coordination structure/execution by different dependency structures.**

H_8: **There is a significant difference in IT adoption by different dependency structures.**

H_9: **There is a significant difference in IT usefulness by different dependency structures.**

Research Methodology

This investigation employs a survey research strategy. The data collected are mainly opinion and demographic in nature. A multiple-company, multiple-team survey was used to examine the role of IT support mechanisms in coordination management for teams. Survey research is conducted when there is no other way to get the information needed (Alreck and Settle 1995), when generalizing results from a sample to a population is critical (Gutek 1989), and when the item of interest occurs in the current time or recent past (Pinsonneault and Kraemer 1993). While multiple data collection methods are recommended (e.g., Pinsonneault and Kraemer 1993; Buckley, Buckley, and Chiang 1976; Kidder and Judd 1987), due to time and economic constraints, this study uses only the survey method.

This study is an explanatory investigation, based on the definition provided by Pinsonneault and Kraemer (1993). They state that the central research question in an explanatory survey is whether the hypothesized relationship exists and if it exists for the reasons posited. Since this study examined possible differences in the coordination structure, IT adoption, and IT usefulness among virtual and non-virtual teams, it is an explanatory survey.

For this study, all information was gathered utilizing a survey instrument. Demographic information concerning organizations using virtual teams and those employing traditional, face-to-face teams was measured, producing nominal and interval values. The dependency variable was measured with Likert-type questions. The intra-

team management variable was assessed using both nominal values and Likert-type scales for control and coordination and two cumulative scores for IT support mechanism frequency of use and importance in completing team activities. The IT implementation variable used Likert-type questions, yielding a cumulative score. The IT use variable utilized the expert panel assessment of IT evolution, a rank ordering of IT support mechanisms, compared with survey responses from the team members to calculate a cumulative score. The user acceptance of IT variable was measured by computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness scales, each yielding a cumulative score.

Populations and Subjects

For this study, the unit of analysis is the team member, and the sample frame is each member of a team responsible for completion of a business project. The parent population is all problem-solving team members operating in a business environment, and the target population is the business team member. Ideally, the sample for this study would have been randomly selected from all team-utilizing organizations operating worldwide. However, reality required that high-ranking executives or IS professionals in each designated organization be contacted and requested to select team members for this study. Therefore, a convenience sample was used and sampling bias may be present.

A field survey was conducted in eighteen companies — seven organizations utilizing traditional, face-to-face teams and eleven organizations utilizing virtual teams.

A few of the firms were members of the departmental advisory board and/or research center board of directors at the University of North Texas. Others were contacted through friends and relatives working in a variety of industries. Self-selection on the part of these organizations presents possible bias. Random selection of team members within each organization was not possible and may compound that bias. Five individuals, each currently working with at least one team, were surveyed in each of the companies, resulting in thirty-five traditional, face-to-face team members and fifty-five virtual team members. Electronic and telephone contact made it possible to address any questions or concerns from participants.

Administration

IS/IT executives were initially contacted by phone, by e-mail, or in person to participate in the research project. Those who agreed to participate were sent a packet containing one survey for them to complete; seven copies of surveys for team members to complete; eight copies of definitions of the seventeen IT support mechanisms; eight self-addressed, stamped envelopes for return of the completed questionnaires; and a self-addressed, stamped postcard to request a copy of the full study results. All participants were asked to return the completed questionnaires within two weeks. Telephone and e-mail contact information were provided for the purpose of answering questions. Follow-up contact with the IS/IT executives was scheduled weekly after the initial mailing to answer questions and to prompt return of the completed surveys.

Pilot Study

Following development of the survey instrument, a pilot study was conducted with one organization who utilizes virtual teams and one that utilizes traditional, face-to-face teams. One IS executive and five team members from each organization completed the appropriate portions of the survey instrument. The pilot study assisted in removing any confusion on questionnaire items and provided information concerning time requirements for participants. Analysis of the results followed the data analysis procedures outlined in the Participating Organization Feedback section of this chapter to ensure that the statistical procedures were provided for and in place.

Panel of Experts

Infusion of a technological innovation can be measured by identifying a succession of technological configurations, and successive configurations should incrementally build on the functionality of prior configurations (Zmud and Apple 1992). A panel of experts was asked to rank the technologies to determine infusion of the IT support mechanisms. Three individuals were contacted for the panel of experts. The first is an Associate Professor in the Business Computer Information Systems Department and the second is the Director of Computing Services, both in the College of Business Administration at the University of North Texas. The third member represents a technology company located in the Dallas/Fort Worth Metroplex. The results are presented in Table 2 (below).

Table 2. Panel of Experts' Infusion of Technology Rankings

IT Support Mechanism	Mean	Rank
Same Time/Location IT Support Mechanisms		
Presentation support software	1.33	1
Electronic support for "chauffeur" providing face-to-face meeting facilitation services	2.67	2
Group Decision Support Systems (GDSS)	2.67	3
Computer support for face-to-face meetings without "chauffeur"	3.33	4
Electronic Meeting IT Support Mechanisms		
Telephone conferencing	1.00	1
PC screen-sharing software	2.67	2
Text-filtering software	3.33	3
Computer-conferencing systems	4.00	4
Computer-support audio/video teleconferences	4.00	5
Nonhuman participants in team meetings (Artificial intelligence)	6.00	6
Between Meeting IT Support Mechanisms		
Calendar management for groups	2.33	1
Project management software	2.33	2
Conversational structuring	3.00	3
Group-authoring software	4.00	4
"Electronic hallway" or computer-supported spontaneous interaction	4.67	5
Group memory management	5.67	6
Comprehensive work team support which puts users "inside" computing environment	6.00	7

The experts ranked the IT support mechanisms within each category, determining the infusion of the technologies. The three experts did not agree on the rankings. To determine the infusion of technological innovation, a simple mean for the rankings was used. In cases where the arithmetic mean was the same, the item with the least variance in ranking is listed first. For example, while "Electronic support for 'chauffeur' . . . " and "GDSS" each had a mean of 2.67, the 'chauffeur' rankings (2, 3, 3) displayed less variance than the "GDSS" rankings (3, 1, 4) and is listed first.

Participating Organization Feedback

The major focus of this analysis is on differences — between organizations using virtual teams and those employing traditional, face-to-face teams; among virtual teams by industry; and between dependency structures. Participating organizations were provided an abbreviated sketch of their team members' responses. Their reports consisted of descriptive statistics and crosstabs analysis focusing on four areas. First was a listing of the number of responses for the most frequently used and most important IT support mechanisms. Particular attention was paid to similarities and differences in responses, highlighting those consistently ranked in the top five in each category as well as those not ranked by any respondents. Second was a discussion concerning perceived dependency between the team and the rest of the organization. Particular attention was paid to those dependencies with a high rating mean and with a large variance among respondents.

The third area examined computer self-efficacy, a measure of level of confidence in dealing with new and unknown computer applications. Scores were listed from lowest to highest and measures of central tendency (mean, median, and mode) were calculated and presented. The fourth area evaluated statistically significant relationships between characteristics of individuals and their perceptions about the technology. Crosstabs analysis was run on the responses using SPSS 7.5 for Windows, examining the Pearson Chi-Square significance. This comparison explored possible relationships between an individual's characteristics or attributes and their responses to the survey. Statistically significant relationships at the .05 and .10 levels were presented, if found. If no other relationships were significant, mention was made of relationships that were close to the .10 level of confidence (e.g., .116, .125).

Measurement

Appendix B contains a variable analysis table which provides a visual representation of surrogates, measurement instruments, number of measures, and scales used in the research. A questionnaire was developed and tested to elicit information from the participants (see Appendix C). The seventeen IT support mechanisms were presented both individually and grouped into Johansen's (1988) three categories: Same Time/Location, Between Meeting, and Electronic Meeting IT Support Mechanisms. Same Time/Location IT Support Mechanisms include: electronic support for "chauffeur" providing face-to-face meeting facilitation services, Group Decision Support Systems

(GDSS), presentation support software, and computer support for face-to-face meetings without "chauffeur." Between Meeting IT Support Mechanisms include: project management software, calendar management for groups, group-authoring software, conversational structuring, group memory management, "electronic hallway" or computer-supported spontaneous interaction, and comprehensive work team support which puts users "inside" their computing environment. Electronic Meeting IT Support Mechanisms include: telephone conferencing, PC screen-sharing software, computer-conferencing systems, text-filtering software, computer-supported audio/video teleconferences, and nonhuman participants in team meetings.

Organization demographic information was completed by high-ranking IS/IT executives, not lower than IS/IT director, with access to the necessary information. This portion consisted of check-lists, estimated amounts, and open-ended questions regarding the organization's industry, number of personnel, budget procedures, and IT routinization. Current and projected budget procedures for computer-based system expansion to support communication were of interest in two time periods: current and future (six and twelve months forward). The level of IT implementation (routinization) was measured following the procedures developed by Yin (1979) and used by Zmud and Apple (1992). Specific questions were asked concerning each IT support mechanism with regard to five issues: budget, personnel, training, organizational governance, and supply and maintenance. The number of passages and cycles for each IT support mechanism and each issue were elicited from this individual.

Team members were asked to complete the team demographic information, which contains both open- and closed-ended questions. This dealt with the history, current status, and size of the team itself. Additional information was requested regarding the use of computer devices and the rules, policies, and procedures for coordinating and controlling jobs and activities of the team. Each member was then asked to supply information regarding their job training, educational background, and current and previous team memberships and reactions. The dependency measure consisted of questions about the extent to which the team depends on others.

Each virtual team member was asked to rank the IT support mechanisms on two issues: frequency of use and importance in coordinating team activities. In addition, months of experience with each of the IT support mechanisms were requested from each virtual team member. Infusion of technological innovation was determined by comparing each team member's frequency of use ranking with results from the panel of experts determination. This measure of technology infusion was recorded within each of the categories of support mechanisms (possible 1 through 4 with Same Time/Location, 1 through 6 for Electronic Meeting, and 1 through 7 for Between Meeting) and with an overall sum of the three categories (possible 3 through 17).

User acceptance of IT was measured by duplicating the computer-self efficacy, perceived ease of use, intention to use, and perceived usefulness scales used by Venkatesh and Davis (1996). Computer self-efficacy consists of ten questions, each with a possible yes or no response. If a yes response is recorded, the participant is asked to

further elaborate by choosing a confidence level from a scale of one to ten. As a result of the scaling on the original instrument, each question has eleven possible values from zero to ten with a "no" response recorded as a zero. Perceived usefulness and perceived ease of use scales each consist of four items, and the intention to use scale consists of two items. Each participant was asked for a rating, on a scale of one to seven, about their belief concerning the degree to which using a particular technology enhances their job performance, is free from unnecessary effort on their part, and will be used by them. To encourage participants to complete the entire instrument, the seventeen technologies identified by Johansen (1988) were grouped by their type: same time/location, between meeting, and electronic meeting support mechanisms. As a result, the respondents were asked to complete one computer self-efficacy instrument and three separate pages containing perceived usefulness, intention to use, and perceived ease of use scales for each of the three types of IT support mechanisms.

Internal Consistency and Unidimensionality

Internal consistency for the four measures of user acceptance of IT (computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness) was assessed with Cronbach's (1951) coefficient alpha, "probably the best estimate of internal consistency" (Crano and Brewer 1973, p. 230). Computer self-efficacy resulted in 10 responses per participant. For each of the three categories of IT support mechanisms (same time/location, between meeting, and electronic meeting), perceived ease of use,

intention to use, and perceived usefulness were measured. Perceived ease of use and perceived usefulness each resulted in 12 responses per participant per measure. Intention to use resulted in 6 responses per participant. The results of Cronbach's coefficient alpha are shown in Table 3 below. Based on the greater than .80 rule-of-thumb (Crano and Brewer 1973, Nunnally 1978, and Blau 1988), these coefficients indicate that all four measures have high internal consistency. Full results may be found in Appendix E.

Table 3. Internal Consistency Coefficients

Measure	**Cronbach's Alpha**
Computer Self-Efficacy (n = 88)	.9034
Perceived Ease of Use (n = 90)	.9377
Intention to Use (n = 90)	.8233
Perceived Usefulness (n = 90)	.9322

Another method for assessing internal consistency is to determine whether items "share only one common focus" (Crano and Brewer 1973, p. 231). The unidimensionality of the scales was evaluated by means of factor analysis. Three of the four measures resulted in all items loading on a single factor. Intention to use loaded on two factors. The first eigenvalues, percent of variance explained by the first eigenvalue, ratio of the first eigenvalue to the second, and range of factor loadings are shown in Table 4 for each measure. Full results are shown in Appendix F. Eigenvalues (3.201 to 7.205) and percent of variance (53.349% to 60.040%) are relatively large for all four measures, indicating a consistently high percentage of variance explained by the first factor. The

factor loading should attain a minimum of 0.50 (Straub 1989) to be considered as part of a factor. Each of the measures surpasses that level on all items, with ranges of factor loadings from a low of .600 to a high of .857. Unidimensionality is supported for computer self-efficacy, perceived ease of use, and perceived usefulness by these results, as indicated by the large factor loadings.

Table 4. Evidence of Unidimensionality (Factor Analysis)

Measure	**Eigenvalue**	**Percent of Variance**	**Ratio of First:Second**	**Range of Factor Loadings**
Computer self-efficacy	5.518	55.183	3.8134:1	.600 - .804
Perceived ease of use	7.205	60.040	4.3066:1	.671 - .857
Intention to use	3.201	53.349	1.9759:1	.758 - .810
				.783 - .795
Perceived usefulness	6.894	57.452	3.0383:1	.729 - .793

To increase interpretability, each factor can be "rotated" so as to minimize the distance of each individual variable from one of the factors (Richard, LeMay, and Taylor 1995). Perceived ease of use, intention to use, and perceived usefulness were each measured three times, once for each of the three categories of IT support mechanisms. VARIMAX rotation was performed. These results are summarized in Table 5 and presented in full in Appendix F. Perceived ease of use and perceived usefulness loaded along IT support mechanism category lines, indicating consistent differentiation between the three categories by the respondents. Intention to use loaded onto the same 2

components as the previous discussion: (1) same time/location and between meeting mechanisms, and (2) electronic meeting mechanisms.

Table 5. Factor Analysis with VARIMAX rotation

Measure	Number of Iterations	Range of Factor Loadings		
		Same Time/ Location	Between Meeting	Electronic Meeting
Perceived ease of use	7	.546 - .841	.735 - .845	.826 - .862
Intention to use	3	.792 - .894		.965 - .972
Perceived usefulness	5	.906 - .945	.921 - .948	.933 - .948

Statistical Hypotheses

The hypotheses for the research concentrate on three dependent variables (coordination structure, adoption of IT, and usefulness of IT) from three perspectives (between virtual and non-virtual teams, among virtual teams by industry, and between dependency structure). The main hypotheses presented earlier in this chapter are restated below with variable names and decomposed into specific, testable sub-hypotheses identified by surrogates. Hypotheses 1 through 3 concentrate on differences between virtual and non-virtual team responses, hypotheses 4 through 6 examine differences among virtual teams by industry, and hypotheses 7 through 9 explore differences by dependency structure.

H_1: **There is a significant difference in intra-team management between virtual and non-virtual teams.**

H_{1a}: There is a significant difference in the use of automated equipment, machines, and computer devices in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{1b}: There is a significant difference in the precision with which operating rules, policies, and procedures control and coordinate work activities in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{1c}: There is a significant difference in the time spent on orientation and training of individuals in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{1d}: There is a significant difference in the ranking of frequency of use of same time/location IT support mechanisms in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{1e}: There is a significant difference in the ranking of frequency of use of between meeting IT support mechanisms in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{1f}: There is a significant difference in the ranking of frequency of use of electronic meeting IT support mechanisms in organizations

using virtual teams and those employing traditional, face-to-face teams.

H_{1g}: There is a significant difference in the ranking of importance placed on same time/location IT support mechanisms in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{1h}: There is a significant difference in the ranking of importance placed on between meeting IT support mechanisms in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{1i}: There is a significant difference in the ranking of importance placed on electronic meeting IT support mechanisms in organizations using virtual teams and those employing traditional, face-to-face teams.

H_2: **There is a significant difference in IT implementation and use between virtual and non-virtual teams.**

H_{2a}: There is a significant difference in routinization in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{2b}: There is a significant difference in infusion in organizations using virtual teams and those employing traditional, face-to-face teams.

H_3: **There is a significant difference in user acceptance of IT between virtual and non-virtual teams.**

H_{3a}: There is a significant difference in computer self-efficacy in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{3b}: There is a significant difference in perceived ease of use in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{3c}: There is a significant difference in intention to use in organizations using virtual teams and those employing traditional, face-to-face teams.

H_{3d}: There is a significant difference in perceived usefulness in organizations using virtual teams and those employing traditional, face-to-face teams.

H_4: **There is a significant difference in intra-team management among virtual teams by industry.**

H_{4a}: There is a significant difference in the use of automated equipment, machines, and computer devices among virtual teams grouped by industry.

H_{4b}: There is a significant difference in the precision with which operating rules, policies, and procedures control and coordinate work activities among virtual teams grouped by industry.

H_{4c}: There is a significant difference in the time spent on orientation and training of individuals among virtual teams grouped by industry.

H_{4d}: There is a significant difference in the ranking of frequency of use of same time/location IT support mechanisms among virtual teams grouped by industry.

H_{4e}: There is a significant difference in the ranking of frequency of use of between meeting IT support mechanisms among virtual teams grouped by industry.

H_{4f}: There is a significant difference in the ranking of frequency of use of electronic meeting IT support mechanisms among virtual teams grouped by industry.

H_{4g}: There is a significant difference in the ranking of importance placed on same time/location IT support mechanisms among virtual teams grouped by industry.

H_{4h}: There is a significant difference in the ranking of importance placed on between meeting IT support mechanisms among virtual teams grouped by industry.

H_{4i}: There is a significant difference in the ranking of importance placed on electronic meeting IT support mechanisms among virtual teams grouped by industry.

H_5: **There is a significant difference in IT implementation and use among virtual teams by industry.**

H_{5a}: There is a significant difference in routinization among virtual teams grouped by industry.

H_{5b}: There is a significant difference in infusion among virtual teams grouped by industry.

H_6: **There is a significant difference in user acceptance of IT among virtual teams by industry.**

H_{6a}: There is a significant difference in computer self-efficacy among virtual teams grouped by industry.

H_{6b}: There is a significant difference in perceived ease of use among virtual teams grouped by industry.

H_{6c}: There is a significant difference in intention to use among virtual teams grouped by industry.

H_{6d}: There is a significant difference in perceived usefulness among virtual teams grouped by industry.

H_7: **There is a significant difference in intra-team management by dependency.**

H_{7a}: There is a significant difference in the use of automated equipment, machines, and computer devices by dependency.

H_{7b}: There is a significant difference in the precision with which operating rules, policies, and procedures control and coordinate work activities by dependency.

H_{7c}: There is a significant difference in the time spent on orientation and training of individuals by dependency.

H_{7d}: There is a significant difference in the ranking of frequency of use of same time/location IT support mechanisms by dependency.

H_{7e}: There is a significant difference in the ranking of frequency of use of between meeting IT support mechanisms by dependency.

H_{7f}: There is a significant difference in the ranking of frequency of use of electronic meeting IT support mechanisms by dependency.

H_{7g}: There is a significant difference in the ranking of importance placed on same time/location IT support mechanisms by dependency.

H_{7h}: There is a significant difference in the ranking of importance placed on between meeting IT support mechanisms by dependency.

H_{7i}: There is a significant difference in the ranking of importance placed on electronic meeting IT support mechanisms by dependency.

H_8: **There is a significant difference in IT implementation and use by dependency.**

H_{8a}: There is a significant difference in routinization by dependency.

H_{8b}: There is a significant difference in infusion by dependency.

H_9: **There is a significant difference in user acceptance of IT by dependency.**

H_{9a}: There is a significant difference in computer self-efficacy by dependency.

H_{9b}: There is a significant difference in perceived ease of use by dependency.

H_{9c}: There is a significant difference in intention to use by dependency.

H_{9d}: There is a significant difference in perceived usefulness by dependency.

Summary

This chapter presented the theoretical and research frameworks used to address the research questions, defined variables and surrogates, presented the main hypotheses phrased as constructs, discussed the specific methodology employed in the research, and developed the testable hypotheses presented above. The following chapter presents an analysis of the results.

CHAPTER 4

DATA ANALYSIS

This chapter presents the descriptive statistics and results of hypothesis testing for this study. Situations where the number of responses or degrees of freedom vary indicate that one or more individuals did not complete a portion of the survey instrument.

Demographics

The surveys were mailed to 28 companies – 10 that utilize traditional, face-to-face teams and 18 that utilize virtual teams. Each packet contained one IS/IT survey and seven team member surveys. Each of the company contacts agreed via telephone, personal contact, or e-mail to participate in the study. Of these, three companies returned the entire survey packet after failing to elicit participation within the firm. Therefore, the total number of potential responses to the survey was 175. Three companies did not return any responses, and four companies returned between two and four team member responses. Eighteen firms – 7 using non-virtual and 11 using virtual teams – completed the minimum of five surveys from team participants. A total of 123 team participant surveys were returned, representing a response rate of 70.3%. The first 5 completed team

participant surveys from each company were used, resulting in a total of 90 surveys analyzed for this study.

Table 6. Number of Reporting Companies by Location and Division Focus

Industry	Virtual		Non-Virtual	
	Location	Division	Location	Division
Aerospace	2	1	0	0
Aircraft	0	1	0	0
Class 8 Trucks	0	1	0	0
Computing/Software	2	2	0	0
Consulting Services	1	0	1	1
Electric/Gas Utilities	0	0	1	0
Financial Services	1	0	1	1
Health Care	1	0	1	0
Heavy Manufacturing	1	0	0	0
Insurance	1	0	0	0
Medical Diagnostics	0	1	0	0
Retail	0	0	2	2
Technology	0	5	0	2
Telecommunications	0	0	1	1
Transportation	2	0	0	0

The eighteen companies reported the location and division focus as well as the number of personnel at their physical location and in their division. The number of personnel for the locations ranged from 18 to 10,000 with a mean of 2,089 (standard

deviation of 3,102.98), while the number of personnel for the divisions ranged from 10 to 15,000 with a mean of 2,534 (standard deviation of 4,912.31). Table 6 (above) summarizes the location and division focus information for organizations using virtual and non-virtual teams.

Forty-four respondents reported working on a temporary team, and forty-five reported working on a permanent team. The average time the team had been together ranged from 1 to 120 months, with a mean of 18 months (standard deviation of 22.13). For the temporary teams, planned termination of the project team ranged from immediately to 36 months into the future, with a mean of 7.3 months (standard deviation of 8.23). The number of team members working together on the current project ranged from 2 to 52, with a mean of 11.6 (standard deviation of 8.80). Past experience working on teams ranged from 0 to 150 teams, with a mean of 18.7 (standard deviation of 28.98); and current team assignments ranged from 1 to 16 teams, with a mean of 2.9 (standard deviation of 2.48).

The number of years of academic, vocational, or professional education beyond high school ranged from 1 to 9, with a mean of 5 (standard deviation of 1.71). The highest educational degree obtained ranged from high school diploma to doctoral degrees – 5 high school diplomas, 4 vocational/craft certifications, 54 bachelor's degrees, 22 master's degrees, and 4 doctoral degrees. The years in which these degrees were awarded ranged from 1962 to 1997. Major fields of study included: electrical, mechanical, and aeronautical engineering; electrical technology; math; computer science; IS; business and

systems administration; business management, organizational dynamics, human resources, and international management; marketing; accounting; finance; production/operations management; management science; organizational research; English; education; economics; logistics; history; media/communications; journalism; biology; and psychology.

The number of years that respondents worked full-time ranged from 1 to 38, with a mean of 17.2 years (standard deviation of 9.47). The number of years worked in the industry in which they currently work ranged from 1 to 35, with a mean of 12.7 years (standard deviation of 8.65). The number of years worked for their organization ranged from less than 1 to 30, with a mean of 8.5 years (standard deviation of 7.51). The number of years worked in their current position ranged from less than 1 to 16, with a mean of 2.9 years (standard deviation 3.28).

Computer self-efficacy is a measure of level of confidence in dealing with new and unknown computer applications. Ten conditions were presented, and participants rated their response on an eleven-point scale. Possible results range from total scores of 0, where the individual felt they could not complete the job under any of the conditions, to 100, where they felt totally confident they could complete the job under all conditions presented. Eighty-eight individuals completed this portion of the survey. Total computer self-efficacy scores ranged from a low of 28 to a high of 100. The measures of central tendency were: mean = 73.77; median = 75.00; and mode = 68 with six occurrences.

Standard error of the mean was 1.68, standard deviation was 15.73, and variance was 247.33.

Consolidated Results For All Participating Organizations

Table 7 summarizes the number of responses by IT support mechanism when participants were asked to rank order the seventeen mechanisms by frequency of use and by importance in coordinating team activities. The respondents were asked to rank the mechanisms from the most frequently used (rank 1) to the least frequently used (rank 17). IT support mechanisms not used were to be ranked zero of left blank. After collection of the data, these ranks were reversed so that the most frequently used received rank 17 down to the least frequently used rank of 1. Those mechanisms not used were left with a ranking of zero. This reverse ranking allowed easier interpretation of the results with higher totals for frequency of use and importance indicating more use of IT support mechanisms and a greater importance assigned to their usage. Three of the ninety respondents ranked all seventeen mechanisms on frequency of use and four ranked all on importance; however, the IS/IT executives did not indicate that all seventeen mechanisms were in place within those organizations. Sixteen individuals used duplicate rankings to indicate frequency of use and twenty-seven used duplicates for importance of the mechanisms. Duplicate rankings were summed and averaged. For example, if an individual ranked three mechanisms as number 17, the average of 17 + 16 + 15, or 16, was used for each. Only twenty-four of the ninety individuals ranked the mechanisms

exactly the same in frequency of use and importance. Nine individuals did not rank any mechanisms for frequency of use, and the same number, but not the same respondents, did not rank any mechanisms for importance. These responses were coded as zeros.

Table 7. Number of Responses for Frequency of Use and Importance
(Listed in order of mechanisms on survey instrument)

IT Support Mechanism	Frequency of Use	Importance
Electronic support for "chauffeur"	21	25
Group Decision Support Systems (GDSS)	18	19
Telephone conferencing	65	65
Presentation support software	67	67
Project management software	61	61
Calendar management for groups	54	56
Group-authoring software	20	23
Computer support without "chauffeur"	20	23
PC screen-sharing software	19	23
Computer-conferencing systems	26	29
Text-filtering software	24	24
Computer audio/video teleconferences	45	45
Conversational structuring	23	25
Group Memory Management	13	16
"Electronic hallway"	23	25
Comprehensive work team support	16	18
Nonhuman participants (Artificial intelligence)	3	6

A majority of the 81 respondents ranked five IT support mechanisms for both frequency of use and importance: telephone conferencing, presentation support software, project management software, calendar management for groups, and computer-supported audio/video teleconferences. Table 8 identifies the frequency with which each of these five mechanisms was ranked number 1 and number 2 among the IT support mechanisms. Telephone conferencing received the most number 1 and number 2 rankings, with a total of 46 for frequency of use and 40 for importance. Next follows presentation support software, project management software, calendar management for groups, and computer-supported audio/video teleconferences.

Table 8. Frequency of Number 1 and 2 Rankings for Top Five IT Support Mechanisms

Mechanism	Frequency of Use		Importance	
	Rank 1	Rank 2	Rank 1	Rank 2
Telephone Conferencing	29	17	29	11
Presentation Support Software	9	14	8	19
Project Management Software	10	14	15	9
Calendar Management for Groups	13	10	17	6
Computer-supported Audio/Video Teleconferences	5	2	6	3

Telephone conferencing is clearly the most frequently used and most important of the seventeen IT support mechanisms for team members. However, it is interesting to note that the total number of the top two rankings changes between the two measures. Telephone conferencing received a total of 46 of the top two rankings for frequency of

use, but that total dropped to 40 for the importance measure. Project management software and calendar management for groups remained much the same, with totals of 24 and 23, respectively. Presentation support software gained, with a total of 23 top two rankings for frequency of use and 27 for importance. Computer-supported audio/video teleconferencing rose from a total of 7 for frequency of use to 9 for importance.

Realizing that no group works in a vacuum or with unlimited resources, participants were asked to what extent the work their team performs depends upon others. Each person was asked to indicate how much of the normal work of their team fits the description of four dependencies using a five-point Likert scale, ranging from 1 (almost none of the work) to 5 (almost all of the work). These dependencies are not mutually exclusive or interchangeable, and responses could range from extremes of 4 (almost none of the work) to 20 (almost all of the work) for the total dependency measure. Table 9 summarizes results from all participants for each dependency type.

Table 9. Dependency Results

Dependency	Mean	Std Error	Median	Mode	Std Dev	Variance
Shared Resources	3.21	.12	3.00	4	1.14	1.29
Producer/ Consumer	3.38	.13	4.00	4	1.25	1.56
Simultaneity	3.36	.12	4.00	4	1.16	1.36
Task/Subtask	3.59	.12	4.00	4	1.14	1.30

All pilot study and participating firms requested and received full study results, which consisted of a shortened version of the Study Conclusions section of Chapter 6.

Hypothesis Testing

A summary of each hypothesis' results is included in tables below, and full results are included in Appendix G. Hypotheses 1 through 3 compared virtual and non-virtual teams using independent-sample t-tests, equal variances assumed. Hypothesis 1 tested for differences in intra-team management. Only two of the sub-hypotheses were found to be significant. Table 10 presents a summary of the results for Hypothesis 1.

Levene's test for equality of variances was significant (.007) for sub-hypothesis $H1_a$, indicating that variances were significantly different in virtual and non-virtual team results. This suggests the necessity of conducting an independent-sample t-test, with equal variances not assumed. However, even with non-pooled (not-equal) variances assumed, there is no significant difference in the use of automated equipment, machines, and computer devices between virtual and non-virtual teams (see Appendix G).

Table 10. Summary of Hypothesis 1 Results

Variable	Hypothesis	Result	Significance (two-tailed)
Use of automated equipment, machines, and computer devices	$H1_a$	t = -1.825 df = 87	p = .071 Not significant
Operating rules, policies, and procedures	$H1_b$	t = -1.273 df = 84	p = .206 Not significant
Orientation and Training Time	$H1_c$	t = 1.205 df = 86	p = .232 Not significant
Frequency of use of same time/ location IT support mechanisms	$H1_d$	t = -1.480 df = 88	p = .142 Not significant
Frequency of use of between meeting IT support mechanisms	$H1_e$	t = .136 df = 88	p = .892 Not significant
Frequency of use of electronic meeting IT support mechanisms	$H1_f$	t = -2.069 df = 88	p = .041 Significant
Importance of same time/ location IT support mechanisms	$H1_g$	t = -1.972 df = 88	p = .052 Not significant
Importance of between meeting IT support mechanisms	$H1_h$	t = -.635 df = 88	p = .527 Not significant
Importance of electronic meeting IT support mechanisms	$H1_i$	t = -2.884 df = 88	p = .005 Significant

Differences in IT adoption between virtual and non-virtual teams were tested for Hypothesis 2. Neither routinization nor infusion were found to be significantly different (Table 11).

Table 11. Summary of Hypothesis 2 Results

Variable	Hypothesis	Result	Significance (two-tailed)
Routinization	$H2_a$	t = 1.298 df = 88	p = .198 Not significant
Infusion	$H2_b$	t = -1.520 df = 88	p = .132 Not significant

Differences in user acceptance of IT between virtual and non-virtual teams were tested for Hypothesis 3. Perceived ease of use, intention to use, and perceived usefulness were found to be significantly different (Table 12).

Table 12. Summary of Hypothesis 3 Results

Variable	Hypothesis	Result	Significance (two-tailed)
Computer Self-Efficacy	$H3_a$	t = -1.247 df = 86	p = .216 Not significant
Perceived Ease of Use	$H3_b$	t = 3.078 df = 88	p = .003 Significant
Intention to Use	$H3_c$	t = 3.271 df = 88	p = .002 Significant
Perceived Usefulness	$H3_d$	t = 2.580 df = 88	p = .012 Significant

Levene's test for equality of variances was significant for sub-hypothesis $H3_c$ and $H3_d$. Non-pooled (not-equal) variances assumption supported a significant difference in

the intention to use and perceived usefulness of the IT support mechanisms (Appendix G).

Hypotheses 4 through 6 compared virtual team results by industry using multivariate analysis of variance (MANOVA), with fixed factors of location focus and division focus. The IS/IT executive survey provided information on the location and division focus. Hypothesis 4 tested for differences in intra-team management among virtual teams by industry. The analysis found two sub-hypotheses significantly different: $H4_f$ frequency of use of electronic meeting IT support mechanisms by location focus (Table 13), and $H4_b$ precision of following operating rules, policies, and procedures by division focus (Table 14).

Table 13. Summary of Hypothesis 4 Results by Location Focus

Variable	Hypothesis	Result	Significance (two-tailed)
Use of automated equipment, machines, and computer devices	$H4_a$	F = 1.453	p = .241 Not significant
Operating rules, policies, and procedures	$H4_b$	F = .619	p = .607 Not significant
Orientation and Training Time	$H4_c$	F = 2.633	p = .062 Not significant
Frequency of use of same time/ location IT support mechanisms	$H4_d$	F = .588	p = .626 Not significant
Frequency of use of between meeting IT support mechanisms	$H4_e$	F = .404	p = .751 Not significant
Frequency of use of electronic meeting IT support mechanisms	$H4_f$	F = 2.887	p = .046 Significant
Importance of same time/ location IT support mechanisms	$H4_g$	F = .379	p = .769 Not significant
Importance of between meeting IT support mechanisms	$H4_h$	F = .167	p = .918 Not significant
Importance of electronic meeting IT support mechanisms	$H4_i$	F = 1.554	p = .214 Not significant

Table 14. Summary of Hypothesis 4 Results by Division Focus

Variable	Hypothesis	Result	Significance (two-tailed)
Use of automated equipment, machines, and computer devices	$H4_a$	F = 3.292	p = .077 Not significant
Operating rules, policies, and procedures	$H4_b$	F = 6.273	p = .016 Significant
Orientation and Training Time	$H4_c$	F = 3.238	p = .079 Not significant
Frequency of use of same time/ location IT support mechanisms	$H4_d$	F = .717	p = .402 Not significant
Frequency of use of between meeting IT support mechanisms	$H4_e$	F = 1.557	p = .219 Not significant
Frequency of use of electronic meeting IT support mechanisms	$H4_f$	F = .015	p = .904 Not significant
Importance of same time/ location IT support mechanisms	$H4_g$	F = .960	p = .333 Not significant
Importance of between meeting IT support mechanisms	$H4_h$	F = 1.545	p = .221 Not significant
Importance of electronic meeting IT support mechanisms	$H4_i$	F = .003	p = .956 Not significant

Hypothesis 5 tested for differences in IT adoption among virtual teams by industry. The analysis found routinization to be significantly different by both location and division focus, but infusion was not significantly different by either (see Table 15).

Table 15. Summary of Hypothesis 5 Results by Location and Division Focus

Variable	Hypo-thesis	Location Result	Location Significance (two-tailed)	Division Result	Division Significance (two-tailed)
Routinization	$H5_a$	F = 3.763	p = .017 Significant	F = 6.291	p = .016 Significant
Infusion	$H5_b$	F = 1.452	p = .240 Not significant	F = .062	p = .805 Not significant

Hypothesis 6 tested for differences in user acceptance of IT among virtual teams by industry. The analysis found none of the four sub-hypotheses significant (Table 16).

Table 16. Summary of Hypothesis 6 Results by Location and Division Focus

Variable	Hypo-thesis	Location Result	Location Significance (two-tailed)	Division Result	Division Significance (two-tailed)
Computer Self-Efficacy	$H6_a$	F = .300	p = .825 Not significant	F = .183	p = .670 Not significant
Perceived Ease of Use	$H6_b$	F = .261	p = .853 Not significant	F = 3.193	p = .081 Not significant
Intention to Use	$H6_c$	F = 1.376	p = .262 Not significant	F = 2.593	p = .114 Not significant
Perceived Usefulness	$H6_d$	F = .547	p = .653 Not significant	F = 2.229	p = .142 Not significant

For Hypotheses 7 through 9, a total dependency score was calculated summing the ratings on the four dependencies identified. The mean for all respondents was calculated, then each individual's dependency score was compared to the mean. This result

classified each team as being either higher or lower in dependency level, compared to the rest of the sample. This higher or lower dependency level was then utilized in comparisons using independent-sample t-tests, equal variances assumed. Hypothesis 7 tested for differences in intra-team management by dependency structure. Three sub-hypotheses were found to be significant (Table 17): $H7_b$ precision of following operating rules, policies, and procedures; $H7_d$ frequency of use of same time/location IT support mechanisms; and $H7_g$ importance of same time/location IT support mechanisms.

Levene's test for equality of variances was significant for sub-hypothesis $H7_a$ and $H7_b$. Non-pooled (not-equal) variances assumption supported a significant difference in the use of automated equipment, machines, and computer devices and in the precision of following operating rules, policies, and procedures (Appendix G).

Table 17. Summary of Hypothesis 7 Results

Variable	Hypothesis	Result	Significance (two-tailed)
Use of automated equipment, machines, and computer devices	$H7_a$	t = -1.485 df = 87	p = .141 Not significant
Operating rules, policies, and procedures	$H7_b$	t = -2.008 df = 84	p = .048 Significant
Orientation and Training Time	$H7_c$	t = -.980 df = 86	p = .330 Not significant
Frequency of use of same time/ location IT support mechanisms	$H7_d$	t = -3.086 df = 88	p = .003 Significant
Frequency of use of between meeting IT support mechanisms	$H7_e$	t = -1.192 df = 88	p = .236 Not significant
Frequency of use of electronic meeting IT support mechanisms	$H7_f$	t = -1.169 df = 88	p = .245 Not significant
Importance of same time/ location IT support mechanisms	$H7_g$	t = -2.606 df = 88	p = .011 Significant
Importance of between meeting IT support mechanisms	$H7_h$	t = -.365 df = 88	p = .716 Not significant
Importance of electronic meeting IT support mechanisms	$H7_i$	t = -.775 df = 88	p = .440 Not significant

Differences in IT adoption by dependency structure were tested for Hypothesis 8. Only infusion was found to be significantly different by dependency structure (Table 18).

Table 18. Summary of Hypothesis 8 Results

Variable	Hypothesis	Result	Significance (two-tailed)
Routinization	$H8_a$	t = -.007 df = 88	p = .994 Not significant
Infusion	$H8_b$	t = -2.313 df = 88	p = .023 Significant

Differences in user acceptance of IT by dependency structure were tested for Hypothesis 9. None of the four sub-hypotheses were found to be significant (Table 19).

Table 19. Summary of Hypothesis 9 Results

Variable	Hypothesis	Result	Significance (two-tailed)
Computer Self-Efficacy	$H9_a$	t = -.891 df = 86	p = .375 Not significant
Perceived Ease of Use	$H9_b$	t = 1.600 df = 88	p = .131 Not significant
Intention to Use	$H9_c$	t = 1.847 df = 88	p = .068 Not significant
Perceived Usefulness	$H9_d$	t = 1.135 df = 88	p = .259 Not significant

Summary

This chapter presented descriptive statistics and the results of hypothesis testing. The following chapter is a discussion of these results.

CHAPTER 5

DISCUSSION

This research study is concerned about differences — differences between virtual and non-virtual teams, between virtual teams by industry, and between dependency structures. Each of these three areas for difference were compared along three variables: intra-team management, IT adoption, and user acceptance of IT. The discussion of results concentrates on these areas and is grouped together by differences in form. Hypotheses 1 through 3 compared virtual and non-virtual team responses. Hypotheses 4 through 6 compared virtual team responses by location and division focus. Hypotheses 7 through 9 compared responses between higher and lower dependency levels.

Differences Between Virtual and Non-Virtual Team Member Responses

Hypothesis 1

Hypothesis 1 predicts a significant difference in intra-team management between virtual and non-virtual teams. Only two of the nine surrogates were significantly different between virtual and non-virtual team member responses, thus Hypothesis 1 was rejected. Intra-team management efforts of teams are not significantly different, based on the collaborative environment in which teams operate.

Sub-Hypothesis $H1_a$

Automated equipment, machines, and computer devices are used "quite a bit" to control and coordinate work activities. The means for team use of these tools is not significantly different, based on the proximity of team members to each other.

Sub-Hypothesis $H1_b$

The basic operating rules, policies, and procedures used to control and coordinate all jobs and activities "most generally" specify how work activities are to be coordinated and controlled for teams. The means indicate that traditional and virtual teams are just as likely to adhere to accepted and established operating rules, policies, and procedures while accomplishing their group work.

Sub-Hypothesis $H1_c$

Job training and orientation time does not differ between those who are expected to work together face-to-face and those who work together at a distance. The amount of time is between "about a day" and "about a week." The means reported by traditional and virtual team members were not significantly different.

Sub-Hypotheses $H1_d$ Through $H1_i$

The rankings for frequency of use and importance of same time/location and between meeting IT support mechanisms by team members was not significantly

different, whether they worked in close physical proximity or separated by space and/or time zones. However, the rankings for both frequency of use and importance of electronic meeting mechanisms was significantly higher for virtual teams than for traditional, face-to-face teams (Table 20).

Table 20. Means of Rankings for Frequency of Use and Importance for Virtual and Non-virtual Teams

IT Support Mechanisms	Frequency of Use		Importance	
	Traditional	Virtual	Traditional	Virtual
Same Time/Location	16.2000	20.3909	15.8571	21.5455
Between Meeting	32.5429	31.8818	31.7571	35.0636
Electronic Meeting	22.8857	31.0000	21.0571	32.5545

The order of the means of the rankings is the same for non-virtual and virtual teams, and it remains the same for frequency of use and importance. The highest ranked mechanisms are between meeting IT support mechanisms, followed by electronic meeting and same time/location.

Of special interest are same time/location mechanisms, designed for use in traditional, face-to-face meeting situations, and electronic meeting mechanisms, designed to support geographically separated collaboration. The means of the rankings for same time/location mechanisms are about half what they are for between meeting mechanisms among the non-virtual teams. Even though these mechanisms were designed for use in this type of work situation, they are not used as frequently or considered as important for

the traditional teams as the other IT support mechanisms. Virtual team ranking means for electronic meeting mechanisms are almost tied with between meeting mechanisms for frequency of use and follow between meeting mechanisms for importance. The tools designed specifically for use by this type of distributed team membership are not yet considered more important or used more frequently than the other IT support mechanisms.

Hypothesis 2

Hypothesis 2 predicts a significant difference in IT adoption between virtual and non-virtual teams. Neither routinization nor infusion of technology within the organizations was significantly different between virtual and non-virtual team member responses, thus Hypothesis 2 was rejected.

The statistical analysis evaluated routinization and infusion at their component levels as well as in total. Routinization measures consist of cycles and passages, but neither component was significantly different between traditional and virtual teams. Infusion levels were measured for same time/location, between meeting, and electronic meeting mechanisms, but none of these three measures were found to be significantly different between virtual and non-virtual teams.

Innovative technology is just as likely to be adopted and become a part of an organization, regardless of the proximity of team members. While it might be expected that virtual teams are more likely to adopt new and sophisticated technology,

organizations who utilize traditional, face-to-face teams are just as likely to invest in the technology and make it a part of their standard operating environment.

Hypothesis 3

Hypothesis 3 predicts a significant difference in user acceptance of IT between virtual and non-virtual teams. Computer self-efficacy was not significantly different. However, perceived ease of use, intention to use, and perceived usefulness were significantly different between virtual and non-virtual team member responses, thus these results fail to reject Hypothesis 3.

Individuals in this study who work in virtual teams do not have significantly different computer self-efficacy scores when compared to those working in non-virtual teams. The level of confidence when dealing with new and unfamiliar computer applications is not different for those people who work together locally and at a distance.

Virtual team members reported higher perceived ease of use, intention to use, and perceived usefulness regarding IT support mechanisms. This could result from familiarity and past use of the technology. Previous successes working together at a distance with the aid of technology may translate to expected future benefits.

Differences Among Virtual Teams By Industry

Hypothesis 4

Hypothesis 4 predicts a significant difference in intra-team management among

virtual teams by industry. Of the nine surrogates tested, only one ($H4_f$) was significantly different among virtual team member responses by location focus, and one ($H4_b$) was significantly different by division focus. Thus Hypothesis 4 was rejected. While two of the possible eighteen sub-hypotheses were significantly different, these results indicate that intra-team management efforts are not different when comparing the industries in which virtual teams operate.

Sub-Hypothesis $H4_a$

As the use of automated equipment, machines, and computer devices has become more widespread, these tools are used to control and coordinate work activities, regardless of which industry the team operates within.

Sub-Hypothesis $H4_b$

The evaluation of virtual team results by location focus indicates that teams operating in any industry are just as likely to adhere to operating rules, policies, and procedures. However, results along division focus indicate a significant difference in their adherence to established procedures while accomplishing their group work.

Sub-Hypothesis $H4_c$

Training and orientation time does not differ between industries for those who are expected to work together at a distance.

Sub-Hypotheses $H4_d$ Through $H4_f$

The rankings for frequency of use of electronic meeting IT support mechanisms were significantly different among location industries. However, rankings for frequency of use of same time/location and between meeting mechanisms by location focus were not different. In addition, rankings for frequency of use for all three types of IT support mechanisms by division focus were not different. There is insufficient evidence to support differences in frequency of use rankings among industries.

Sub-Hypotheses $H4_g$ Through $H4_i$

The rankings of importance of all three types of IT support mechanisms were not significantly different by either location or division focus. There is insufficient evidence to support differences in importance rankings among industries.

Hypothesis 5

Hypothesis 5 predicts a significant difference in IT adoption among virtual teams by industry. Routinization of technology within the organizations was significantly different along both location and division focus. Infusion was not significantly different along either location or division focus. There is insufficient evidence to support this hypothesis, thus Hypothesis 5 was rejected.

The tests of between-subjects effects (Table 21) indicate significant differences for passages along both location and division focuses, but significance is demonstrated

for cycles only along division focus. These results indicate that the industry in which a firm is involved is a possible factor in deciding to invest in new, innovative technology and make it a part of their standard operating environment – IT implementation differs by industry.

Table 21. Tests of Between-Subjects Effects – Routinization

	Location Focus		Division Focus	
	F	Sig	F	Sig
Routinization	3.763	.017	6.291	.016
Number of Cycles	2.083	.115	4.253	.045
Number of Passages	184.159	.000	155.448	.000

Hypothesis 6

Hypothesis 6 predicts a significant difference in user acceptance of IT among virtual teams by industry. Computer self-efficacy, perceived ease of use, intention to use, and perceived usefulness were not significantly different among virtual team member responses by industry, thus Hypothesis 6 was rejected.

Individuals in this study who work in the industries represented by virtual teams did not report statistically different computer self-efficacy scores. Comfort with new and unfamiliar computer applications is not different between the industries. Virtual team members also did not report statistically different perceived ease of use, intention to use, and perceived usefulness of IT support mechanisms, regardless of the industry on which

their organization focuses. Individuals working in all reporting industries do not differ in perceptions concerning the usefulness and ease of use of IT support mechanisms, and the reported intention to use these tools is not different.

Differences Between Dependency Structures

Hypothesis 7

Hypothesis 7 predicts a significant difference in intra-team management by dependency structure. Of the nine surrogates tested, only three were significantly different by dependency structure, thus Hypothesis 7 was rejected. Intra-team management efforts of teams are not significantly different, based on a higher or lower dependency structure.

Sub-Hypothesis $H7_a$

Automated equipment, machines, and computer devices are used "quite a bit" to control and coordinate work activities, regardless of the extent to which the team is reliant on others in the organization to accomplish their work. The means for team use of these tools is not significantly different, based on a perceived dependency on others within the organization.

Sub-Hypothesis $H7_b$

Teams vary in adherence to operating rules, policies, and procedures. Those

teams operating more independently of others in the organization reported that basic operating rules, policies, and procedures "somewhat specifically" indicate how work activities are to be coordinated and controlled in their team. Those teams operating less dependently of others reported a level of adherence between "most generally" and "somewhat specifically." The results indicate that with more reliance on others in the organization comes a greater need to adhere to accepted and established operating rules, policies, and procedures while accomplishing group works.

Sub-Hypothesis $H7_c$

Job training and orientation time does not differ with dependence on others in the organization. The amount of time is between "about a day" and "about a week." The means reported by higher and lower dependency were not significantly different.

Sub-Hypothesis $H7_d$ Through $H7_i$

The rankings for frequency of use and importance of between meeting and electronic meeting IT support mechanisms by team members was not significantly different, whether a higher or lower dependency on others within the organization exists. However, the rankings for both frequency of use and importance of same time/location mechanisms was significantly higher for teams with a higher dependency on others than those with a lower dependency level (Table 22).

Table 22. Means of Rankings for Frequency of Use and Importance for Higher and Lower Dependency Structures

IT Support Mechanisms	Frequency of Use		Importance	
	Higher Dependency	Lower Dependency	Higher Dependency	Lower Dependency
Same Time/Location	22.5938	14.3810	22.7083	15.4762
Between Meeting	34.7604	29.1429	34.6458	32.7857
Electronic Meeting	29.9688	25.4167	29.5521	26.4048

The order of the means of the rankings is the same for higher and lower dependency teams, and it remains the same for frequency of use and importance. The highest ranked mechanisms are between meeting IT support mechanisms, followed by electronic meeting and same time/location. This ranking order is the same as Sub-Hypotheses $H1_d$ through $H1_i$, which compared virtual and non-virtual team responses.

The frequency of use and importance of same time/location IT support mechanisms were the only measures which differed by dependency structure. As might be expected, those teams with lower dependency on others ranked same time/location IT support mechanisms as being used less frequently and as being less important in accomplishing their group works. However, there was not a significant difference in frequency of use or importance of between meeting and electronic meeting IT support mechanisms. While three of the nine sub-hypotheses were significantly different, these results indicate that management efforts within the team are the same, regardless of the team's level of dependency on others within the organization.

Hypothesis 8

Hypothesis 8 predicts a significant difference in IT adoption by dependency structure. Only infusion of technology was significantly different by dependency structure, thus Hypothesis 8 was rejected.

Innovative technology is just as likely to be adopted and become a part of an organization, whether a higher or lower dependency on others within the organization exists. The purchase of new and sophisticated technology is more likely in organizations with a higher dependency level with others in the organization (mean of 9.40 versus 7.33). These mixed results indicate that those who work more interdependently tend to invest in new, innovative technology. However, companies are just as likely to make the technology a part of their standard operating environment, regardless of team dependency with others in the organization.

Hypothesis 9

Hypothesis 9 predicts a significant difference in user acceptance of IT by dependency structure. None of the four measures were significantly different by dependency structure, thus Hypothesis 9 was rejected.

Individuals in this study who work under higher and lower dependency on others within the organization do not have statistically different computer self-efficacy scores. The respondents' level of confidence and comfort when dealing with new and unfamiliar

computer applications is not different between those people who must rely on others and those who may act more independently to accomplish their group work.

Team members did not report differences in perceived ease of use, intention to use, or perceived usefulness of IT support mechanisms, regardless of the level of dependency on others within the organization for completion of their work. Individuals working interdependently and dependently do not exhibit a difference in their perceptions concerning the usefulness and ease of use of IT support mechanisms or in their reported intention to use these tools.

Summary

The team members responding to this survey reported no significant differences in intra-team management, regardless of virtual or non-virtual team structure, the industry in which their virtual team operated, or the level of dependency on others within the organization. IT adoption displayed mixed results. The adoption of IT was not significantly different between virtual and non-virtual team structures. However, routinization was different by industry and infusion was different by level of dependency. Use acceptance of IT results indicate differences between virtual and non-virtual team members, but no differences by industry or by dependency levels. Computer self-efficacy scores were not significantly different between the individuals who responded to the survey. However, virtual team members reported higher perceived ease of use, intention to use, and perceived usefulness of the IT support mechanisms.

CHAPTER 6

CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

This final chapter presents conclusions based on the research results, a discussion of limitations of the study, and opportunities for future research

Study Conclusions

As stated in Chapter 1, the purpose of this research was to examine virtual team members' use and perceptions of IT support mechanisms. This was accomplished by eliciting responses from virtual and non-virtual team members concerning intra-team management, IT adoption, and user acceptance of IT. The study focused on differences, specifically differences between virtual and non-virtual teams, differences among virtual teams by industry, and differences by dependency structure. This research identified the IT support mechanisms currently in use, inspected dependency upon others within the organization to accomplish the team's work, and examined individual characteristics and possible relationships with perceptions concerning technology.

The results of this explanatory field survey indicate that five of the seventeen IT support mechanisms are more frequently used and considered more important in accomplishing team work: telephone conferencing, presentation support software, project

management software, calendar management for groups, and computer-supported audio/video teleconferencing. All five of these mechanisms are commonplace, entry-level type mechanisms in the evolutionary scheme of supportive technology, with the exception of computer-supported audio/video teleconferencing. This more advanced electronic meeting mechanism, however, can be viewed as a small step from telephone conferencing and should not be intimidating to users. Virtual team members continue to use familiar, widely available technology to accomplish their group works. They are not driven to use newly developed technologies merely because of their membership in a virtual team, but remain loyal to the tools that have worked for them in the past. A more compelling reason than possessing new technology designed specifically to support virtual teams is necessary for team members to change their perceptions and use of IT support mechanisms.

Dependency upon others within the organization to accomplish the team's work was not significantly different between the four identified dependency structure components. Among the sample teams involved in this study, the level of dependency does not differ. This indicates that the way in which teams work with others is not different, regardless of their organizational structure, industry involvement, or level of interdependence with others in their organizations. Moving to a virtual environment has not changed the reliance upon others necessary to achieve the team's goals.

Hypothesized differences in intra-team management were not manifest. No statistically significant differences were found in the control and coordination efforts of

virtual and non-virtual teams, among virtual teams by industry, or by dependency structure. The ways in which teams control and coordinate their group efforts do not differ, regardless of their geographic location, industry focus, or level of dependency on others. Virtual team members view themselves as team members, and the inability to meet regularly on a face-to-face basis does not change their view of how the team should operate.

Results concerning hypothesized differences in IT adoption were not conclusive. Adopting and making innovative technology a part of an organization does not differ between firms utilizing virtual teams and those utilizing traditional, face-to-face teams. Whether a new technology becomes part of an organization's standard operating environment depends on the industry in which the firm operates; and use of newer, more innovative technology is likely in organizations with a higher dependency among work groups. The industry on which a firm is focused determines if IT implementation is necessary for success. It seems appropriate that an organization in the technology industry would adopt innovative IT as quickly as possible and view this integration as necessary for the firm's survival. Likewise, teams who must work more closely with others within and outside the organization should use the best available technology to facilitate their communication and coordination efforts.

User acceptance of IT did not differ by industry or by dependency level. However, virtual team members reported greater ease of use and usefulness of the IT support mechanisms than non-virtual team members, along with more intention to use.

The computer self-efficacy component of user acceptance was not different among individuals, regardless of their team's structure, industry focus, or dependency level. Individuals working in a problem-solving business environment have used and are familiar with computers and software, and any magic or mystery surrounding the computer seems to have vanished. However, those who have worked in the new environment of virtual teams are more inclined to use IT support mechanisms and believe these mechanisms are easier to use and more useful than those operating in a more traditional team environment. As team members move into the virtual work world, they view new tools as being beneficial in accomplishing their work; and familiarity and previous successes with technology translate into expected future benefits.

This research evaluated responses from multiple industries and multiple teams. The results indicate few differences between virtual and non-virtual team members. Virtual and non-virtual teams were not found to be different in how the teams are managed, in adoption of IT, and in comfort and confidence when dealing with new and unfamiliar tools. This absence of differences encourages organizations to utilize their in-house expertise based on project goals and constraints, rather than worrying about how teams are managed or how comfortable individual members are about the supporting technology. However, differences in perceived ease of use, intention to use, and perceived usefulness may be important considerations in forming virtual teams and in tailoring training for newly implemented technology.

Limitations of the Study

Organizations who agreed to participate were self-selected, responding to a request for participation in this study. Team members within each organization were not randomly selected by the researcher, but were asked to participate by IS/IT executives interested in the study. The information collected was self-reported by individual team members, and there was no opportunity to independently verify responses. It is possible that the responses of one team member did not accurately reflect the opinions of others in the group or the organization.

In addition, a larger sample size could possibly detect differences not indicated by the results of this study. The relatively small sample size of ninety respondents could result in random events, and different measures might detect or reverse differences discovered. An individual may have concurrent membership in more than one team, possibly with the same individuals and in a combination of traditional, face-to-face and virtual teams. It may be difficult for those individuals to restrict their replies to the specific team under consideration and not allow experiences with other teams or specific individuals to influence their responses.

Future Research

As pointed out by DeSanctis and Jackson (1994), much remains to be discovered about how organizations choose among all possible coordination mechanisms, specifics of situations where these coordination mechanisms are deemed effective, and steps to be

taken to maximize benefits and minimize costs of the coordination mechanisms. While this study has expanded upon one dimension of DeSanctis and Jackson's (1994) Model of Horizontal Coordination Management, two other dimensions (coordination structures and coordination modes) warrant further investigation.

A good working relationship with several of the participating firms could allow a longitudinal study. This could provide an interesting insight into the evolution and adoption of both new and existing technologies.

No measurement for success, effectiveness, or productivity was included in this research. Evaluating the success of team efforts supported by these IT support mechanisms could prove beneficial for organizations in allocating resources for IT adoption and expansion. Viewpoints of success would be helpful from multiple sources, such as team members, work coordinators or managers, and customers. In addition, a revised data collection instrument and statistical analysis could provide valuable insight into similarities among teams and organizations. While this research concentrated on analyzing differences, a different approach could provide input regarding comparable characteristics rather than merely confirming or denying differences.

Individual demographic information was collected that has not been addressed in this research study. Regression analysis could be performed to determine if any of the identified attributes are predictors of user acceptance of IT.

This study concentrated on virtual teams operating within an organization's confines. A few of the firms contacted mentioned their interorganizational work, but this

study was restricted to intraorganizational efforts. A repeat survey crossing organizational borders would provide further insight into the experiences and perspectives of virtual team members.

APPENDIX A

GLOSSARY

GLOSSARY

Hierarchical Organization - organizational form of a bureaucracy, "unencumbered by the personal whims of the leader or by traditional procedures that are no longer applicable. This is because bureaucracies represent the final stage of depersonalization. Such organizations have a series of officials whose roles are circumscribed by written definition of their authority. These offices are arranged in a hierarchy, each successive step embracing all those beneath it" (Pugh and Hickson 1997, p. 5, commenting on contribution of Max Weber to the theoretical development of organizations).

Hot Desk Environment - individual desks are abandoned and employees are allocated a desk for the day, when needed (Barnatt 1995). People who have experienced this situation often make a reservation ahead of time and are assigned a location upon arrival at the central workplace. If appropriate, personal belongings may be stored and set-up when necessary.

Hotelling - workers spend much of their working life with clients, and use these client facilities much as a hotel (Barnatt 1995).

Information Technology - "refers to the technological side of an information system. It includes hardware, databases, software networks, and other devices. As such, it can be viewed as a subsystem of an information system" (Turban, McLean and Wetherbe 1996, p. 9). "Computers plus telecommunications plus workstations plus information stores" (Keen 1991, p. 1)

Network(ed) Organization - "more akin to a federation or a constellation of business units that are typically interdependent, relying on one another for critical expertise and know-how and having a peer relationship with the centre" (Bahrami 1992).

Telecommuting or *homeworking* - employees using a remote terminal to access their office system (Barnatt 1995).

Virtual Corporation - "a temporary network of companies that come together quickly to exploit fast-changing opportunities . . . and they disband quickly after exploiting an opportunity (Coyle and Schnarr 1995, p. 41).

Virtual Organization - "an activity without a building as its home" (Handy 1995, p. 40). "project-focused, collaborative networks uninhibited by time and space ... without spatial territory and the cultural norms so important in traditional organizations ... offer the benefits of a high degree of focus on a common purpose, as well as the

assembly of the right skills to accomplish that purpose precisely. Thus they offer a level of productivity unattainable in traditional organizations" (Richman 1995, p. 19).

Virtual Product - "The ideal virtual product or service is one that is produced instantaneously and customized in response to customer demand. A virtual product (the term will be used to mean both physical products and services) mostly exists even before it is produced. Its concep, design, and manufacture are stored in the minds of cooperating teams, in computers, and in flexible production lines" (Davidow and Malone 1992, p. 4).

Virtual Teams - virtual teamworking with people collaborating closely but in a variety of locations (Barnatt 1995).

APPENDIX B

VARIABLE ANALYSIS TABLE

VARIABLE ANALYSIS TABLE

Construct	Variable Type	Variable	Surrogate	Measurement	Measures	Scale
Organizational Structure (Form)	Independent	Virtual Team	Organization: industry, personnel and team membership, IT budget procedures and policies Team: team history, leader and members; member background and team association	Survey	20	Nominal, Ordinal (varies)
		Non-Virtual Team				
Dependency Structure (Shared Resources, Producer/Consumer, Simultaneity, Task/Subtask)	Independent	Dependency	Dependency	Survey	4	Ordinal (1 to 5)
Coordination Structure (Execution)	Dependent	Intra-team Management	Control and Coordination	Survey	3	Nominal, Ordinal (1 to 5)
			IT Support Mechanisms	Survey	2	Interval
IT Adoption	Dependent	IT Implementation	Routinization	Survey	9	Interval
		IT Use	Infusion	Expert Panel, Survey	3	Interval
IT Usefulness	Dependent	User Acceptance of IT	Computer Self-Efficacy	Survey	10	Interval
			Perceived Ease of Use	Survey	4	Interval
			Intention to Use	Survey	2	Interval
			Perceived Usefulness	Survey	4	Interval

APPENDIX C

SURVEY INSTRUMENT

Organization Demographics:

For information purposes only, to be held in strictest confidence:

Name of organization: _____

Location: _____ Division: _____

On which industry is this location primarily focused? _____

this division? _____

How many personnel at: this location?_____ this division? _____

What percentage of personnel are involved in traditional teams?	_____%	_____%
What percentage of these teams are permanent?	_____%	_____%
What percentage of these teams are temporary?	_____%	_____%
What percentage of personnel are involved in virtual teams?	_____%	_____%
What percentage of these teams are permanent?	_____%	_____%
What percentage of these teams are temporary?	_____%	_____%

The primary funding source for IT is part of: (check one)

_____ the Information Systems group's budget
_____ the budget for a group of departments
_____ an individual department's budget
_____ each work team's budget
_____ other; explain _____

Where in the organization is the final responsibility for IT? (check one)

_____ the Information Systems group
_____ a group of departments
_____ user department
_____ a high-level steering committee
_____ other; explain _____

Decisions on which hardware to acquire for team projects are primarily made by: (check one)

_____ the Information Systems group
_____ a group of departments
_____ user department
_____ a high-level steering committee
_____ individual user
_____ other; explain _____

Who purchases team project hardware? (check all that apply and complete expenditure limit)

_____ the Information Systems group Expenditure limit: _____

_____ user department Expenditure limit: _____

_____ individual user Expenditure limit: _____

_____ a group of departments Expenditure limit: _____

_____ a high-level steering committee Expenditure limit: _____

_____ other; explain _____ Expenditure limit: _____

Decisions on which software to acquire for team projects are primarily made by: (check one)

_____ the Information Systems group
_____ a group of departments
_____ user department
_____ a high-level steering committee
_____ individual user
_____ other; explain _____

Who purchases team project software? (check all that apply and complete expenditure limit)

_____ the Information Systems group Expenditure limit: _____

_____ user department Expenditure limit: _____

_____ individual user Expenditure limit: _____

_____ a group of departments Expenditure limit: _____

_____ a high-level steering committee Expenditure limit: _____

_____ other; explain _____ Expenditure limit: _____

The party primarily responsible for providing approval to use "non-standard" packaged software would be:

_____ the Information Systems group
_____ a group of departments
_____ user department
_____ a high-level steering committee
_____ individual user
_____ other; explain _____

Is there any anticipated change in funding, acquisition, and purchasing responsibilities, as outlined above,

for future IT: in next 6 months? _____ in next 1 year ? _____ If so, please explain: _____

_____

_____

IT Routinization:

Please indicate how many *passages* (formal transition from one organizational state to another) and *cycles* (organizational event that occurs repeatedly) each IT support mechanism has experienced or survived in five different types of resources or operations. Usually a passage occurs once, while cycles occur on a regular basis, such as an annual budget cycle. The types of resources/operations include: budgetary resources, personnel resources, training programs for service personnel, organizational governance, and supply and maintenance operations budget. When identifying the number of passages and cycles, please consider the following questions:

1 Budget - When considering budgetary resources, how many budget cycles has the IT survived?
2 Personnel - When considering personnel resources, has the necessary skill experienced a passage to become part of the job description or prerequisite skill? How many cycles has the necessary skill survived of introducing new personnel and/or promoting key personnel?
3 Training - When considering training programs for service personnel, have the necessary skills experienced a passage to become part of professional standards or professional school curriculum? During how many training cycles have the necessary skills been taught?
4 Org. Gov. - When considering organizational governance, has the IT experienced a passage to become part of the appropriate organizational status? How many cycles has the necessary skill survived to attain widespread use?
5 Supply & Maint. - When considering supply and maintenance operations budget, has the IT experienced a passage to having supply and maintenance provided by the organization or on a long-term contract basis? How many cycles has the IT survived equipment turnover?

The following example shows the format that will be used to collect your responses regarding each of the IT support mechanisms:

	Budget	Personnel		Training		Org. Governance		Supply & Maint	
IT SUPPORT MECHANISM	Budget cycles (# cycles)	Prereq. skill (passages)	Turnover/promote (# cycles)	Prof. stds.. (passages)	Skills taught (# cycles)	Org. status (passages)	Widespread use (# cycles)	Provided (passages)	Equip turnover (# cycles)
Word Processing Software (Example)	10	1	5	1	15	1	2	1	3

The example above indicates that **Word Processing Software** has: survived 10 budget cycles, become part of the prerequisite skills, survived 5 turnover/promotion cycles, become part of the professional standards, been taught over 15 training cycles, become a part of the appropriate organizational status, survived 2 cycles to attain widespread use, supply and maintenance provided, and survived 3 equipment turnover cycles.

	Budget	Personnel		Training		Org. Governance		Supply & Maint	
IT SUPPORT MECHANISM	Budget cycles (# cycles)	Prereq. skill (passages)	Turnover/promote (# cycles)	Prof. stds. (passages)	Skills taught (# cycles)	Org. status (passages)	Widespread use (# cycles)	Provided (passages)	Equip turnover (# cycles)
Electronic support for "chauffeur" providing face-to-face meeting facilitation services									
Group Decision Support Systems (GDSS)									
Telephone conferencing									
Presentation support software									

	Budget	Personnel		Training		Org. Governance		Supply & Maint	
IT SUPPORT MECHANISM	Budget cycles (# cycles)	Prereq. skill (passages)	Turnover/promote (# cycles)	Prof. stds.. (passages)	Skills taught (# cycles)	Org. status (passages)	Widespread use (# cycles)	Provided (passages)	Equip turnover (# cycles)
Word Processing Software (Example)	10	1	5	1	15	I	2	1	3
Project management software									
Calendar management for groups									
Group-authoring software									
Computer support for face-to-face meetings without "chauffeur"									
PC screen-sharing software									
Computer-conferencing systems									
Text-filtering software									
Computer-supported audio/video teleconferences									
Conversational structuring									
Group Memory Management									
"Electronic hallway" or computer-supported spontaneous interaction used to encourage and/or support encounters like "meetings" that happen around coffee pots, in hallways									
Comprehensive work team support which puts users "inside" their computing environment									
Nonhuman participants in team meetings (Artificial intelligence)									

Team Demographics (For information purposes only, to be held in strictest confidence):

On which project is this team focused? _____

Is the team a temporary team ____ or a permanent team ____ ?

Length of time the team has been in existence? _____ months

If the team is temporary, how soon is the planned or anticipated termination date? _____ months

Including the team leader, how many team members are there? _____

To do its work, how much does your team use automated equipment, machines, or computer devices?

NOT AT ALL	VERY LITTLE	SOMEWHAT	QUITE A BIT	VERY MUCH
1	2	3	4	5

Please describe the basic operating rules, policies, and procedures used to control and coordinate all jobs and activities of your team as a whole: _____

How precisely do these rules, policies, and procedures specify how work activities are to be coordinated and controlled in your team?

VERY GENERALLY	MOST GENERALLY	SOMEWHAT SPECIFICALLY	QUITE SPECIFICALLY	VERY SPECIFICALLY
1	2	3	4	5

When you began this job, how long a period of orientation and training did you receive that was directly related to your tasks in this job?

A FEW HOURS OR LESS	ABOUT A DAY	ABOUT A WEEK	ABOUT A MONTH	MORE THAN A MONTH
1	2	3	4	5

How many years of academic, vocational, or professional education have you obtained beyond high school?

YEARS AFTER HIGH SCHOOL									
0	1	2	3	4	5	6	7	8	9

What is the highest educational degree you obtained in school?

GRADE SCHOOL DIPLOMA	HIGH SCHOOL DIPLOMA	VOCATIONAL OR CRAFT CERTIFICATION	COLLEGE		
			BACHELOR'S DEGREE	MASTER'S DEGREE	DOCTORAL DEGREE
1	2	3	4	5	6

Indicate the specific major or field of specialization in which you obtained this degree.

_____

In what year was this degree conferred? _____

How many years have you worked full-time? _____ In this industry? _____

In this organization? _____ In current position? _____

Number of past team associations? _____ Impressions: _____

_____

_____

Number of current team associations? _____ Impressions: _____

_____

_____

Dependency Structure: Please indicate how much of the normal work of your team depends on others as described by each of the following cases.

My team is required to compete for resources with different activities requiring the same limited resources. Resource allocation is required to manage interdependencies among these activities.

ALMOST NONE OF THE WORK		ABOUT 50% OF ALL THE WORK		ALMOST ALL OF THE WORK
1	LITTLE 2	3	A LOT 4	5

My team works under a producer/consumer relationship where one activity produces something that is used by another activity. Dependencies can be of several kinds: prerequisite constraints, transfer of product, and usability.

ALMOST NONE OF THE WORK		ABOUT 50% OF ALL THE WORK		ALMOST ALL OF THE WORK
1	LITTLE 2	3	A LOT 4	5

My team performs under simultaneity constraints, where scheduling and synchronization are critical. Activities need to occur at the same time (or cannot occur at the same time).

ALMOST NONE OF THE WORK		ABOUT 50% OF ALL THE WORK		ALMOST ALL OF THE WORK
1	LITTLE 2	3	A LOT 4	5

My team works by decomposing goals into subtask activities and dividing coordination responsibilities with these subtasks.

ALMOST NONE OF THE WORK		ABOUT 50% OF ALL THE WORK		ALMOST ALL OF THE WORK
1	LITTLE 2	3	A LOT 4	5

-IT SUPPORT MECHANISMS:

The following is a list of IT support mechanisms that may be used by your team. In the first column, indicate your frequency of use by ranking the mechanisms, placing the numbers 1 through 17 in the space provided (1 is the most used and 17 the least used). If you do not use one of the mechanisms, place a 0 in the blank. In the second column, please indicate how important you feel these IT support mechanisms are in coordinating your team activities, ranking them 1 (most important) through 17 (least important). Again, if you do not use one of the mechanisms, place a 0 in the blank. In the third column, please estimate the number of months experience, if any, you have with the mechanism.

IT Support Mechanism	***Frequency*** (rank 1-17)	***Importance*** (rank 1-17)	***Months*** (e.g.,18)
Electronic support for "chauffeur" providing face-to-face meeting facilitation services	_____	_____	_____
Group Decision Support Systems (GDSS)	_____	_____	_____
Telephone conferencing	_____	_____	_____
Presentation support software	_____	_____	_____
Project management software	_____	_____	_____
Calendar management for groups	_____	_____	_____
Group-authoring software	_____	_____	_____
Computer support for face-to-face meetings without "chauffeur"	_____	_____	_____
PC screen-sharing software	_____	_____	_____
Computer-conferencing systems	_____	_____	_____
Text-filtering software	_____	_____	_____
Computer-supported audio/video teleconferences	_____	_____	_____
Conversational structuring	_____	_____	_____
Group Memory Management	_____	_____	_____
"Electronic hallway" or computer-supported spontaneous interaction used to encourage and/or support encounters like "meetings" that happen around coffee pots, in hallways	_____	_____	_____
Comprehensive work team support which puts users "inside" their computing environment	_____	_____	_____
Nonhuman participants in team meetings (AI)	_____	_____	_____

Computer Self-Efficacy Measure:

Often we are told about software packages that are available to make work easier. For the following questions, imagine that you were given a new software package for some aspect of your work. It doesn't matter specifically what this software package does, only that it is intended to make your job easier and that you have never used it before.

The following questions ask you to indicate whether you could use this unfamiliar software package under a variety of conditions. For each of the conditions, please indicate whether you think you would be able to complete the job using the software package. Then, for each condition that you answer "Yes," please rate your confidence about your first judgement, by circling a number 1 to 10, where 1 indicates "Not at all confident," 5 indicates "Moderately confident," and 10 indicates "Totally confident."

For example, consider the following sample item:

I Could Complete the Job Using the Software Package...
...if there was no one around to tell me what to do as I go.

The sample response shows that the individual felt she or he could complete the job using the software without assistance from another ("Yes" is circled), and was moderately confident that she or he could do so ("5" is circled).

(Yes) .. 1 2 3 4 (5) 6 7 8 9 10
Not at all Confident — Moderately Confident — Totally Confident
No

I could complete the job using a software package...

...if there was no one around to tell me what to do as I go.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if I had never used a package like it before.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if I had only the software manuals for reference.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if I had seen someone else using it before trying it myself.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if I could call someone for help if I got stuck.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if someone else had helped me get started.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if I had a lot of time to complete the job for which the software was provided.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if I had just the built-in help facility for assistance.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if someone showed me how to do it first.	Yes... No	1 2 3 4 5 6 7 8 9 10
...if I had used similar packages before this one to do the same job.	Yes... No	1 2 3 4 5 6 7 8 9 10

Same Time/Location IT Support Mechanisms

This group of IT support mechanisms includes: electronic support for "chauffeur" providing face-to-face meeting facilitation services, Group Decision Support Systems (GDSS), presentation support software, and computer support for face-to-face meetings without "chauffeur." Please place an "X" or checkmark to indicate where along the scale you respond to the following statements.

Perceived Ease of Use of Same Time/Location IT Support Mechanisms:

My interaction with same time/location IT support mechanisms is clear and understandable.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Interacting with same time/location IT support mechanisms does not require a lot of my mental effort.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find same time/location IT support mechanisms easy to use.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find it easy to get same time/location IT support mechanisms to do what I want them to do.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Intention to Use Same Time/Location IT Support Mechanisms:

Assuming I had access to same time/location IT support mechanisms, I intend to use them.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Given that I had access to same time/location IT support mechanisms, I predict that I would use them.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Perceived Usefulness of Same Time/Location IT Support Mechanisms:

Using same time/location IT support mechanisms would improve my performance in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Using same time/location IT support mechanisms my job would increase my productivity.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Using same time/location IT support mechanisms would enhance my effectiveness in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find same time/location IT support mechanisms would be useful in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Between Meeting IT Support Mechanisms

This group of IT support mechanisms includes: project management software; calendar management for groups; group-authoring software; conversational structuring; group memory management; "electronic hallway" or computer-supported spontaneous interaction used to encourage and/or support encounters like "meetings" that happen around coffee pots, in hallways; and comprehensive work team support which puts users "inside" their computing environment.

Perceived Ease of Use of Between Meeting IT Support Mechanisms:

My interaction with between meeting IT support mechanisms is clear and understandable.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Interacting with between meeting IT support mechanisms does not require a lot of my mental effort.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find between meeting IT support mechanisms easy to use.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find it easy to get between meeting IT support mechanisms to do what I want them to do.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Intention to Use Between Meeting IT Support Mechanisms:

Assuming I had access to between meeting IT support mechanisms, I intend to use them.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Given that I had access to between meeting IT support mechanisms, I predict that I would use them.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Perceived Usefulness of Between Meeting IT Support Mechanisms:

Using between meeting IT support mechanisms would improve my performance in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Using between meeting IT support mechanisms my job would increase my productivity.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Using between meeting IT support mechanisms would enhance my effectiveness in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find between meeting IT support mechanisms would be useful in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Electronic Meeting IT Support Mechanisms

This group of IT support mechanisms includes: telephone conferencing, PC screen-sharing software, computer-conferencing systems, text-filtering software, computer-supported audio/video teleconferences, and nonhuman participants in team meetings.

Perceived Ease of Use of Electronic Meeting IT Support Mechanisms:

My interaction with electronic meeting IT support mechanisms is clear and understandable.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Interacting with electronic meeting IT support mechanisms does not require a lot of my mental effort.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find electronic meeting IT support mechanisms easy to use.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find it easy to get electronic meeting IT support mechanisms to do what I want them to do.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Intention to Use Electronic Meeting IT Support Mechanisms:

Assuming I had access to electronic meeting IT support mechanisms, I intend to use them.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Given that I had access to electronic meeting IT support mechanisms, I predict that I would use them.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Perceived Usefulness of Electronic Meeting IT Support Mechanisms:

Using electronic meeting IT support mechanisms would improve my performance in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Using electronic meeting IT support mechanisms my job would increase my productivity.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

Using electronic meeting IT support mechanisms would enhance my effectiveness in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

I find electronic meeting IT support mechanisms would be useful in my job.

likely | _____ | _____ | _____ | _____ | _____ | _____ | _____ | unlikely
extremely quite slightly neither slightly quite extremely

APPENDIX D

DEFINITIONS OF IT SUPPORT MECHANISMS

Definitions of IT Support Mechanisms

(listed in order presented in survey instrument)

1 **Electronic support for "chauffeur" providing face-to-face meeting facilitation services**

As the team members talk with each other, a facilitator types quietly, recording summary phrases from each statement that are projected on a screen for the group to see. Periodically, the facilitator stops the meeting and asks the group members to look at what has been recorded to check for accuracy. The facilitator then tries to organize what was heard into a more coherent whole. As the meeting ends, draft versions (along with complete meeting notes) are printed and photocopied for team members to take with them.

2 **Group Decision Support Systems (GDSS)**

Need to build a consensus among group members? First the team must phrase the question: How do we decide what we have to decide? GDSSs ask team members for anonymous judgements, their own uncertainties, and a self-rating of their expertise. The system then records all input and feeds back a first-round set of judgements from the group. The group goes through a series of these "rounds" until a decision is reached. The system does not make the decision, but provides an effective and efficient group decision-making process.

3 **Telephone conferencing**

Each team member sits at their own desk with a screen display that shows a conference room table indicating who is present and who is talking at any given time. The system is an extension of each member's telephone. While face-to-face meetings still occur, telephone meetings provide an opportunity for much more regular communications.

4 **Presentation support software**

Team members often have to make presentations, either to the team itself or to people who have an interest in what the team is doing. Software can make the process of preparing presentations much easier, even if the meetings themselves have no new electronic aids. Instead of relying only on a graphics artist, with frequent long delays, many presentations can be prepared by the author. Thus, the desktop becomes functionally linked to the podium, and each team member can use the system.

5 **Project management software**

The team has better things to do with its time than keep records, but there is a harsh set of deadlines to remember. While the team focuses on the content of its work, the system has a basic record of tasks to be conducted, task assignments, subtask breakdowns, and schedules. Each team member reviews their progress with the system on a weekly basis, and the system is used during team meetings. The software organizes what the team has to do and reminds members when it has to be done.

6 **Calendar management for groups**

Work teams need to coordinate calendars with each other and perhaps with others. Each team member designates times that are unavailable and available, with a weighting that indicates flexibility in the event the system has trouble finding matches of free time. The "black book" quietly records people's schedules and suggests the most promising meeting dates and times.

7 **Group-authoring software**

Group authorship is a common practice, typically via a series of scrawled comments that are centralized onto one draft before changes are made. Group-authorship software allows team members to make document revisions, with the system remembering who made which changes. Team members can suggest changes without wiping out the original; comparisons among alternative drafts are easily made. The overall goal is to improve the speed and quality of group writing.

8 **Computer support for face-to-face meetings without "chauffeur"**

In this case, team members work directly with computers, rather than through a "chauffeur" (as in item 1). This is a bigger step, requiring more than one workstation in the room, software that can provide direct group support, and enough users skills to make it possible. It builds, however, on the familiar notion of face-to-face meetings and its primary competition is the white board.

9 **PC screen-sharing software**

This approach to computer-supported teams builds directly on PC use: anything that can be displayed on a PC screen could be shared with another (and perhaps more than one other) PC screen. Often team members are also connected by conference calling to discuss revisions represented visually on the screen. The

system keeps track of the drafts and who creates what. At the end of the meeting, everyone has a revised version on their own PC.

10 **Computer-conferencing systems**

Computer conferencing provides group communications through computers, the group version of electronic mail. Computer-conferencing systems are geared toward groups, and filing of messages is by group or by topic. Drafts and other working documents, graphics, or models are also exchanged through the conferencing system.

11 **Text-filtering software**

Work teams often need large amounts of information that is hard to find. Text filtering allows users to search free-form or semi-structured text, with more power achievable through more structure. Typically, users specify search criteria to be used by the filter. Text filtering can also be used to identify people with common interests. In this way, text filtering can be used for computer support of much larger communities, creating a kind of magnet for filtering text.

12 **Computer-supported audio/video teleconferences**

It is possible to project computer output during audio conferences or include personal computers in video teleconference rooms. Discussion among the team members can thus be supported by periodic recalculations of spreadsheets and/or searches for relevant information while attempting to solve a problem.

13 **Conversational structuring**

Communication among team members is a critical aspect of a team's performance. One approach to computer-supported teams is to develop (or select) a structure for team conversations that will be in close keeping with the task and with the style of the team participants themselves. Conversational structuring requires building explicit forms of communication about what most teams usually do in unstructured ways.

14 **Group Memory Management**

Work teams have a need for group memory, particularly if individual members can search the memory in ways they prefer. Group memory management systems contain notes from all the team meetings, with links among many of the words and concepts, to assist in retrieving information by team members.

15 **"Electronic hallway"**

It is often said that the most important team meetings happen around coffee pots, at water fountains, or in hallways. This type of system allows "drop-in" encounters over electronic media, much like what currently happens. For example, it is almost midnight when Chris is ready to log off the system. Just then, the system notifies her that Jay has logged on. They type messages to each other briefly before shifting to an audio link. A long conversation ensures, the kind that rarely occurs at the office while everyone is rushing about.

16 **Comprehensive work team support which puts users "inside" their computing environment**

An integrated computer-based system is attractive for work teams who have many support needs. The general direction is toward putting users "inside" their computing environments. For example, the latest data are now in and it is time to figure out what they mean. Each team member takes a crack at the analysis, sending along draft spreadsheet models and making statistical passes through the new data. Finally, they meet around a workstation, with one person doing the updates and final runs. A summary briefing is then prepared for the brand manager, who receives the briefing and background data on her workstation 10 minutes before the meeting at which she is to decide how to respond to the competition.

17 **Nonhuman participants in team meetings (Artificial intelligence)**

At some point, computer programs should be able to function, in some sense, as team "members." People could communicate through an expert system, rather than simply extracting information from the system. The electronic participant could have specialized knowledge that nobody on the team has, but it does not have definitive answers. It is a collaborative process, with all the team members contributing.

APPENDIX E

INTERNAL CONSISTENCY

AND UNIDIMENSIONALITY

Reliability - Computer Self-Efficacy

Method 2 (covariance matrix) will be used for this analysis - N of Cases = 88.0

RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	CSE1	6.0568	2.3798	88.0
2.	CSE2	5.0795	2.3791	88.0
3.	CSE3	6.7386	2.6195	88.0
4.	CSE4	7.2045	2.4267	88.0
5.	CSE5	8.4205	1.8428	88.0
6.	CSE6	8.1818	1.8039	88.0
7.	CSE7	8.2273	2.2166	88.0
8.	CSE8	6.3977	2.3270	88.0
9.	CSE9	8.6591	1.6808	88.0
10.	CSE10	8.8068	1.5377	88.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	73.7727	247.3271	15.7266	10

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	7.3773	5.0795	8.8068	3.7273	1.7338	1.6183

Item Variances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	4.6242	2.3646	6.8619	4.4974	2.9020	2.3553

Inter-item Covariances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	2.2343	.9236	4.4552	3.5316	4.8238	.6979

Inter-item Correlations	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.4980	.2525	.7869	.5344	3.1169	.0186

Analysis of Variance

Source of Variation	Sum of Sq.	DF	Mean Square	F	Prob.
Between People	2151.7455	87	24.7327		
Within People	3153.0000	792	3.9811		
Between Measures	1281.7227	9	142.4136	59.5902	.0000
Residual	1871.2773	783	2.3899		
Total	5304.7455	879	6.0350		
Grand Mean	7.3773				

Reliability Coefficients 10 items

Alpha = .9034 Standardized item alpha = .9084

Reliability - Perceived Ease of Use

Method 2 (covariance matrix) will be used for this analysis - N of Cases = 90.0

RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	STLE1	3.6778	1.6882	90.0
2.	STLE2	3.7667	1.6830	90.0
3.	STLE3	3.5222	1.4396	90.0
4.	STLE4	3.6444	1.5310	90.0
5.	BME1	3.0333	1.5539	90.0
6.	BME2	3.4889	1.7239	90.0
7.	BME3	3.2444	1.4864	90.0
8.	BME4	3.2667	1.4596	90.0
9.	EME1	2.8556	1.6045	90.0
10.	EME2	3.3556	1.7308	90.0
11.	EME3	3.0222	1.4298	90.0
12.	EME4	3.1889	1.4526	90.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	40.0667	210.3775	14.5044	12

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.3389	2.8556	3.7667	.9111	1.3191	.0829

Item Variances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	2.4625	2.0444	2.9958	.9513	1.4653	.1350

Inter-item Covariances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	1.3699	.8363	1.9396	1.1032	2.3192	.1250

Inter-item Correlations	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.5616	.3061	.8760	.5699	2.8616	.0212

Analysis of Variance

Source of Variation	Sum of Sq.	DF	Mean Square	F	Prob.
Between People	1560.3000	89	17.5315		
Within People	1151.6667	990	1.1633		
Between Measures	82.0333	11	7.4576	6.8257	.0000
Residual	1069.6333	979	1.0926		
Total	2711.9667	1079	2.5134		
Grand Mean	3.3389				

Reliability Coefficients 12 items

Alpha = .9377 Standardized item alpha = .9389

Reliability - Intention to Use

Method 2 (covariance matrix) will be used for this analysis - N of Cases = 90.0

RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	STLI1	2.8889	1.4798	90.0
2.	STLI2	2.8556	1.3947	90.0
3.	BMI1	2.5000	1.2016	90.0
4.	BMI2	2.4556	1.1914	90.0
5.	EMI1	2.3889	1.0985	90.0
6.	EMI2	2.3667	1.0326	90.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	15.4556	29.5317	5.4343	6

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	2.5759	2.3667	2.8889	.5222	1.2207	.0550

Item Variances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	1.5452	1.0663	2.1898	1.1235	2.0536	.1891

Inter-item Covariances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.6754	.2141	1.8939	1.6798	8.8455	.2232

Inter-item Correlations	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.4333	.1636	.9536	.7900	5.8288	.0768

Analysis of Variance

Source of Variation	Sum of Sq.	DF	Mean Square	F	Prob.
Between People	438.0537	89	4.9220		
Within People	411.8333	450	.9152		
Between Measures	24.7648	5	4.9530	5.6943	.0000
Residual	387.0685	445	.8698		
Total	849.8870	539	1.5768		
Grand Mean	2.5759				

Reliability Coefficients 6 items

Alpha = .8233 Standardized item alpha = .8210

Reliability - Perceived Usefulness

Method 2 (covariance matrix) will be used for this analysis - N of Cases = 90.0

RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	STLU1	3.1111	1.2127	90.0
2.	STLU2	3.1111	1.2219	90.0
3.	STLU3	3.1556	1.2800	90.0
4.	STLU4	3.0556	1.3013	90.0
5.	BMU1	2.6000	1.1198	90.0
6.	BMU2	2.5556	1.1027	90.0
7.	BMU3	2.5778	1.1216	90.0
8.	BMU4	2.5000	1.1143	90.0
9.	EMU1	2.6111	1.1485	90.0
10.	EMU2	2.6000	1.1198	90.0
11.	EMU3	2.5667	1.0918	90.0
12.	EMU4	2.5333	1.1631	90.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	32.9778	112.6287	10.6127	12

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	2.7481	2.5000	3.1556	.6556	1.2622	.0721

Item Variances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	1.3653	1.1921	1.6935	.5014	1.4206	.0287

Inter-item Covariances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.7291	.4539	1.4881	1.0342	3.2783	.1151

Inter-item Correlations	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.5356	.3315	.9602	.6286	2.8960	.0587

Analysis of Variance

Source of Variation	Sum of Sq.	DF	Mean Square	F	Prob.
Between People	835.3296	89	9.3857		
Within People	694.1667	990	.7012		
Between Measures	71.4074	11	6.4916	10.2050	.0000
Residual	622.7593	979	.6361		
Total	1529.4963	1079	1.4175		
Grand Mean	2.7481				

Reliability Coefficients 12 items

Alpha = .9322 Standardized item alpha = .9326

Factor Analysis - Computer Self-Efficacy

Communalities

	Initial	Extraction
Computer Self-Efficacy 1	1.000	.809
Computer Self-Efficacy 2	1.000	.698
Computer Self-Efficacy 3	1.000	.689
Computer Self-Efficacy 4	1.000	.704
Computer Self-Efficacy 5	1.000	.666
Computer Self-Efficacy 6	1.000	.785
Computer Self-Efficacy 7	1.000	.746
Computer Self-Efficacy 8	1.000	.432
Computer Self-Efficacy 9	1.000	.668
Computer Self-Efficacy 10	1.000	.768
Extraction Method: Principal Component Analysis.		

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cum-ulative %	Total	% of Variance	Cum-ulative %
1	5.518	55.183	55.183	5.518	55.183	55.183
2	1.447	14.471	69.654	1.447	14.471	69.654
3	.721	7.205	76.859			
4	.561	5.612	82.472			
5	.496	4.955	87.427			
6	.398	3.984	91.410			
7	.294	2.939	94.350			
8	.244	2.441	96.790			
9	.177	1.769	98.559			
10	.144	1.441	100.000			
Extraction Method: Principal Component Analysis.						

Component Matrix(a)

	Component	
	1	2
Computer Self-Efficacy 1	.796	.419
Computer Self-Efficacy 2	.650	.525
Computer Self-Efficacy 3	.729	.396
Computer Self-Efficacy 4	.781	.306
Computer Self-Efficacy 5	.788	-.211
Computer Self-Efficacy 6	.779	-.423
Computer Self-Efficacy 7	.804	-.317
Computer Self-Efficacy 8	.600	.269
Computer Self-Efficacy 9	.729	-.370
Computer Self-Efficacy 10	.745	-.462
Extraction Method: Principal Component Analysis.		
a 2 components extracted.		

Factor Analysis - Perceived Ease of Use

Communalities

	Initial	Extraction
Same Time/Location Perceived Ease of Use		
STLE1	1.000	.767
STLE2	1.000	.742
STLE3	1.000	.878
STEL4	1.000	.857
Between Meeting Perceived Ease of Use		
BME1	1.000	.788
BME2	1.000	.787
BME3	1.000	.870
BME4	1.000	.847
Electronic Meeting Perceived Ease of Use		
EME1	1.000	.811
EME2	1.000	.840
EME3	1.000	.879
EME4	1.000	.825
Extraction Method: Principal Component Analysis.		

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cum-ulative %**	**Total**	**% of Variance**	**Cum-ulative %**	**Total**	**% of Variance**	**Cum-ulative %**
1	7.205	60.040	60.040	7.205	60.040	60.040	3.424	28.529	28.529
2	1.673	13.940	73.980	1.673	13.940	73.980	3.325	27.707	56.237
3	1.013	8.440	82.420	1.013	8.440	82.420	3.142	26.183	82.420
4	.567	4.722	87.142						
5	.362	3.016	90.158						
6	.301	2.504	92.663						
7	.221	1.843	94.506						
8	.163	1.355	95.861						
9	.143	1.194	97.055						
10	.132	1.104	98.159						
11	.123	1.023	99.181						
12	9.824E-02	.819	100.000						
Extraction Method: Principal Component Analysis.									

Component Matrix(a)

	Component		
	1	2	3
Same Time/Location Perceived Ease of Use			
STLE1	.767	-5.974E-02	-.419
STLE2	.857	-6.816E-02	-4.284E-02
STLE3	.826	-9.158E-02	-.433
STEL4	.826	-9.481E-02	-.408
Between Meeting Perceived Ease of Use			
BME1	.793	-.393	6.884E-02
BME2	.671	-.293	.501
BME3	.792	-.442	.216
BME4	.778	-.467	.156
Between Meeting Perceived Ease of Use			
EME1	.743	.509	2.694E-02
EME2	.705	.441	.386
EME3	.776	.523	5.033E-02
EME4	.746	.517	4.983E-02
Extraction Method: Principal Component Analysis.			
a 3 components extracted.			

Rotated Component Matrix(a)

	Component		
	1	2	3
Same Time/Location Perceived Ease of Use			
STLE1	.278	.252	.791
STLE2	.424	.514	.546
STLE3	.284	.299	.841
STEL4	.288	.314	.822
Between Meeting Perceived Ease of Use			
BME1	.165	.735	.469
BME2	.289	.838	3.746E-02
BME3	.166	.845	.359
BME4	.123	.819	.402
Electronic Meeting Perceived Ease of Use			
EME1	.826	.133	.334
EME2	.847	.347	3.598E-02
EME3	.862	.156	.333
EME4	.840	.142	.316
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a Rotation converged in 7 iterations.			

Component Transformation Matrix

Component	1	2	3
1	.570	.578	.584
2	.777	-.611	-.154
3	.268	.542	-.797

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Factor Analysis - Intention to Use

Communalities

	Initial	Extraction
Same Time/Location Intention to Use		
STLI1	1.000	.694
STLI2	1.000	.685
Between Meeting Intention to Use		
BMI1	1.000	.801
BMI2	1.000	.731
Electronic Meeting Intention to Use		
EMI1	1.000	.960
EMI2	1.000	.951
Extraction Method: Principal Component Analysis.		

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cum-ulative %**	**Total**	**% of Variance**	**Cum-ulative %**	**Total**	**% of Variance**	**Cum-ulative %**
1	3.201	53.349	53.349	3.201	53.349	53.349	2.843	47.381	47.381
2	1.620	26.994	80.344	1.620	26.994	80.344	1.978	32.963	80.344
3	.989	16.489	96.833						
4	8.253E-02	1.376	98.209						
5	6.592E-02	1.099	99.307						
6	4.157E-02	.693	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix(a)

	Component	
	1	2
Same Time/Location Intention to Use		
STLI1	.808	-.203
STLI2	.810	-.167
Between Meeting Intention to Use		
BMI1	.808	-.384
BMI2	.758	-.395
Electronic Meeting Intention to Use		
EMI1	.572	.795
EMI2	.580	.783
Extraction Method: Principal Component Analysis.		
a 2 components extracted.		

Rotated Component Matrix(a)

	Component	
	1	2
Same Time/Location Intention to Use		
STLI1	.807	.206
STLI2	.792	.239
Between Meeting Intention to Use		
BMI1	.894	4.671E-02
BMI2	.855	1.296E-02
Electronic Meeting Intention to Use		
EMI1	.124	.972
EMI2	.138	.965
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a Rotation converged in 3 iterations.		

Component Transformation Matrix

Component	1	2
1	.880	.476
2	-.476	.880
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		

Factor Analysis - Perceived Usefulness

Communalities

	Initial	Extraction
Same Time/Location Perceived Usefulness		
STLU1	1.000	.943
STLU2	1.000	.958
STLU3	1.000	.949
STLU4	1.000	.915
Between Meeting Perceived Usefulness		
BMU1	1.000	.910
BMU2	1.000	.966
BMU3	1.000	.935
BMU4	1.000	.964
Electronic Meeting Perceived Usefulness		
EMU1	1.000	.940
EMU2	1.000	.964
EMU3	1.000	.964
EMU4	1.000	.951
Extraction Method: Principal Component Analysis.		

Total Variance Explained

Com-ponent	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cum-ulative %	Total	% of Variance	Cum-ulative %	Total	% of Variance	Cum-ulative %
1	6.894	57.452	57.452	6.894	57.452	57.452	3.821	31.843	31.843
2	2.269	18.912	76.364	2.269	18.912	76.364	3.779	31.493	63.336
3	2.196	18.301	94.665	2.196	18.301	94.665	3.759	31.329	94.665
4	.136	1.133	95.798						
5	.120	1.002	96.800						
6	9.026E-02	.752	97.552						
7	7.585E-02	.632	98.185						
8	6.275E-02	.523	98.707						
9	5.328E-02	.444	99.151						
10	4.102E-02	.342	99.493						
11	3.840E-02	.320	99.813						
12	2.242E-02	.187	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix(a)

	Component		
	1	2	3
Same Time/Location Perceived Usefulness			
STLU1	.759	-4.479E-02	.604
STLU2	.752	-7.541E-02	.622
STLU3	.752	-6.175E-02	.616
STLU4	.766	-.149	.554
Between Meeting Perceived Usefulness			
BMU1	.729	.559	-.256
BMU2	.755	.586	-.227
BMU3	.765	.559	-.193
BMU4	.753	.587	-.228
Electronic Meeting Perceived Usefulness			
EMU1	.753	-.486	-.371
EMU2	.793	-.461	-.352
EMU3	.760	-.492	-.379
EMU4	.757	-.482	-.381
Extraction Method: Principal Component Analysis.			
a 3 components extracted.			

Rotated Component Matrix(a)

	Component		
	1	2	3
Same Time/Location Perceived Usefulness			
STLU1	.168	.216	.932
STLU2	.175	.184	.945
STLU3	.169	.195	.939
STLU4	.264	.156	.906
Between Meeting Perceived Usefulness			
BMU1	.195	.921	.152
BMU2	.179	.948	.188
BMU3	.185	.922	.224
BMU4	.177	.948	.186
Electronic Meeting Perceived Usefulness			
EMU1	.935	.175	.186
EMU2	.933	.211	.222
EMU3	.948	.176	.185
EMU4	.941	.184	.180
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a Rotation converged in 5 iterations.			

Component Transformation Matrix

Component	1	2	3
1	.583	.573	.577
2	-.640	.761	-.109
3	-.501	-.306	.810

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

APPENDIX F

HYPOTHESIS TESTING

T-Test - H1

Group Statistics

	Virtual	N	Mean	Std. Deviation	Std. Error Mean
Team Use	**traditional**	35	4.20	1.05	.18
	virtual	54	4.54	.69	9.43E-02
Precisely	**traditional**	34	2.62	1.26	.22
	virtual	52	2.96	1.20	.17
Training	**traditional**	34	2.56	1.48	.25
	virtual	54	2.19	1.37	.19
Frequency-Same Time/Location	**traditional**	35	16.2000	13.0751	2.2101
	virtual	55	20.3909	13.1098	1.7677
Frequency-Between Meeting	**traditional**	35	32.5429	24.4244	4.1285
	virtual	55	31.8818	21.1697	2.8545
Frequency-Electronic Meeting	**traditional**	35	22.8857	17.7387	2.9984
	virtual	55	31.0000	18.3780	2.4781
Importance-Same Time/Location	**traditional**	35	15.8571	13.8774	2.3457
	virtual	55	21.5455	12.9948	1.7522
Importance-Between Meeting	**traditional**	35	31.7571	25.7295	4.3491
	virtual	55	35.0636	23.0028	3.1017
Importance-Electronic Meeting	**traditional**	35	21.0571	18.0024	3.0430
	virtual	55	32.5545	18.7035	2.5220

Independent Samples Test

	Levene's Test for Equality of Variances (Equal variances assumed)	
	F	**Sig.**
Team Use	7.752	.007
Precisely	.954	.331
Training	.541	.464
Frequency-Same Time/Location	.368	.545
Frequency-Between Meeting	1.416	.237
Frequency-Electronic Meeting	.163	.687
Importance-Same Time/Location	.358	.551
Importance-Between Meeting	1.060	.306
Importance-Electronic Meeting	.013	.909

		t-test for Equality of Means						
	Equal Var. Assumed	t	df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% C. I. of the Mean	
							Lower	Upper
Team Use	Yes	-1.825	87	.071	-.34	.18	-.70	3.01E-02
	No	-1.675	53.114	.100	-.34	.20	-.74	6.65E-02
Precisely	Yes	-1.273	84	.206	-.34	.27	-.88	.19
	No	-1.262	68.566	.211	-.34	.27	-.89	.20
Training	Yes	1.205	86	.232	.37	.31	-.24	.99
	No	1.184	66.353	.240	.37	.32	-.26	1.00
Frequency-Same Time/Location	Yes	-1.480	88	.142	-4.1909	2.8318	-9.8185	1.4366
	No	-1.481	72.687	.143	-4.1909	2.8301	-9.8317	1.4499
Frequency-Between Meeting	Yes	.136	88	.892	.6610	4.8614	-9.0000	10.3221
	No	.132	64.935	.896	.6610	5.0192	-9.3632	10.6853
Frequency-Electronic Meeting	Yes	-2.069	88	.041	-8.1143	3.9210	-15.9064	-.3222
	No	-2.086	74.442	.040	-8.1143	3.8899	-15.8643	-.3643
Importance-Same Time/Location	Yes	-1.972	88	.052	-5.6883	2.8850	-11.4217	4.507E-02
	No	-1.943	69.002	.056	-5.6883	2.9279	-11.5293	.1527
Importance-Between Meeting	Yes	-.635	88	.527	-3.3065	5.2095	-13.6593	7.0463
	No	-.619	66.544	.538	-3.3065	5.3418	-13.9701	7.3572
Importance-Electronic Meeting	Yes	-2.884	88	.005	-11.4974	3.9863	-19.4193	-3.5755
	No	-2.909	74.592	.005	-11.4974	3.9522	-19.3713	-3.6235

T-Test - H2

Group Statistics

	Virtual	N	Mean	Std. Deviation	Std. Error Mean
Routinization	**traditional**	35	77.00	54.20	9.16
	virtual	55	60.91	59.23	7.99
Routinization - Cycles	**traditional**	35	60.57	45.50	7.69
	virtual	55	49.82	53.24	7.18
Routinization - Passages	**traditional**	35	16.43	11.57	1.96
	virtual	55	11.09	9.55	1.29
Infusion	**traditional**	35	7.57	4.50	.76
	virtual	55	8.98	4.15	.56
Infusion - Same Time/Location	**traditional**	35	1.69	1.49	.25
	virtual	55	1.93	1.44	.19
Infusion - Between Meeting	**traditional**	35	3.23	2.68	.45
	virtual	55	3.44	2.33	.31
Infusion - Electronic Meeting	**traditional**	35	2.66	2.15	.36
	virtual	55	3.62	2.01	.27

Independent Samples Test

	Levene's Test for Equality of Variances (Equal variances assumed)	
	F	**Sig.**
Routinization	.241	.625
Routinization-Cycles	.001	.976
Routinization-Passages	1.296	.258
Infusion	.115	.736
Infusion-Same Time/Location	.260	.611
Infusion-Between Meeting	2.320	.131
Infusion-Electronic Meeting	.997	.321

		t-test for Equality of Means						
	Equal Var. Assumed	t	df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% C. I. of the Mean	
							Lower	Upper
Team Use	Yes	-1.825	87	.071	-.34	.18	-.70	3.01E-02
	No	-1.675	53.114	.100	-.34	.20	-.74	6.65E-02
Precisely	Yes	-1.273	84	.206	-.34	.27	-.88	.19
	No	-1.262	68.566	.211	-.34	.27	-.89	.20
Training	Yes	1.205	86	.232	.37	.31	-.24	.99
	No	1.184	66.353	.240	.37	.32	-.26	1.00
Frequency-Same Time/Location	Yes	-1.480	88	.142	-4.1909	2.8318	-9.8185	1.4366
	No	-1.481	72.687	.143	-4.1909	2.8301	-9.8317	1.4499
Frequency-Between Meeting	Yes	.136	88	.892	.6610	4.8614	-9.0000	10.3221
	No	.132	64.935	.896	.6610	5.0192	-9.3632	10.6853
Frequency-Electronic Meeting	Yes	-2.069	88	.041	-8.1143	3.9210	-15.9064	-.3222
	No	-2.086	74.442	.040	-8.1143	3.8899	-15.8643	-.3643
Importance-Same Time/Location	Yes	-1.972	88	.052	-5.6883	2.8850	-11.4217	4.507E-02
	No	-1.943	69.002	.056	-5.6883	2.9279	-11.5293	.1527
Importance-Between Meeting	Yes	-.635	88	.527	-3.3065	5.2095	-13.6593	7.0463
	No	-.619	66.544	.538	-3.3065	5.3418	-13.9701	7.3572
Importance-Electronic Meeting	Yes	-2.884	88	.005	-11.4974	3.9863	-19.4193	-3.5755
	No	-2.909	74.592	.005	-11.4974	3.9522	-19.3713	

T-Test - H3

Group Statistics

	Virtual	N	Mean	Std. Deviation	Std. Error Mean
Computer Self-Efficacy Score	**traditional**	34	71.15	15.13	2.59
	virtual	54	75.43	16.01	2.18
Perceived Ease of Use	**traditional**	35	45.77	15.67	2.65
	virtual	55	36.51	12.69	1.71
Intention to Use	**traditional**	35	17.69	6.60	1.12
	virtual	55	14.04	4.00	.54
Perceived Usefulness	**traditional**	35	36.49	13.63	2.30
	virtual	55	30.75	7.46	1.01

Independent Samples Test

	Levene's Test for Equality of Variances (Equal variances assumed)	
	F	**Sig.**
Computer Self-Efficacy Score	.448	.505
Perceived Ease of Use	1.720	.193
Intention to Use	5.938	.017
Perceived Usefulness	5.292	.024

		t-test for Equality of Means						
	Equal Var. Assumed	t	df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% C. I. of the Mean	
							Lower	Upper
Computer Self-Efficacy Score	Yes	-1.247	86	.216	-4.28	3.43	-11.10	2.54
	No	-1.263	73.253	.211	-4.28	3.39	-11.03	2.47
Perceived Ease of Use	Yes	3.078	88	.003	9.26	3.01	3.28	15.24
	No	2.938	61.552	.005	9.26	3.15	2.96	15.57
Intention to Use	Yes	3.271	88	.002	3.65	1.12	1.43	5.87
	No	2.945	49.988	.005	3.65	1.24	1.16	6.14
Perceived Usefulness	Yes	2.580	88	.012	5.74	2.23	1.32	10.16
	No	2.284	47.133	.027	5.74	2.51	.68	10.80

General Linear Model - H4

Between-Subjects Factors

		Value Label	N
Location Industry	**1**	aerospace/defense	10
	4	computing/software	10
	5	consulting	3
	6	financial services	5
	7	health care	5
	8	heavy manufacturing	5
	9	insurance	5
	12	transportation	9
Division Industry	**1**	aerospace	5
	2	aircraft	5
	3	class 8 trucks	5
	4	computing/software	10
	10	medical diagnostic	5
	11	technology	22

Multivariate Tests(d)

Effect		Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power(a)
Intercept	Pillai's Trace	.981	201.785(b)	9.000	35.000	.000	1816.068	1.000
	Wilks' Lambda	.019	201.785(b)	9.000	35.000	.000	1816.068	1.000
	Hotelling's Trace	51.888	201.785(b)	9.000	35.000	.000	1816.068	1.000
	Roy's Largest Root	51.888	201.785(b)	9.000	35.000	.000	1816.068	1.000
LINDUSTR	Pillai's Trace	.870	1.678	27.000	111.000	.032	45.318	.973
	Wilks' Lambda	.340	1.701	27.000	102.860	.030	44.478	.968
	Hotelling's Trace	1.375	1.714	27.000	101.000	.029	46.275	.974
	Roy's Largest Root	.839	3.449(c)	9.000	37.000	.004	31.045	.961
DINDUSTR	Pillai's Trace	.334	1.951(b)	9.000	35.000	.076	17.563	.744
	Wilks' Lambda	.666	1.951(b)	9.000	35.000	.076	17.563	.744
	Hotelling's Trace	.502	1.951(b)	9.000	35.000	.076	17.563	.744
	Roy's Largest Root	.502	1.951(b)	9.000	35.000	.076	17.563	.744
LINDUSTR * DINDUSTR	Pillai's Trace	.000	.(b)	.000	.000	.	.	.
	Wilks' Lambda	1.000	.(b)	.000	39.000	.	.	.
	Hotelling's Trace	.000	.(b)	.000	2.000	.	.	.
	Roy's Largest Root	.000	.000(b)	9.000	34.000	1.000	.000	.050

a Computed using alpha = .05
b Exact statistic
c The statistic is an upper bound on F that yields a lower bound on the significance level.
d Design: Intercept+LINDUSTR+DINDUSTR+LINDUSTR * DINDUSTR

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power(a)
Corrected Model	Team Use	4.081(b)	8	.510	1.049	.415	8.396	.422
	Precisely	18.401(c)	8	2.300	1.781	.107	14.251	.685
	Training	25.703(d)	8	3.213	2.123	.054	16.986	.776
	Frequency - Same Time/Location	1715.241(e)	8	214.405	1.254	.292	10.034	.503
	Frequency - Between Meeting	5242.885(f)	8	655.361	1.517	.180	12.137	.599
	Frequency - Electronic Meeting	6016.269(g)	8	752.034	3.043	.008	24.345	.922
	Importance - Same Time/Location	1499.930(h)	8	187.491	1.071	.401	8.565	.431
	Importance - Between Meeting	7512.936(i)	8	939.117	1.962	.075	15.694	.735
	Importance - Electronic Meeting	5014.423(j)	8	626.803	2.139	.052	17.114	.779
Intercept	Team Use	927.544	1	927.544	1908.345	.000	1908.345	1.000
	Precisely	382.712	1	382.712	296.397	.000	296.397	1.000

	Training	213.888	1	213.888	141.350	.000	141.350	1.000
	Frequency - Same Time/Location	20611.606	1	20611.606	120.570	.000	120.570	1.000
	Frequency - Between Meeting	38352.101	1	38352.101	88.784	.000	88.784	1.000
	Frequency - Electronic Meeting	44480.478	1	44480.478	179.993	.000	179.993	1.000
	Importance - Same Time/Location	22315.604	1	22315.604	127.430	.000	127.430	1.000
	Importance - Between Meeting	44175.826	1	44175.826	92.280	.000	92.280	1.000
	Importance - Electronic Meeting	46985.246	1	46985.246	160.355	.000	160.355	1.000
LINDUSTR	**Team Use**	2.118	3	.706	1.453	.241	4.358	.357
	Precisely	2.396	3	.799	.619	.607	1.856	.168
	Training	11.952	3	3.984	2.633	.062	7.898	.604
	Frequency - Same Time/Location	301.611	3	100.537	.588	.626	1.764	.162
	Frequency - Between Meeting	523.051	3	174.350	.404	.751	1.211	.123
	Frequency - Electronic Meeting	2140.202	3	713.401	2.887	.046	8.660	.649

	Importance - Same Time/Location	198.930	3	66.310	.379	.769	1.136	.118
	Importance - Between Meeting	239.641	3	79.880	.167	.918	.501	.078
	Importance - Electronic Meeting	1365.744	3	455.248	1.554	.214	4.661	.380
DINDUSTR	**Team Use**	1.600	1	1.600	3.292	.077	3.292	.426
	Precisely	8.100	1	8.100	6.273	.016	6.273	.687
	Training	4.900	1	4.900	3.238	.079	3.238	.421
	Frequency - Same Time/Location	122.500	1	122.500	.717	.402	.717	.131
	Frequency - Between Meeting	672.400	1	672.400	1.557	.219	1.557	.230
	Frequency - Electronic Meeting	3.600	1	3.600	.015	.904	.015	.052
	Importance - Same Time/Location	168.100	1	168.100	.960	.333	.960	.160
	Importance - Between Meeting	739.600	1	739.600	1.545	.221	1.545	.229
	Importance - Electronic Meeting	.900	1	.900	.003	.956	.003	.050

LINDUSTR * DINDUSTR	**Team Use**	.000	0	.	.	.	.000	.
	Precisely	.000	0	.	.	.	.000	.
	Training	.000	0	.	.	.	.000	.
	Frequency - Same Time/Location	.000	0	.	.	.	.000	.
	Frequency - Between Meeting	.000	0	.	.	.	.000	.
	Frequency - Electronic Meeting	.000	0	.	.	.	.000	.
	Importance - Same Time/ Location	.000	0	.	.	.	.000	.
	Importance - Between Meeting	.000	0	.	.	.	.000	.
	Importance - Electronic Meeting	.000	0	.	.	.	.000	.
Error	**Team Use**	20.900	43	.486				
	Precisely	55.522	43	1.291				
	Training	65.067	43	1.513				
	Frequency - Same Time/Location	7350.889	43	170.951				

	Frequency - Between Meeting	18574.822	43	431.973				
	Frequency - Electronic Meeting	10626.289	43	247.123				
	Importance - Same Time/Location	7530.200	43	175.121				
	Importance - Between Meeting	20584.814	43	478.717				
	Importance - Electronic Meeting	12599.322	43	293.007				
Total	**Team Use**	1087.000	52					
	Precisely	530.000	52					
	Training	332.000	52					
	Frequency - Same Time/Location	30288.250	52					
	Frequency - Between Meeting	75320.250	52					
	Frequency - Electronic Meeting	63863.500	52					
	Importance - Same Time/Location	32959.750	52					

	Importance - Between Meeting	90891.000	52					
	Importance - Electronic Meeting	70001.250	52					
Corrected Total	**Team Use**	24.981	51					
	Precisely	73.923	51					
	Training	90.769	51					
	Frequency - Same Time/Location	9066.130	51					
	Frequency - Between Meeting	23817.707	51					
	Frequency - Electronic Meeting	16642.558	51					
	Importance - Same Time/Location	9030.130	51					
	Importance - Between Meeting	28097.750	51					
	Importance - Electronic Meeting	17613.745	51					
a Computed using alpha = .05								
b R Squared = .163 (Adjusted R Squared = .008)								

c R Squared = .249 (Adjusted R Squared = .109)
d R Squared = .283 (Adjusted R Squared = .150)
e R Squared = .189 (Adjusted R Squared = .038)
f R Squared = .220 (Adjusted R Squared = .075)
g R Squared = .361 (Adjusted R Squared = .243)
h R Squared = .166 (Adjusted R Squared = .011)
i R Squared = .267 (Adjusted R Squared = .131)
j R Squared = .285 (Adjusted R Squared = .152)

General Linear Model - H5

Between-Subjects Factors

		Value Label	N
Location Industry	**1**	aerospace/defense	10
	4	computing/software	10
	5	consulting	5
	6	financial services	5
	7	health care	5
	8	heavy manufacturing	5
	9	insurance	5
	12	transportation	10
Division Industry	**1**	aerospace	5
	2	aircraft	5
	3	class 8 trucks	5
	4	computing/software	10
	10	medical diagnostic	5
	11	technology	25

Multivariate Tests(d)

Effect		Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power(a)
Intercept	Pillai's Trace	.997	2531.993(b)	5.000	42.000	.000	12659.967	1.000
	Wilks' Lambda	.003	2531.993(b)	5.000	42.000	.000	12659.967	1.000
	Hotelling's Trace	301.428	2531.993(b)	5.000	42.000	.000	12659.967	1.000
	Roy's Largest Root	301.428	2531.993(b)	5.000	42.000	.000	12659.967	1.000
LINDUSTR	Pillai's Trace	1.262	6.392	15.000	132.000	.000	95.883	1.000
	Wilks' Lambda	.003	52.984	15.000	116.345	.000	656.744	1.000
	Hotelling's Trace	219.219	594.326	15.000	122.000	.000	8914.893	1.000
	Roy's Largest Root	218.906	1926.376(c)	5.000	44.000	.000	9631.879	1.000
DINDUSTR	Pillai's Trace	.982	456.293(b)	5.000	42.000	.000	2281.463	1.000
	Wilks' Lambda	.018	456.293(b)	5.000	42.000	.000	2281.463	1.000
	Hotelling's Trace	54.321	456.293(b)	5.000	42.000	.000	2281.463	1.000
	Roy's Largest Root	54.321	456.293(b)	5.000	42.000	.000	2281.463	1.000
LINDUSTR * DINDUSTR	Pillai's Trace	.000	.(b)	.000	.000	.	.	.
	Wilks' Lambda	1.000	.(b)	.000	44.000	.	.	.
	Hotelling's Trace	.000	.(b)	.000	2.000	.	.	.
	Roy's Largest Root	.000	.000(b)	5.000	41.000	1.000	.000	.050

a Computed using alpha = .05
b Exact statistic
c The statistic is an upper bound on F that yields a lower bound on the significance level.
d Design: Intercept+LINDUSTR+DINDUSTR+LINDUSTR * DINDUSTR

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power(a)
Corrected Model	Routinization	109809.545(b)	8	13726.193	7.930	.000	63.438	1.000
	Routinization - Cycles	79968.182(c)	8	9996.023	6.289	.000	50.308	.999
	Routinization - Passages	4779.545(d)	8	597.443	189.534	.000	1516.270	1.000
	Infusion	262.082(e)	8	32.760	2.253	.040	18.023	.809
	Infusion - Same Time/Location	32.109(f)	8	4.014	2.319	.035	18.556	.823
	Infusion - Between Meeting	77.127(g)	8	9.641	2.049	.061	16.395	.763
	Infusion - Electronic Meeting	64.882(h)	8	8.110	2.421	.028	19.368	.842
Intercept	Routinization	99500.625	1	99500.625	57.482	.000	57.482	1.000
	Routinization - Cycles	68337.778	1	68337.778	42.991	.000	42.991	1.000
	Routinization - Passages	2918.403	1	2918.403	925.838	.000	925.838	1.000
	Infusion	3597.344	1	3597.344	247.388	.000	247.388	1.000

	Infusion - Same Time/Location	198.025	1	198.025	114.437	.000	114.437	1.000
	Infusion - Between Meeting	460.136	1	460.136	97.811	.000	97.811	1.000
	Infusion - Electronic Meeting	598.044	1	598.044	178.521	.000	178.521	1.000
LINDUSTR	**Routinization**	19543.500	3	6514.500	3.763	.017	11.290	.778
	Routinization - Cycles	9934.000	3	3311.333	2.083	.115	6.250	.499
	Routinization - Passages	1741.500	3	580.500	184.159	.000	552.476	1.000
	Infusion	63.340	3	21.113	1.452	.240	4.356	.359
	Infusion - Same Time/Location	11.760	3	3.920	2.265	.093	6.796	.536
	Infusion - Between Meeting	5.040	3	1.680	.357	.784	1.071	.115
	Infusion - Electronic Meeting	23.100	3	7.700	2.299	.090	6.896	.543
DINDUSTR	**Routinization**	10890.000	1	10890.000	6.291	.016	6.291	.690
	Routinization - Cycles	6760.000	1	6760.000	4.253	.045	4.253	.524

	Routinization - Passages	490.000	1	490.000	155.448	.000	155.448	1.000
	Infusion	.900	1	.900	.062	.805	.062	.057
	Infusion - Same Time/Location	2.500	1	2.500	1.445	.236	1.445	.218
	Infusion - Between Meeting	22.500	1	22.500	4.783	.034	4.783	.572
	Infusion - Electronic Meeting	4.900	1	4.900	1.463	.233	1.463	.220
LINDUSTR * DINDUSTR	**Routinization**	.000	0	.	.	.	.000	.
	Routinization - Cycles	.000	0	.	.	.	.000	.
	Routinization - Passages	.000	0	.	.	.	.000	.
	Infusion	.000	0	.	.	.	.000	.
	Infusion - Same Time/Location	.000	0	.	.	.	.000	.
	Infusion - Between Meeting	.000	0	.	.	.	.000	.
	Infusion - Electronic Meeting	.000	0	.	.	.	.000	.

Error	**Routinization**	79625.000	46	1730.978				
	Routinization - Cycles	73120.000	46	1589.565				
	Routinization - Passages	145.000	46	3.152				
	Infusion	668.900	46	14.541				
	Infusion - Same Time/Location	79.600	46	1.730				
	Infusion - Between Meeting	216.400	46	4.704				
	Infusion - Electronic Meeting	154.100	46	3.350				
Total	**Routinization**	393480.000	55					
	Routinization - Cycles	289590.000	55					
	Routinization - Passages	11690.000	55					
	Infusion	5368.000	55					
	Infusion - Same Time/Location	316.000	55					

	Infusion - Between Meeting	943.000	55					
	Infusion - Electronic Meeting	939.000	55					
Corrected Total	**Routinization**	189434.545	54					
	Routinization - Cycles	153088.182	54					
	Routinization - Passages	4924.545	54					
	Infusion	930.982	54					
	Infusion - Same Time/Location	111.709	54					
	Infusion - Between Meeting	293.527	54					
	Infusion - Electronic Meeting	218.982	54					

a Computed using alpha = .05

b R Squared = .580 (Adjusted R Squared = .507)

c R Squared = .522 (Adjusted R Squared = .439)

d R Squared = .971 (Adjusted R Squared = .965)

e R Squared = .282 (Adjusted R Squared = .157)

f R Squared = .287 (Adjusted R Squared = .164)
g R Squared = .263 (Adjusted R Squared = .135)
h R Squared = .296 (Adjusted R Squared = .174)

General Linear Model - H6

Between-Subjects Factors

		Value Label	N
Location Industry	**1**	aerospace/defense	10
	4	computing/software	10
	5	consulting	5
	6	financial services	5
	7	health care	4
	8	heavy manufacturing	5
	9	insurance	5
	12	transportation	10
Division Industry	**1**	aerospace	5
	2	aircraft	5
	3	class 8 trucks	5
	4	computing/software	10
	10	medical diagnostic	4
	11	technology	25

Multivariate Tests(d)

Effect		Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power(a)
Intercept	Pillai's Trace	.980	526.980(b)	4.000	42.000	.000	2107.920	1.000
	Wilks' Lambda	.020	526.980(b)	4.000	42.000	.000	2107.920	1.000
	Hotelling's Trace	50.189	526.980(b)	4.000	42.000	.000	2107.920	1.000
	Roy's Largest Root	50.189	526.980(b)	4.000	42.000	.000	2107.920	1.000
LINDUSTR	Pillai's Trace	.141	.541	12.000	132.000	.884	6.493	.297
	Wilks' Lambda	.861	.538	12.000	111.413	.885	5.679	.255
	Hotelling's Trace	.158	.537	12.000	122.000	.887	6.443	.293
	Roy's Largest Root	.141	1.555(c)	4.000	44.000	.203	6.219	.440
DINDUSTR	Pillai's Trace	.101	1.174(b)	4.000	42.000	.336	4.694	.336
	Wilks' Lambda	.899	1.174(b)	4.000	42.000	.336	4.694	.336
	Hotelling's Trace	.112	1.174(b)	4.000	42.000	.336	4.694	.336
	Roy's Largest Root	.112	1.174(b)	4.000	42.000	.336	4.694	.336
LINDUSTR * DINDUSTR	Pillai's Trace	.000	.(b)	.000	.000	.	.	.
	Wilks' Lambda	1.000	.(b)	.000	43.500	.	.	.
	Hotelling's Trace	.000	.(b)	.000	2.000	.	.	.
	Roy's Largest Root	.000	.000(b)	4.000	41.000	1.000	.000	.050

a Computed using alpha = .05

b Exact statistic
c The statistic is an upper bound on F that yields a lower bound on the significance level.
d Design: Intercept+LINDUSTR+DINDUSTR+LINDUSTR * DINDUSTR

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power(a)
Corrected Model	Computer Self-Efficacy Score	1708.054(b)	8	213.507	.809	.598	6.474	.327
	Perceived Ease of Use	969.170(c)	8	121.146	.726	.668	5.807	.293
	Intention to Use	167.726(d)	8	20.966	1.359	.240	10.872	.546
	Usefulness	344.043(e)	8	43.005	.740	.656	5.918	.298
Intercept	Computer Self-Efficacy Score	253717.792	1	253717.792	961.607	.000	961.607	1.000
	Perceived Ease of Use	60783.253	1	60783.253	364.180	.000	364.180	1.000
	Intention to Use	8611.792	1	8611.792	558.241	.000	558.241	1.000
	Usefulness	41434.274	1	41434.274	712.732	.000	712.732	1.000
LINDUSTR	Computer Self-Efficacy Score	237.360	3	79.120	.300	.825	.900	.103
	Perceived Ease of Use	130.540	3	43.513	.261	.853	.782	.096
	Intention to Use	63.660	3	21.220	1.376	.262	4.127	.341
	Usefulness	95.340	3	31.780	.547	.653	1.640	.153

DINDUSTR	**Computer Self-Efficacy Score**	48.400	1	48.400	.183	.670	.183	.070
	Perceived Ease of Use	532.900	1	532.900	3.193	.081	3.193	.416
	Intention to Use	40.000	1	40.000	2.593	.114	2.593	.351
	Usefulness	129.600	1	129.600	2.229	.142	2.229	.309
LINDUSTR * DINDUSTR	**Computer Self-Efficacy Score**	.000	0	.	.	.	.000	.
	Perceived Ease of Use	.000	0	.	.	.	.000	.
	Intention to Use	.000	0	.	.	.	.000	.
	Usefulness	.000	0	.	.	.	.000	.
Error	**Computer Self-Efficacy Score**	11873.150	45	263.848				
	Perceived Ease of Use	7510.700	45	166.904				
	Intention to Use	694.200	45	15.427				
	Usefulness	2616.050	45	58.134				
Total	**Computer Self-Efficacy Score**	320791.000	54					
	Perceived Ease of Use	79403.000	54					
	Intention to Use	11502.000	54					
	Usefulness	54421.000	54					

Corrected Total	**Computer Self-Efficacy Score**	13581.204	53					
	Perceived Ease of Use	8479.870	53					
	Intention to Use	861.926	53					
	Usefulness	2960.093	53					

a Computed using alpha = .05

b R Squared = .126 (Adjusted R Squared = -.030)

c R Squared = .114 (Adjusted R Squared = -.043)

d R Squared = .195 (Adjusted R Squared = .051)

e R Squared = .116 (Adjusted R Squared = -.041)

T-Test - H7

Group Statistics

	Dependency	N	Mean	Std. Deviation	Std. Error Mean
Team Use	**Lower**	42	4.26	1.01	.16
	Higher	47	4.53	.69	.10
Precisely	**Lower**	39	2.54	1.31	.21
	Higher	47	3.06	1.11	.16
Training	**Lower**	41	2.17	1.41	.22
	Higher	47	2.47	1.43	.21
Frequency-Same Time/Location	**Lower**	42	14.3810	11.7207	1.8085
	Higher	48	22.5938	13.3096	1.9211
Frequency-Between Meeting	**Lower**	42	29.1429	21.0555	3.2489
	Higher	48	34.7604	23.3425	3.3692
Frequency-Electronic Meeting	**Lower**	42	25.4167	20.3607	3.1417
	Higher	48	29.9688	16.5569	2.3898
Importance-Same Time/Location	**Lower**	42	15.4762	12.0284	1.8560
	Higher	48	22.7083	14.0326	2.0254
Importance-Between Meeting	**Lower**	42	32.7857	23.6442	3.6484
	Higher	48	34.6458	24.5454	3.5428
Importance-Electronic Meeting	**Lower**	42	26.4048	20.6947	3.1933
	Higher	48	29.5521	17.8383	2.5747

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Mean	
									Lower	Upper
Team Use	Equal variances assumed	6.807	.011	-1.485	87	.141	-.27	.18	-.63	9.15E-02
	Equal variances not assumed			-1.454	70.913	.150	-.27	.19	-.64	.10
Precisely	Equal variances assumed	5.342	.023	-2.008	84	.048	-.53	.26	-1.05	-5.20E-03
	Equal variances not assumed			-1.977	74.716	.052	-.53	.27	-1.05	3.99E-03

Training	**Equal variances assumed**	.086	.771	-.980	86	.330	-.30	.30	-.90	.31
	Equal variances not assumed			-.980	84.615	.330	-.30	.30	-.90	.31
Frequency -Same Time/Location	**Equal variances assumed**	3.335	.071	-3.086	88	.003	-8.2128	2.6610	-13.5010	-2.9246
	Equal variances not assumed			-3.113	87.994	.003	-8.2128	2.6384	-13.4562	-2.9694
Frequency -Between Meeting	**Equal variances assumed**	.261	.611	-1.192	88	.236	-5.6176	4.7130	-14.9837	3.7486
	Equal variances not assumed			-1.200	87.910	.233	-5.6176	4.6805	-14.9192	3.6841
Frequency -Electronic Meeting	**Equal variances assumed**	2.843	.095	-1.169	88	.245	-4.5521	3.8934	-12.2895	3.1853

	Equal variances not assumed			-1.153	79.077	.252	-4.5521	3.9473	-12.4090	3.3048
Importance-Same Time/Location	**Equal variances assumed**	3.482	.065	-2.606	88	.011	-7.2321	2.7757	-12.7482	-1.7161
	Equal variances not assumed			-2.633	87.968	.010	-7.2321	2.7472	-12.6917	-1.7726
Importance-Between Meeting	**Equal variances assumed**	.014	.907	-.365	88	.716	-1.8601	5.0983	-11.9920	8.2718
	Equal variances not assumed			-.366	87.167	.715	-1.8601	5.0855	-11.9678	8.2476
Importance-Electronic Meeting	**Equal variances assumed**	1.890	.173	-.775	88	.440	-3.1473	4.0614	-11.2185	4.9238
	Equal variances not assumed			-.767	81.566	.445	-3.1473	4.1020	-11.3081	5.0135

T-Test - H8

Group Statistics

	Dependency	N	Mean	Std. Deviation	Std. Error Mean
Routinization	**Lower**	42	67.12	51.44	7.94
	Higher	48	67.21	62.97	9.09
Routinization - Cycles	**Lower**	42	53.98	45.84	7.07
	Higher	48	54.02	54.54	7.87
Routinization - Passages	**Lower**	42	13.14	9.90	1.53
	Higher	48	13.19	11.36	1.64
Infusion	**Lower**	42	7.33	4.18	.65
	Higher	48	9.40	4.25	.61
Infusion - Same Time/Location	**Lower**	42	1.45	1.42	.22
	Higher	48	2.17	1.42	.20
Infusion - Between Meeting	**Lower**	42	2.95	2.42	.37
	Higher	48	3.71	2.47	.36
Infusion - Electronic Meeting	**Lower**	42	2.93	2.16	.33
	Higher	48	3.52	2.05	.30

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Mean	
									Lower	Upper
Routinization	Equal variances assumed	2.148	.146	-.007	88	.994	-8.93E-02	12.23	-24.39	24.22
	Equal variances not assumed			-.007	87.610	.994	-8.93E-02	12.07	-24.07	23.89
Routinization - Cycles	Equal variances assumed	1.207	.275	-.004	88	.997	-4.46E-02	10.71	-21.32	21.23
	Equal variances not assumed			-.004	87.869	.997	-4.46E-02	10.58	-21.08	20.99

Routinization - Passages	**Equal variances assumed**	1.011	.318	-.020	88	.984	-4.46E-02	2.26	-4.54	4.45
	Equal variances not assumed			-.020	88.000	.984	-4.46E-02	2.24	-4.50	4.41
Infusion	**Equal variances assumed**	.032	.859	-2.313	88	.023	-2.06	.89	-3.83	-.29
	Equal variances not assumed			-2.316	86.773	.023	-2.06	.89	-3.83	-.29
Infusion - Same Time/Location	**Equal variances assumed**	.476	.492	-2.383	88	.019	-.71	.30	-1.31	-.12
	Equal variances not assumed			-2.383	86.446	.019	-.71	.30	-1.31	-.12
Infusion - Between Meeting	**Equal variances assumed**	.041	.840	-1.464	88	.147	-.76	.52	-1.78	.27

	Equal variances not assumed			-1.466	86.837	.146	-.76	.52	-1.78	.27
Infusion - Electronic Meeting	**Equal variances assumed**	.670	.415	-1.334	88	.186	-.59	.44	-1.47	.29
	Equal variances not assumed			-1.329	85.099	.187	-.59	.45	-1.48	.29

T-Test - H9

Group Statistics

	Dependency	N	Mean	Std. Deviation	Std. Error Mean
Computer Self-Efficacy Score	**Lower**	41	72.17	16.38	2.56
	Higher	47	75.17	15.17	2.21
Perceived Ease of Use	**Lower**	42	42.71	13.42	2.07
	Higher	48	37.83	15.27	2.20
Intention to Use	**Lower**	42	16.57	5.68	.88
	Higher	48	14.48	5.07	.73
Usefulness	**Lower**	42	34.33	11.86	1.83
	Higher	48	31.79	9.36	1.35

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Mean	
									Lower	Upper
Computer Self-Efficacy Score	Equal variances assumed	.048	.826	-.891	86	.375	-3.00	3.36	-9.69	3.69
	Equal variances not assumed			-.887	82.210	.378	-3.00	3.38	-9.73	3.73
Perceived Ease of Use	Equal variances assumed	.488	.487	1.600	88	.113	4.88	3.05	-1.18	10.94
	Equal variances not assumed			1.614	87.997	.110	4.88	3.02	-1.13	10.89
Intention to Use	Equal variances assumed	.977	.326	1.847	88	.068	2.09	1.13	-.16	4.34

	Equal variances not assumed			1.833	82.936	.070	2.09	1.14	-.18	4.36
Usefulness	**Equal variances assumed**	.398	.530	1.135	88	.259	2.54	2.24	-1.91	6.99
	Equal variances not assumed			1.118	77.733	.267	2.54	2.27	-1.99	7.07

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