

Using Dual Structural Theory to Explore the Adoption of Groupware:
The Role of Task-Technology Fit

by
Carolyn Deanne Andruski Hall

Submitted to the Faculty of Extension

University of Alberta

In partial fulfillment of the requirements for the degree of
Master of Arts in Communications and Technology

September 2003

Acknowledgements

Designing this research project has been challenging and, on many occasions quite daunting. Although the formulation of this research study began in January 2002, for some time before that, I had interest in researching teamwork and collaboration. Participating in the Master of Arts in Communications and Technology program has allowed opportunities for me to learn and understand the creative possibilities and constraints of using computer-mediated communications technology for online learning. Consequently, I have deepened my personal interest in virtual teams and how they can leverage technology to enable communication and collaboration.

Many organizations espouse the importance of teamwork, collaboration, cooperation and coordination. Yet, often no more than lip service is paid to these noble aims. When teams form, they often have no clear direction or sense of what it means to collaborate and work together for mutual benefit. There is generally a common agreement about tasks that need to be done, but often little understanding of the other important elements of group dynamics (e.g., inclusiveness, trust, common vision and effective interpersonal communication) especially given the relatively lean media richness of computer technology as a communication vehicle.

Therefore, teamwork and collaboration were the general areas of interest that I wanted to tie into my research study. This, of course is a very broad topic, which had to be honed and narrowed to a manageable scope. Through an initial five-month period, a more focused research design began to take shape – it was massaged, chipped at, reviewed, unglued, deconstructed, strengthened, mulled over, revised and finally, more clearly defined.

For this to occur required the guidance of experienced academic researchers, instructors and supporters within my personal and professional networks. I would sincerely like to thank Dr.

Ron Sept to whom I am deeply indebted for providing timely support, sage advice and encouragement at critical moments on how to formulate a research project that was manageable, that tied into my general area of interest and was academically sound. I am equally grateful to my MACT 2001 cohorts for their suggestions and ongoing encouragement, especially in those times of despair, when, due to sleep deprivation and information overload, I doubted whether I could complete this process. Additionally, I would like to thank Dr. Dianne Conrad, Dr. Marco Adria and Susan Petruszczuk for coming to my rescue at various times of need in the MACT program. I am most grateful for the support of Dr. Kirby Wright, my project supervisor, who provided practical guidance to complete this study. I would like to extend heartfelt gratitude to the research participants and sponsors who gave willingly of their time and offered both candid comments about their experiences with and very helpful recommendations regarding use of groupware technology. I am most appreciative of their insights, sense of humour and willingness to explore, in depth, the impact of groupware as a tool to achieve their virtual team goals. Finally, I would like to acknowledge the support of my children, Michael and Christyn, and husband, Wayne, for believing in my ability to complete this academic journey successfully.

Table of Contents

Acknowledgements	1
Abstract	5
Introduction	6
Purpose of the Research	7
The Research Questions	8
Literature Review	8
Defining Virtual Teams	8
- Supporting Roles for Virtual Teams Using Groupware	8
Overview of Groupware	10
Defining Groupware	11
Taxonomy and Work Task Applications of Groupware	12
Challenges and Issues Around Adoption of Groupware Technology	12
Groupware Research	13
Theoretical Frameworks: Modified Structuration Theories	16
- Duality of Technology Model	16
- Adaptive Structuration Theory	18
- Modified Duality of Technology Model	18
Collaborative and Communication Needs of Virtual Teams	19
Methodology	20
Defining the Case	20
- The Research Participants	20
- Access	21
- Selection	21
- Ethical Treatment	23
Data Collection	24
- Pre-test of Data Collection Instruments	24
- Interviews with Experienced Users	24
- Interviews with New Users	25
- Keeping Track of the Data	26
Data Analysis	26
Findings	27
Experienced Users' Experiences with QuickPlace	27
- Information Database and Repository	28
- Project Management	28
- Communication and Collaboration	29
- Overall Factors Contributing to Adoption of QuickPlace	30
- Barriers to Adoption of QuickPlace	32
- Champions' Predictors for Successful Adoption of QuickPlace	35
Pre-Project New Users' Expectations of QuickPlace Use	35
- Positive Expectations	36
- Negative Expectations	38
Post-Project New Users' Experiences with QuickPlace	39
Discussion and Analysis	44
Pre-Project New Users' Expectations About QuickPlace Use	44
Experienced and Post-Project New Users' Experiences with QuickPlace	46

- Commitment	46
- Ease of Use	47
- Training and Technical Support	48
- Usefulness	49
Relating to the Structuration Theories	51
Conclusion	53
Comments and Considerations	58
References	59
Appendices	62
Appendix A. A Quick Look at QuickPlace	62
Appendix B. Coleman's Taxonomy of Groupware Applications	64
Appendix C. Ethics	65
Appendix D. Sample Cover Letter to Research Participants	71
Appendix E. Sample Consent Form for Research Participants	73
Appendix F. Sample Interview Questions	75
Appendix G. QuickPlace Research Case Study: Example of Categories and Quotes from Case Study Interviews	78
Appendix H. The Long Table Approach to Data Analysis	79
Appendix I. Expectations of New Users About Factors Affecting Use of QuickPlace	81
Appendix J. Summary of Factors Relating to QuickPlace Use by Experienced and Post-Project New Users	82
Appendix K. QuickPlace Applications: Features and Functions Used by Virtual Team Members	83

Abstract

A phenomenological case study approach was used to examine the fit between task and technology as a factor in encouraging members of virtual teams to adopt and use QuickPlace (collaborative groupware). I conducted semi-structured interviews with two groups of participants in a large public organization. The first included eight *experienced* participants (three women and four men) who had used the groupware for at least one virtual team project. The second comprised six *new* users (two women and four men) whom I interviewed prior to using groupware and again after using it over a period of six months to determine if and how the technology had met their virtual teamwork needs. The pre-project interviews determined some of the new users' expectations; the interviews with experienced and post-project new users looked at factors that had an impact on their use of QuickPlace. The results indicated a number of determinants of groupware adoption: a specific defined purpose for using the technology showing it filled a need or benefit had to be clearly obvious; members needed to be competent in and committed to using the technology and working collaboratively at a distance; the technology needed to be easy to use, useful and work effectively and efficiently; a site administrator was available to organize and help customize the website; ongoing technical support was available; a strong project leader was heading the project (familiar with team building and project management skills); and training and time to learn the technology were provided upfront. Those virtual team members who were able to adapt the way they work or customize the technology to accommodate their work preferences, were most apt to adopt the groupware.

Introduction

Teams or small groups are complex social entities that may or may not function optimally, depending on interpersonal relationships, the intricacies of group dynamics and the skills, training, commitment and inherent capabilities of team members to collaborate and communicate. Virtual teams face similar complex issues with the added constraints of being geographically or temporally dispersed. These teams function across “space, time and organizational boundaries with links strengthened by webs of communication technologies” (Lipnack and Stamps, 1997). Organizations aim for speed, flexibility, integration and innovation (Ashkenas et al., 2002), and frequently promote collaboration and goal achievement through teamwork. To successfully engage in teamwork and accomplish their collaborative and communication tasks across organizational boundaries, virtual team members depend on computer-mediated communication (CMC) and digital or electronic technologies. The nature of CMCs and the way virtual team members have customized them or adapted their way of working to use the technology, have added another layer of complexity and richness to the phenomenon of teamwork.

As organizations move to improve the quality and speed of communications and transfer of knowledge, both intra-organizationally and more globally, they require the use of computer-mediated communications and Internet technologies to accomplish those goals. Thus, collaborative technologies such as groupware and teamware are becoming commonplace tools in many workplaces. Groupware, first coined in 1978, now pervades many organization networks (Coleman, 1997). It is estimated that in 2002, there were over twenty million groupware users.

Some of the communication technology capabilities that have been identified by virtual teams to assist them in collaborating and exchanging information effectively include the

following: a repository for common documents; an indexable information storage and retrieval system; chat and discussion thread capabilities; e-mail distribution; anytime, anyplace, anyone capabilities; ability to work on shared documents simultaneously; project management tools (calendars, Gantt charts, milestone logs, “to do” lists); directories; and databases. In addition to these task-related needs for virtual teams, there are interpersonal communication needs that need to be addressed such as trust, supportive group climate, non-threatening environment, strong gatekeeper, facilitator for meetings, inclusiveness and other related factors.

The findings of this research study should benefit those individuals and organizations considering the use of distance collaboration technologies, as it addresses the applications, successes and failures of groupware.

Purpose of the Research

The purpose of this research project was to examine the acceptance and adoption of communication and collaborative technology (specifically, groupware known as QuickPlace) by virtual team members who work in a large public organization. The research focused on the task–technology fit,¹ one of the overarching factors that influence the adoption of collaborative technology. Using the theoretical framework of dual structuration, I studied three main areas: communication and collaboration needs of virtual teams; the ability of groupware to meet those needs; and whether users adapted their work strategies to use the technology or changed the technology to support their work needs. The method of enquiry for this research was a phenomenological case study using qualitative research methods.

¹ For purposes of this paper, task-technology fit is defined as both the ability of the technology, QuickPlace, to meet the communication and collaboration work needs of virtual team members and, the ability of the individuals to adapt their work strategies or adapt the technology in order to meet their virtual team work needs.

The Research Questions

The primary research questions for this study were “How do Internet-based collaborative and communication technologies meet the work needs of virtual team members?” and “How do virtual team members change their work strategies to use this technology or adapt the technology to meet their work needs?” The secondary research question is “What are the communication and collaboration needs of virtual team members?”

Literature Review

Defining Virtual Teams

Warkentin and Beranek (1999) define virtual teams as “groups of individuals engaged in a common task or goal communicating through electronic means, which may be electronic mail, Web-based communications, video and/or audio, but in general have considerable interaction online” (p. 271). For this case study, a virtual team was defined as a group of geographically distributed individuals who use QuickPlace groupware for collaborating and communicating on a mutual team project. Duarte and Snyder (1999) indicate six key competencies required of virtual team members: project management, networking, use of technology, self-management, boundary management and interpersonal awareness (p. 126). Teams working together in the same location are referred to as same place, collocated or face-to-face teams, whereas teams geographically separated are known as non-collocated, distance, dispersed or distributed. Virtual teams rely on groupware to perform various collaboration and coordination tasks which vary widely depending on the project and make up of the team.

Supporting roles for virtual teams using groupware.

Thompson (1998) cites studies that look at four supporting roles needed by virtual teams to communicate and collaborate: manager, auxiliary, facilitator and participant. The role of these

individuals is to assist and support group members in using technology to accomplish their tasks. Orlikowski, Yates, Okamura and Fujimoto (1994) likewise looked at the influence that organizational mediators' interventions had on a group's use of computer conferencing systems. This literature suggested that groupware is more likely to succeed when vigorously promoted and endorsed by influential individuals termed champions. These researchers state that champions and trainers typically intervene in the initial stages of implementing the technology, but usually do not have an ongoing role. The researchers state, however, that not just initial training, but continuous ongoing training is needed for effective technology use. Therefore, the importance of additional roles to ensure use of technology is also noted. Orlikowski et al. (April 1994) cite their studies and other research that recognizes the importance of these additional intervention roles. Mediators (designated and trained supporting staff) serve specific functions such as education, support and administration. They play a significant role in influencing "how users appropriate their technologies and how those technologies are contextualized in certain conditions of use" (par. 6), and providing ongoing guidance. For example, expert users or local gurus, offer advice and support on how to use the technology. These are sometimes termed translators - proficient users who share with less proficient colleagues how they have customized the technology to enable them to work more productively. Technology systems staff may be needed to help with technical problems. Finally, chauffeurs are those who actually relieve users of the need to interact directly with the technology (e.g., posting, setting up databases, archiving, customizing the folders).

Cole (1994) says, "The communication style of the leader, in addition to the leader's usage patterns, influences the team's use of groupware" (p. 8). If the leader regularly uses the technology and exhibits a positive attitude that collaboration and sharing information via

groupware is valuable, the team is more apt to adopt and use the technology. Cole indicates this type of modeling is essential reinforcement because it suggests the groupware exists for real business reasons – important enough to motivate the leader to use it.

Overview of Groupware

Very simply, groupware is “technology designed to facilitate the work of groups: to enable them to communicate, cooperate, coordinate, solve problems, compete or negotiate” (Usability First online). Although traditional technologies like the telephone and fax qualify as groupware, the term usually refers to technology that uses computer networks (i.e., e-mail, newsgroups, video conferencing, chat). Groupware is typically grouped into two dimensions based on whether users are working together at the same time or at different times, or in the same place or in different places. Same time groupware is termed real time or synchronous; different time groupware is termed asynchronous. Computer-supported cooperative work (CSCW) examines the design, adoption and use of groupware. Some of the most common reasons for using groupware are to facilitate efficient communications (i.e., faster, clearer, more persuasive); enable communication where it would not otherwise be possible; enable telecommuting; cut travel costs; bring together multiple perspectives and expertise; form groups with common interests where it would not be possible to gather a sufficient number of people face-to-face; save time and cost in coordinating group work; facilitate group problem-solving and enable new codes of communication such as anonymous interchanges or structured interactions (Usability First, online).

Defining Groupware

Johansen (1998) defines groupware² as specialized computer aids designed for collaborative work groups. Krasner et al. (1991) explain that groupware is computer technology that actively facilitates collaborating users. Prabhakar and Litecky (1997) state it is a software application targeted at groups and organizations that merges computers, databases and communication technology. Kline and Johnson (2001) define it as “a particular aspect of computer-supported cooperative work pertaining to the computer technologies (both the hardware and the software) that actively facilitates both synchronous and asynchronous communication for decision making by collaborative groups of three or more users” (p. 22).

QuickPlace, a Lotus-IBM Internet-based version of groupware, was designed to support collaboration and communication of virtual team members. Because it is housed on the Internet rather than on a client server, the problems of firewall security are overcome for partners external to an organization. This opens up accessibility to participants who work outside the organizational boundaries. The virtual team Internet sites also have the advantage of accommodating multiple platforms (i.e., UNIX, PC and Mac) and software (e.g., Word Perfect, Microsoft Word, MS Excel, MS Access). More details about QuickPlace can be found in Appendix A.

This literature review describes the taxonomy of groupware applications; highlights the challenges and issues around adoption and implementation of groupware systems; and, suggests the theoretical frameworks and models that relate to the adoption of new computer-mediated communication technology. It will, for the most part, focus specifically on one determinant of adoption: the usefulness and capacity of the technology to enable completion of tasks by team

² For purposes of this paper, the following words will be considered relatively synonymous: groupware, teamware, group decision support systems (GDSS), collaborative technologies, computer-mediated communication and computer supported cooperative work (CSCW).

members who are geographically and temporally dispersed. Simply, it looks at the fit between task and technology as a determinant of whether the technology will be used and adopted by a virtual team.

Taxonomy and Work Task Applications of Groupware

Coleman (1997a, 1997b) defines twelve categories that form a logical taxonomy of groupware applications and their use by virtual team members. These categories include electronic mail and messaging; group calendaring and scheduling; electronic meeting systems; desktop and real time data conferencing; non real time data conferencing; group document handling; workflow; workgroup utilities and groupware development tools; groupware frameworks, services and applications; and Internet-based applications for collaboration. Examples and descriptions of these categories are included in Appendix B. QuickPlace includes all the applications mentioned above with the exception of desktop video and real time conferencing (e.g., instant messaging, white boarding), real time electronic meeting systems, and some workflow and vertical groupware applications.

Challenges and Issues Around Adoption of Groupware

Groupware is heralded as a technology tool by which virtual teams can communicate and collaborate on team projects. However, there continue to be many instances where the purported benefits of groupware have not met user expectations resulting in the non-adoption of the technology.

Over the past fifteen years, groupware has been studied in the fields of information technology and management, computer science, computer-supported cooperative work and recently, in organizational psychology. Many of these groupware research studies have looked at the problems encountered with acceptance and adoption of the technology.

Groupware Research

In his Technology Acceptance Model (1986), Davis indicates four elements of user acceptance: attitude toward the task and groupware; social pressures to do the tasks and use the groupware; perceived usefulness of groupware; and ease of use.

In their research, Prabhakar and Litecky (1997) asked, “What are the factors that influence the adoption and use of Internet-based collaboration software by distributed teams?” (p. 1). They looked at structures and processes related to managing virtual teams. Best practices in applying groupware to manage virtual projects included having a formal implementation plan, clearly defined goals and metrics and a charter that includes its purpose, scope, schedules and deliverables. Additionally, orientating and training team members to become familiar with the technology and its use in context were noted as important for acceptance of the technology. As with regular teams, determining expectations, accountability and decision-making norms were other important factors for virtual teams to work collaboratively.

Grudin (1994) states that while computer support has focused on organizations and individuals, the needs of groups are different, and technology has not met those needs. He reports that repeated expensive groupware failures have been the result of either not meeting the member’s work needs or not addressing the evaluation issues that have arisen. His studies indicate it is important to “identify a group’s problems and match the computer solution to it” - to match the task to the technology tool. Depending on geographic proximity, dispersed teams need to determine their communication and collaboration needs and decide on a number of technology choices. For example, is it better to use voice or electronic mail; employ synchronous or asynchronous data conferences; or have structured or unstructured meeting processes. They also need to determine who are the right team players (i.e., those with the right combination of

experience, skills, knowledge and attitude for collaborative work). Grudin indicates that management attitude, technical support, follow-through support and having technology champions are also important considerations that have an impact on the use and adoption of groupware.

Other studies similarly looked at the relationship of the fit between technology and task to the adoption and use of groupware. McGrath et al. (1993) posit technology affects task performance depending on the degree of fit between the technology and the group, its task and the context of the action. Cole (1994) and Thompson (1998, par. 4) describe the social factors that influence a team's use of groupware, particularly "process and task fit" in which technology, work practices and cultures are aligned to facilitate improved flows of work and communication. Thompson (1998) says a good fit supports the team in using groupware to get their work done and to realize benefits. Synteta (1998) agrees, explaining failure of adoption is due to the "lack of appropriate individual benefit." Thompson (1998) further recognizes the valuable role of groupware within the organizational culture, and in some cases, a need to mandate minimum usage. On the other hand, Mark and Poltrock (2001) report successful adoption of data conferencing technology at the Boeing Company through grassroots implementation rather than mandated implementation. Igarria and Guimaraes (1995) determined that perceived usefulness and perceived ease of use had an impact on user acceptance of microcomputer technology. Parnisto (1996) reports studies indicating the following factors as influencers of adoption of groupware technology: fit between task, technology and organizational structures; communication contexts; and, processes through which potential adopters learn about and develop attitudes towards innovations, particularly the attributes, opinions or actions of leaders.

Kline's research (1997) on adoption of groupware stems from observations that studies of end-users of technology in real work contexts had been neglected. Her work, therefore, initially involved a qualitative field study approach to generate the variables that foster or hinder adoption of groupware. Kline found that the primary variables that fostered effective use of groupware were ease of use (i.e., having an intuitive user interface); accessibility; amount of training, technical support and time to learn to use the system; meeting the user's communication and collaboration needs; and senior management setting an example by using the technology. Furthermore, the study determined that if using the groupware were perceived as saving money and time, it would more likely be adopted. Additionally, both the hardware and software needed to be reliable and data kept current for adoption to occur.

Factors that hindered use were lack of privacy when using the system; no buy-in of users; inadequate training; inadequate hardware; expensive to maintain; no technical support available; no compatibility with old systems; lack of organizational commitment; and, information overload. Additional elements that hindered use were if virtual meetings were not structured and there was no facilitator to keep discussions on task.

Based on these findings, Kline (2001) further developed and tested a groupware adoption scale "to assess why users are committed to using their systems or why they are not." This scale has been validated through field study and can be used by organizations to evaluate why a new system is or is not being used and to determine where intervention may assist in fostering adoption (2001, p. 61). The elements of this groupware adoption tool that influence whether the technology will be adopted include ease of use, training, technical support, consultation, ability to meet work needs and system capabilities correlated with degree of commitment to use the new system (p. 62). In another study, Kline and Johnson (2001, p. 31-2) identified five variables

necessary for promoting user acceptance and adoption of groupware: “organizational commitment and buy-in of everyone; ease of use of the groupware (i.e., user friendly, freedom from technical difficulties, compatible with existing hardware and software, acceptable learning curve); perceived usefulness of groupware (i.e., benefits are noted, work performance has improved and there is a saving of time and/or money; adequate training (e.g., sufficient time to learn the groupware, individualized training); and, adequate, ongoing technical support (e.g., available manuals and online help, available technical staff)” (p. 32). These factors link closely to the fit between task and technology.

While many of these studies have looked at why groupware has failed, Palen’s (1998) study of Sun Microsystems’ use of calendar management technology, shows widespread adoption and successful use of one groupware application. Palen looked at the ability of technology to support coordination of user interactions (p. 71). She indicates that the “viability of groupware technology depends upon the effectiveness of the technology for individual support, the constraints of technological design and the technology’s consonance with the socio-organizational environment with respect to individual behaviour and group-level coordination” (p. 122). Palen concludes there needs to be a good fit between the technology and the work needs of individual users. How does this extant body of work fit into the theoretical frameworks of scholarly research?

Theoretical Frameworks: Structuration Theories

Duality of technology model.

Structuration is a social process “of reciprocal interaction of human actors and structural features of organizations” (Orlikowski, 1992, p. 400). In her work with Lotus Notes, Orlikowski (1992) uses a technology-structuring perspective to examine computer-mediated communication

technologies, predominantly in the field of information technology. She posits a *duality of technology model* that examines the interaction between technology and organizations, blending the polarized imperatives of technology and social construction (termed *strategic choice*). The *technology imperative* views technology as an objective external force, which has a strong effect on organizational structure. It provides insights into how technology (in this instance, considered the independent variable) is used and how it plays a deterministic role in how users behave, or how they do their work (Palen, 1998, p. 69). This contrasts with the *strategic choice imperative* that focuses on the human (structural) aspects of technology and supports the view that technology (here, considered the dependent variable) is the outcome of strategic choice and social action of users. Orlikowski further explains, “technology is created and changed by human action [upon it], yet it is also used [as is] by humans to accomplish some action” (Palen, p. 70). Yates and Orlikowski (1994) add that users of electronic communication technologies structure the types of communication they use – sometimes using the established rules, other times changing them to fit their need (p. 4). Thus, technology is understood to be a dynamic human construction and this part of the dual technology model provides insights into how technology is interpreted, customized and used.

Orlikowski builds her duality model of technology using Giddens’ *theory of structuration* and *duality of structure formulation*, which “overcomes the dualism between objective structural features [of technology] and subjective, knowledgeable action of human agents” (Palen, 1998, p. 69). She also draws on the work of DeSanctis and Poole who developed the adaptive structuration theory to characterize the role of technologies such as decision support systems (groupware) in group functioning (Orlikowski, 1994).

Adaptive structuration theory.

DeSanctis and Poole looked at “how groups appropriate decision support technologies in support of their tasks and how such appropriation produces intended and unintended structural and decision outcomes” (Orlikowski, 1994, p. 3). The adaptive structuration theory (AST) posits that

when a technology is applied to a group, that group already has existing rules, resources and structures to which it adheres. Thus any technology introduced will be appropriated and adapted by the group in such a way as suits the group’s purpose. This structuration results in configurations and usage of the technology that are peculiar to each group.

This theory has direct links to the socio-technical theories of the 1950s. These indicated that introducing technology into an already existing social system would result in productivity gains that are not predictable. Members of that social system will change the technological innovation to fit how they normally interact and conduct business (Kline, 1999, p. 267).

Modified duality of technology model.

Palen (1998) proposes an analytical model that extends Orlikowski’s dual technology (structural) model. In her model, Palen pulls out individual users, technology and social environment to explain more thoroughly the effects and consequences of a situated use of groupware systems. Palen’s model links groupware technology more directly to communication and collaboration whereas Orlikowski’s deals more with information technology (Palen, p. 71). These theories and models have formed the framework for exploring the adoption and adaptation of QuickPlace teamware by virtual team members in a large public organization.

One reason for failure to use and adopt groupware is related to its usefulness. A lack of fit between the user’s need to collaborate and communicate and the capacity of technology to enable these processes, have resulted in poor or no long-term use of groupware. In other words,

one needs to ask, “Does the technology enhance or support the work needs of users?” To answer this question, an exploration needs to occur to determine what the collaborative and communication needs of virtual teams are and what applications may ultimately meet those needs.

Collaboration and Communication Needs of Virtual Teams

Kline’s Groupware Adoption Scale (2001) assesses how well and why users of groupware have or have not adopted this collaborative technology. My research has focused particularly on the “work needs met” subscale of Kline’s groupware adoption scale. I have attempted to determine the degree of fit between task and technology – how the technology capabilities of QuickPlace met or did not meet the users’ work needs and the ways that users have adapted the technology to meet their needs.

Further, I endeavoured to determine whether the ability to adapt or customize the groupware - to make it more useful - had an effect on adoption. Based on Orlikowski’s duality of technology model and Palen’s extension to that model, I suggested that, if users are able to adapt the fairly customizable technical features of QuickPlace to meet their work needs more closely, they are more apt to adopt the technology.

Collaborative communication technologies are not one-size-fits all. Individuals and groups have different needs and constraints that dictate the way they use technology (Palen, 1998, p. 124). Users modify the technology attributes as much as possible using features in unintended ways to suit their work practice and to align the new technology with their usual way of conducting business. I have explored some adaptations of technology thus tying the research into the adaptive structuration theory.

Methodology

This section describes the overall methodology and specific details about the research project: defining the case study; access to and description, selection and ethical treatment of research participants; data collection and research instruments; and, the data analysis methods.

Defining the Case

According to Rossman and Rallis (1998), a case study is an exploration and intensive study of one specific instance, or “of one single entity or phenomenon (an event, process, organization group or individual)” in order “to understand a larger phenomenon” (p. 70). The mode and methods of qualitative research for a case study are “descriptive, heuristic and inductive...[and use] multiple techniques” (p. 68). Description helps illustrate the complexities of a phenomenon, and over time, shows how events, perspectives and opinions have changed. In this research project, I interviewed participants prior to their online experience with QuickPlace and again after they used the technology. Through this case study format, I determined whether the participants’ perception of technology in terms of meeting their work needs had been met or had changed and how that affected their acceptance and adoption of it.

The research participants.

This research project explored the experiences of members of a virtual team who, for the most part, were first-time users of QuickPlace (QP) technology; these are termed ‘new users’. Although most new users had not used QuickPlace before this project, some had used similar groupware or were involved simultaneously in other QP projects. Thus, the definition of new users became less clear as the interviews progressed. My study also explored and described the experiences of technology champions and experienced project team leaders and key users of QuickPlace, defined collectively as ‘experienced users’. Champions are those experienced users

who initiated QuickPlace pilots in the organization or had been involved in QuickPlace training of team members. Project team leaders are individuals who were project managers and often the gatekeepers of the QuickPlace documents. Key users are virtual team members who had participated in at least one project using QuickPlace technology. One other term that has since been necessary to define is that of site administrator, which seems a more logical term than gatekeeper. Site administrators are those individuals who set up the QuickPlace website, organize it into folders and rooms, index the documents, keep the site maintained and archive old files. At times, they have also been technology trainers for the other virtual team members.

Access.

Over the past year and during the time of my research study, the organization, within which this study was conducted, piloted and supported a number of virtual teams using QuickPlace technology. The organization's QuickPlace champions and sponsors approved this research study and provided a list of new and experienced users for my research.

Selection.

From the organization's list of experienced users, I contacted potential research participants by e-mail, telephone or in person. A total of eight experienced users were selected for interviews. Of these, two were the organization champions, four were project managers and the others were virtual team members.

The main criterion for selecting new users was to identify those individuals who had not used QuickPlace technology or had not yet started a virtual group project that was using QP technology. In September 2002, two new virtual teams were starting their team projects incorporating QuickPlace as the communication and collaboration medium. This provided an opportunity to capture valid expectations of participants prior to their embarking on the virtual

team project and using the QP technology. New users from these teams were contacted through a list provided by the champions. Six new users were selected of whom three were project managers. All but one were from the same project team. Having new users from only one team had the advantage of a common 'environment' and thus this variable could be kept constant for this team. On the other hand, results from a second team meant that glitches and biases facing one team would be different from the other team and different perspectives could be captured. The main project team started with one manager, who was very enthused champion, committed to using QuickPlace. However, early in the project, this individual left and a different manager assumed the project. Consequently, the team project and my study were delayed and the team dynamics, project objectives, expectations and level of commitment may have changed somewhat.

Initially, the case participants were to include both non-located members from within the organization and external partners beyond the organizational boundaries. As it turned out, the project was still in its infant stages (primarily the collection of information) and external partners did not actively participate in this phase of the project. Hence, the need for a teamware technology was perhaps premature to this project. The research organization has a well-oiled Lotus Notes database and intranet that could have worked effectively for the team, who, although dispersed geographically, were all internal members of the organization.

For those participants who were geographically dispersed, I either travelled to their location to interview them in person, or arranged to interview them when they were in the area or contacted them by telephone. The local participants were interviewed in person on the organization's premises. There may have been some differences in results depending on whether interviews had been done by telephone or in person due to the nature of face-to-face

communication. As much as possible, in person interviews were undertaken. This is a limitation of the research design.

Ethical treatment.

An essential element of the research project was to acquire approval from the University of Alberta Faculties of Education and Extension Research Ethics Board. Information about the research study's purpose, significance, research methods and procedures for observing ethical guidelines was provided and approved in July 2002 (see ethics application, Appendix C). Participants were fully informed of the purpose, methodology and use of the findings of this study through a cover letter sent to potential participants inviting them to participate (see sample letter, Appendix D). A consent form was attached for participants to sign before embarking on the research study (see sample consent form, Appendix E). I obtained informed written consent of participants prior to starting the research study and reviewed the details during the first interview before commencing the taped conversation (i.e., reviewing the options, guarantee of confidentiality and anonymity, permission to tape, etc.).

Assurances were given that deception would not be used in collecting the data or in publishing the findings. Anonymity and confidentiality of the source of collected data were prime considerations in this study. Only I had access to the taped interviews, interview transcriptions and notes. All subsequent documents reporting the findings and results have been prepared with no names or reference to specific projects or organizations ensuring non-identification of participants. These documents will be kept in a secured storage facility for five years in accordance with research ethics requirements. Although participants were encouraged to complete the research study, they were able to opt out of the research project with no penalty. They could also choose to opt out of answering any questions they deemed inappropriate. Two

new users participated only in the first interview. All others completed both pre-project and post-project interviews.

Data Collection

Pre-test of data collection instruments.

Before using the interview questions in this research project, I pilot-tested them with two individuals who had not used QuickPlace technology and were not included in the study project. The pilot test ensured the questions were understandable, held common meaning for interviewer and interviewee and related clearly to answering the research questions. Ultimately, I used one main research strategy for data collection in this case study - semi-structured interviews either in person or on the telephone with both experienced and new users.

Interviews with experienced users.

I first conducted interviews with experienced users. In person interviews were taped. Notes were taken for both the in person and telephone interviews. A total of eight interviews were conducted: one group interview with three individuals, three individual in person interviews and two telephone interviews. Open-ended questions were used as a guideline to conduct the interviews. Following the lead of the interviewee's answers, these preliminary questions often led to other questions, not part of the guidelines (see preliminary questions, Appendix F). The purpose of the interviews was to learn about the key issues and problems related to work needs that had arisen during the pilot phases of the organization's QP projects. The questions for the interviews related to the types of communication and collaboration tasks that are required by virtual teams and the abilities of the technology to support those needs (e.g., technology to enable the organizing and sharing of documents, indexing, editing common documents, synchronous and asynchronous online discussion, etc.). Questions were also

developed to gather information about the group dynamics of virtual teams (need for collaboration and communication, issues of trust, etc.) and how the technology either did or did not meet these needs; how users may have adapted their work style to use the technology; or how the technology was adapted or customized by the users. These findings were analyzed, interpreted and synthesized. The main findings were used to develop questions for the new users' interviews.

Interviews with new users.

For new users, data were collected through two semi-structured interviews: one conducted prior to using QuickPlace technology (known as the pre-project interview with pre-project new users) and one after (known as the post-project interview with post-project new users). Interview questions were developed along with a script to introduce and explain the purpose of the interview and its length (approximately one hour for the pre-project interview and half an hour for the post-project) (see pre-project interview questions for new users, Appendix F). A list of questions was not provided ahead of time to the new users.

The intent of the pre-project interview was to assess new users' expectations, attitudes, opinions and perceived needs for communication and collaboration technology for virtual teams (i.e., what the new users stated as their needs for virtual team work and how they perceived the technology might meet those needs). The questions also addressed the collaboration and communication strategies they typically used to conduct virtual teamwork and user's level of expertise or comfort with computers and CMC technology. This established baseline data on how virtual teamwork was currently conducted (e.g., how documents are shared, edited, stored and transmitted; how meetings were conducted; use of e-mail, teleconference, Lotus Notes folders, etc.).

Because of a change in project manager, there was a delay in getting this team project underway. Furthermore, this first phase of the team project ultimately did not include external partners and the team members did the bulk of the work independently. Most of the individuals on the virtual team remained relatively inactive and thus did not use QP until the specific product information had been collected and entered on a database on the QP site. Approximately six months after the initial data collection, I conducted post-project interviews with the research participants to get in depth information about how they had used the technology to meet their communication and collaboration needs, and whether they adapted the technology or changed their own way of working to use the technology. All the taped interviews were transcribed and analyzed to determine whether the expectations and perceived needs were met and what actual experiences had manifested.

Keeping track of the data.

The taped interviews, accompanying transcripts and notes were filed together by name, assigned a coded letter and dated for ease of retrieval. Once the analysis began, the data were filed by theme area or category of responses and letter coded along with page and line numbers for retrieval of quotes and examples (see sample, Appendix G).

Data Analysis

Krueger and Casey (2000) indicate there are four main ways of capturing data from interviews: complete transcript, abridged transcript, notes and memory (p. 130). For purposes of this research case study, the *complete transcripts* along with interview notes were used. The telephone interviews were not taped; therefore, only notes were used. Questions were sent electronically to the experienced users (interviewees) prior to the telephone interview.

Once the verbatim interviews were transcribed, I identified salient themes, recurring ideas, perspectives, descriptions, language and patterns of belief that responded to the research questions as suggested by Rossman and Rallis (1998, p. 178). These were chosen as key responses that depicted the phenomenon of the work needs of virtual teams. The long table approach to data analysis was used to synthesize data from the transcripts. A description of this process is included in Appendix H.

Findings

In this section, I describe the findings of the experiences of experienced users – the QuickPlace functions and features used, overall factors contributing to the adoption of QP, barriers to adoption and the champions' predictors of successful adoption. Following that, I present the findings of new users' expectations before using QP technology and their experiences after using the groupware.

Experienced Users' Experiences with QuickPlace

I interviewed eight experienced QuickPlace users including four project managers, two organization champions and two team members. Six were interviewed in person and two by telephone. This segment describes the experiences of these participants in using QuickPlace.

Uses of QuickPlace that assisted experienced users in the work functions of virtual teams fell generally into three broad categories: (1) a database repository for storing data and information; (2) a project management tool used primarily by some, but not all project managers and leaders; and (3) a communication vehicle and collaboration tool to exchange and access information relevant to the group's achievement of tasks.

Information database and repository.

Unanimously, the experienced users stated the primary function for QuickPlace is as a repository or central filing system for a project's meeting agendas, minutes, articles, reports, surveys, terms of reference and other relevant documents. For example, one participant stated,

I think that what you will find is that most of the groups will end up using this as their central filing system (the repository core). That will be the biggest use of it. When I was down in — listening to the IBM Gartner Group session earlier this spring, they said in their case as well, QuickPlace is primarily used as a repository for information about a common topic... just as we have people working across organizational boundaries, they have the need for that kind of thing rather than some of the other functions. For project management, timetabling and things like those, they will get some use, but I don't think these will be the key feature where people say this is what QuickPlace is all about.

Project management.

One champion stated, "As a project management tool, QuickPlace will get limited use unless it is used for a 'linear construction process' such as construction building." Another champion, however, stated at least one project manager was using the project management applications to organize and keep track of the administrative tasks and coordinate multiple teams under her area of responsibility. He explains:

For example, the — Network, where one individual had the job of communicating with so many teams, agendas and minutes, she was drowning in the administrative task of keeping this all up to date. Having it all in one place where she could send out the e-mail saying "go look", simplified her life so much. It was a QuickPlace that met her work needs and was designed just for her to manage her projects.

Two experienced project managers used QuickPlace project management tools. One used these extensively for conference planning, funding proposals, reporting and task reminders for project deadlines, engaging functions such as the Gantt chart, calendaring, "to do" lists, task notifications and terms of reference for roles, responsibilities, actions and deadlines. This manager noted it is important to understand project management skills first, stating "the QP

project management tool can be applied to manage the project once you understand the concepts of project management.” Clearly the technology met her work needs and thus, she had adopted its functions as indicated below:

I’ve taken a project management course, so I understood how the tasks worked. I think if I didn’t know what this is supposed to look like, I might not have used it. I was looking for this kind of software anyway, and this was in here, so I used it. If I didn’t understand that [project management concepts and processes], I probably wouldn’t have used it. I played around with it and found it worked for me.

Communication and collaboration.

In this broad category, communication and collaboration were addressed. One project manager strongly embraced QuickPlace as a communication tool that enabled inclusiveness for all team members. Because all information is kept in one area, members across organizations have access to pertinent data and documents anytime, anyplace. Team members do not have to remember who was sent what information. With all relevant information and documents posted in one central place, all designated users can access the data.

Contrarily, if members require restriction of certain proprietary information, they can customize the website to limit access to certain individuals. Privileges to allow members to author and publish, edit or “read only” can also be determined. This is important for security and confidentiality.

Two experienced participants frequently used the asynchronous threaded discussions where questions were posted and members responded with answers under ‘Frequently Asked Questions’ in the QuickPlace site index. Three experienced users felt the e-mail update notifications were a useful function that kept them informed or enabled them to update others. Others felt this function was not used appropriately with all messages being sent to all members whether relevant to the recipient or not. Experienced users further agreed that document handling

(publishing, editing, filing) was relatively easy to do and worked effectively, enabling them to achieve collaborative work on pertinent documents.

Overall factors contributing to adoption of quickplace.

One project manager clearly illustrated there must be a clear purpose for using the technology and team members need to see the benefits of using QuickPlace. He stated, “We have been saturated with the message that we need to do business via the Web; but I think the reality is, it is not cool if you don’t need it”. By spending time upfront and determining overall purpose and work needs, a team can select appropriate technology that meets their needs.

I think having purpose is key; these other things are caveats down the road. The main thing is that we’ve got purpose. I think if I were to do this again, we would probably deal with that [purpose] a lot longer upfront and address it.... probably on the phone, both individually and by conference call. I will never lose the value of the telephone. Even though it [conversation] is not documented, there are some things you don’t want documented; and well, face-to-face is the best, but it’s usually not possible. Telephone is still the best communication one-to-one for the moment. I’m not saying it’s the best down the road, because you can’t go back and say, well you said this and I said that, but there are times when you don’t need that – other times you do.

Some participants said virtual team members need to see the benefits and “what’s in it for me” through testimonials from successful teams. They need to be convinced that this technology will save them time with less travel, and allow them to be more efficient in achieving their tasks.

Another positive factor resulting in adoption of QuickPlace is having team members who are attracted and committed to using the technology; they must have the computer skills or a willingness to learn. Furthermore, team members must take personal responsibility for keeping informed by visiting the site.

It also puts the onus of communication on the project person instead of me composing all these e-messages trying to make them look attractive and use colours, and begging somebody, “Please respond.” Now it’s on the website; you’ve got an automatic notification and we’re marching ahead. If you choose not to keep up, that’s your problem.

Content needs to be added regularly to a QuickPlace site and customized to the group's needs for easy retrieval and posting of information. Users also need to be flexible in changing either their method of work to use the technology or customize the technology to enable them to work in a way they prefer.

What people tend to do is define their work styles to the technology. For me, the way I think about things is, I have a way of organizing and have processes for different projects, but it doesn't really matter what the technology is – that is not the way I think. But for some people it is important. They write in a blue scribbler and they have a computer that has a specific program. They can't get past that. If the technology changes, they can't function. Because they define the way they work purely through technology not getting to the point where we say, yes, we have to set our goals and we have to set our measurables, but it doesn't matter how we get there. Some folks say, "I can't use the new program; it looks different. Why can't we go back to the way we used to things in a previous group?"

Frequently mentioned as a factor for adoption was the need for a virtual team to include a QuickPlace site administrator, a strong project leader with competence in project management and teamwork, and a champion of the technology. The process to learn and use the system still remains either overwhelming or to many, not worth the time to learn to use. Several experienced users stated that each team should have a site administrator to set things up and keep it organized - make it simpler for others to just add content and do the information part versus the technology part.

For example, last night we were down in — talking to a group looking at a new alliance arrangement and someone came in and talked about the [detailed] partnership structures. By the end, these guys were saying, "I don't want to go through that". They got overwhelmed with that. It's kind of like they went to the car show and learned how to build a car, and really all they wanted to do was test-drive it. So, what I'm getting at is somebody needs to get this set up, and then [when] other people start to come in and it's somewhat assembled, they are not working through this conceptual landmine area (i.e., "My God, it's organized like a house? What's that about?")

The site administrator somewhat parallels Orlikowski's description of a chauffeur (i.e., those who relieve users of the need to interact directly with the technology by posting, organizing, setting up databases, archiving and customizing folders). For this case study, the term chauffeur might be synonymous with site administrator.

Barriers to adoption of quickplace.

Experienced users stated that some QuickPlace functions did not work properly so they were less apt to use this software. For example, the editing process is confusing and "strange"; Gantt charts and milestones cannot be printed; and, tables do not line up when inserted from Microsoft (MS) Word (it was suggested this may be a formatting problem with programs that convert MS Word to HTML). Furthermore, a feature that would enable synchronous editing of documents and white boarding functions is not available through QP. Several participants felt this would add richness and effectiveness to virtual teamwork and collaboration, particularly for online meetings.

Although QuickPlace is touted as having an intuitive user interface and presumably is easy to use, training is still required to sign on and learn about the basic features. Early pilot teams that did not have any training continue to struggle with the technical applications of QuickPlace and thus do not use the groupware to any great extent. One manager explained that in her research network, various partners from outside the organization were reluctant to consider using QuickPlace technology. They had no training in QuickPlace use and relied heavily on the organization champion to post content and keep the site organized. Because the partners had no need to get involved in QuickPlace other than to read updates, they saw no benefit to learning how to use the technology. The manager describes an "ah, ha!" moment, which was a critical turning point for this team in accepting and seeing the use of the technology. The group observed

a positive 'function-in-action' and realized personal benefit to using the QuickPlace technology as illustrated in this interview:

B: ...in the beginning, we were developing the network. We developed and presented a proposal. And, one of the challenges was that it was new technology for lots of people and so we almost said [collectively], "This is never going to work." There was a situation where we had members down in ___ by their speakerphones and we were up in the ____ [building in City] doing presentations. They were supposed to set up their presentation ahead of time, but didn't, and, we said, 'Well, that's okay. Just go online and post it for us.' And they said, 'We don't know how'. We said, 'We'll tell you how' and we went through step by step. A few minutes later - it didn't take lots of time at all - we just said, 'Click on this, click on this, click on this' and there it was. And here we were hundreds of miles away.

C: So, it was a really positive experience and actually quite simple to do?

B: Yeah, and we needed that kind of "ah ha!" moment because up until then we went, "What the heck? Why are we doing this? You know. Why do we need another tool? You have to have some of those [critical] moments to get the technology up and running."

C: That seems really important - where you can see how to use the technology and that it's an advantage to use it.

B: It's [the technology has] got to help you do things you couldn't do otherwise. We were working with people all over the country and this was a really good example of the positive aspects of the technology where those individuals in _____ could help us develop that presentation from their desk and they could actually work sitting at their desk at do it in real time - it was like a video conference.

Experienced users felt that many virtual teams state they do not have time for upfront training or project management planning; however, they say in most cases, taking this time at the beginning would end up saving time in the long run. They further explain that virtual teams often fail to plan how they are going to work collaboratively and what communication tools are appropriate to achieve the goals of the team. By not taking time to get signed on properly and not taking at least beginner level QuickPlace training, they flounder and remain incapable of using

the technology. One champion stated, “We are a culture that is busy being busy” and mused, “Is this a people (or organizational) issue versus what tool we are talking about using?” He explains,

That’s a tough one for a lot of people to think through. The thought is I am really busy doing this now and I don’t have time to learn. And part of that is a lack of understanding or awareness or belief that by doing something like this, there are good savings down the road.

The basic questions that one should ask are, “Are we truly going to be part of the team - collaborative, contributing, no matter what the tool might end up being? Are those things going to truly contribute that same kind of information to the overall group if done in some other manner? And the answer might be, for a variety of reasons, we are not going to do that regardless [of the tool].

One project manager felt that organization staff might be able to take half to one day for training, but doubted whether private industry would have that opportunity; this poses a problem when external players are part of a virtual team.

One experienced virtual team user was convinced that all team members should have training and be “forced” to use the technology by having an activity as part of the training and expecting new users to try the technology right away.

I think it would be great if when we start up, we actually take a class in QP to force us to use it. No one on our team was forced to use it. Although these people are all busy and that’s the challenge, I think if there was some activity that everybody had to do on QP that actually takes them from a couple of different points. I think that would be really good. Then someone has to follow up with them to make sure they have actually done the activity and help them with any difficulties.

Some members cited the cumbersome process of logging into the QP site as a drawback. Slow landlines were also a major concern leading to non-adoption.

Sometimes we end up going back to our old ways because they are quicker. If it takes me half an hour to sign on and find out where I am going to be and all this and that, I could have written out a fax by long hand and in 30 seconds press send and be done with it.

I think accessibility is going to be a big thing. That was my biggest barrier last time. And stuff on there is applicable. See I’m not so sure posting pictures are

such a good idea. It is kind of nice but kind of useless. I need to access stuff quickly; it has to be pertinent. And I gotta know how to utilize that system, the lingo, the logistics; I've got to know, "What can QP do for me? Is it a powerful tool or is it just 'another' tool?" And, until you know the features, you don't know if it's gonna work. It's like...I've never taken training in Lotus Notes, but again I haven't had the time...but I've learned from other people as well. You know, someone will say, this is really a simple feature and will show me.

Security and confidentiality issues were described as a barrier for researchers who are part of a network using QuickPlace. The manager of one research project felt that the way to overcome this barrier would be through training and demonstrating that you have different levels of security and access on the site. It was suggested that by illustrating to a research network member that she/he can choose to share information with specific individuals rather than with everyone on the team might overcome this barrier.

Champions' predictors for successful adoption of quickplace.

The organization's QuickPlace champions stated a number of overall key predictors of QuickPlace acceptance and adoption. The project must involve geographically dispersed team members; have firewall issues for external partners that can only be overcome with technology like QuickPlace; be of such a size that, if members depend only on e-mail, telephone and face-to-face meetings, the team will be bogged down by information overload and drown in content; and include members who are committed to working collaboratively. It also needs the business management support of a champion, site administrator and project manager.

Pre-Project New Users' Expectations of QuickPlace Use

Six new users, including three project managers, were interviewed in person for the pre-project phase. Four of these were geographically dispersed. Collectively, they had medium to high expectations about the benefits and capabilities of QuickPlace to meet their virtual team work needs. This segment describes their expectations about the use of QuickPlace prior to

starting their virtual team project. A summary of positive and negative expectations about factors affecting the use of QuickPlace can be found in Appendix I.

Positive expectations.

Most project team members felt they would save travel time with fewer face-to-face meetings because they could share information, make team decisions and solve problems online.

I think it is going to be the right kind of technology for us to use...The rest of us – we have children – we just can't keep doing all this driving. It is ridiculous. Since I came to this job, my driving has expanded every year – I am averaging 60,000 kilometres a year on my work vehicle, never mind all my personal driving. That is not sustainable as far as I am concerned.

All six new users stated that having a central database with access to documents in a single collection point (a repository) was a key benefit of using QuickPlace. They would be able to trace discussion threads, keep track of the chronological order of document revisions and have a history of the project as it developed.

I think the big thing is for the people outside [the organization] to be able to get in --- the biggest thing is everything is going to be in one place. The problem with simple e-mail systems is that unless people create folders - are cognitive of taking those e-mails and putting them in those folders - e-mails tend to get lost often and even hard copies, that's another problem. You don't want to always be printing out a hard copy of everything that you get, otherwise why have an e-mail system? So, I think it's kind of a single gathering point for information that you know if it's there, it's there, and you don't have to worry about whether you deleted that e-mail, or ask, "Where is that hard copy?" That is kind of nice.

Three research participants thought the automatic e-mail notification would be very useful and that the team would benefit from being able to customize folders and organize documents on the site according to their needs. Two project managers appeared to be computer savvy, in general, and saw possibilities for customization and organization of project reports and documents; one expected to use the project

management tools. The other two project managers felt they would continue to use their own way of managing projects not based on QP technology.

The scheduling capabilities, such as calendaring, were seen as beneficial but only if all team members were committed to using them. Based on experience with other intranet groupware like Lotus Notes, most felt the collective use of calendaring, for example, was doubtful.

At this early stage of the team projects, external partners were expected to be actively involved. Therefore, the ability of external team members to access the team site without firewall issues was viewed as a very positive feature of QuickPlace.

Several new users expected that time spent upfront for training and learning the system was essential to acceptance of the technology, but felt that team members would likely not take the time to learn the capabilities and this would result in non adoption of QuickPlace. One member felt the amount and type of training required would depend on the individuals, their current computer competencies and experiences.

What kind of training? I don't know about training... Training would depend on people's experience with the subject matter, what approach you are taking with the project, what the expectations are, what people need to be aware of, what kind of deliverables they have to live up to. As I say, the training would be dependent on the individuals, the technology, the subject matter - those kinds of things.

Another member felt it was very important to have follow-up technology support. He described frustrations with learning previous technologies without adequate technology support.

It's make it or break it this time. I don't know if it was QP that I used last time. I'll be honest, if there are a bunch of features on there and I click on them and I can't utilize them, I'm not going to waste my time. Because I found last time, I tried and tried and it didn't work and I checked with different people as to why it might not work and made enquiries and I just did not get a satisfactory answer. And I think that might be an important point. If I make enquiries about this system that there needs to be follow up from the person who is giving support. I shouldn't have to call ten times about one feature. The support person should follow up to ask how it worked. I don't have the time to keep calling. You know

how it is; you get frustrated. You phone once, maybe you'll phone again a second time, and you get, well, I don't know why it's not working; it should work and "don't blame me". Maybe it is my fault, but don't put the onus on the person just to say, don't make it my problem. Maybe it is, but at the same time you've got to coach them, make physical visit and find the problem. People aren't always aware of the hardware in front of them. I think follow up would be key.

Negative expectations.

Negative expectations around adoption of QuickPlace technology focused on lack of member commitment and attitude toward using the groupware, particularly those who had limited computer and Internet skills and, those in rural areas who might become frustrated with downloading large files because of low bandwidth (slow line speed).

Sharing the attachment features, you have to have that [high-speed connections and capabilities]. It can be positive and negative for those people offline. For example, if you have a Power Point presentation and you're offline, how do you download it? If I give you a 60 K file, I can do it on the network, but it's even hard on the network. There are ways that you can get pictures and presentations whittled down to nothing [size] and not lose the quality or picture... That would be nice to have as a feature – how to handle large files. I don't know if it is in there; I haven't really had time to look but, you know, large files, for us are needed – how do you handle pictures? Pictures are the worst - you can have one picture and if it is not set up right, it can take up too much space and time.

Frequent mention was made about the negative effect on adoption caused by having an initial bad experience with technical glitches.

But if they've got slow line speed, or if their server is very unstable, their service or whatever they are using, then that will be a limitation. And, if they have one experience with that, they are going to be screaming at me. But if anyone has server problems, they are going to blame QP rather than the server. But that would be the only thing I think, line speed.

Lotus Notes is an effective database and communication technology that is currently used by the organization's internal staff. Therefore, for internal virtual team members to learn and use a new system, when they already have one that works well, was seen as a drawback to adoption

of QuickPlace. Three new users felt that if QuickPlace helped to make the work simpler or more efficient, or if a clear benefit was demonstrated, it would be more readily used by the team.

If you can demonstrate a benefit for people, almost every person, except for a few oddballs, will buy in. If they see it actually makes it better, then they will buy into it.

That's one of the big problems with palm pilots. Because I tried and others have tried it, and some folks like them, but for certain of us, we've said, "This is no better and no more convenient than what I use now". So technology is not where I need it to be. With this technology [QP], I think we are at the point where what we want to do is at the right stage. Otherwise, I wouldn't have introduced it. I spent a lot of time on it, because I wanted to see if it would really work, or if it was just another distraction that's not important to us. It's got to have a benefit, otherwise why use it. There is so much in computers that has had no benefit - it sounded nice but it did not make the work any easier.

Post-Project New Users' Experiences with QuickPlace

Of the original six new users, four remained as post-project new users including the new project manager and three team members, all from the same virtual team. The leader of the second QuickPlace team was no longer associated with the project so was not interviewed a second time. No external partners were involved in this phase of the project. The post-project findings reflect a single virtual team project.

During this first phase of the team project, QuickPlace was used minimally. Similar to the experienced users, the post-project new users used QuickPlace as a central repository for filing and storing project-related information. In this case study, the team project revolved around first constructing a database of products. A couple of team members conducted independent research to gather data and write a report related to the project. The reports were published on the site and members were informed via automatic e-notification when new information was posted. There was limited new content added and minimal use of asynchronous conferencing discussion threads.

Post-project users hesitated to invest large amounts of time to learn the software. They stated, based on past experience with other technologies, if it takes too much time and they cannot see benefits, they would not take the time to learn how to use QP. Or, if they had tried other new technologies and felt they wasted their time trying to learn those, they were hesitant to learn this new technology.

The other barrier is the just the amount of time that most participants need to become comfortable with the software. People are at different levels – some are very comfortable with it and use it very effectively; others are intimidated and frustrated by it, and, would rather talk on the phone. So, that's one of the big barriers and especially when you have a large team.

It's a time issue. Learning a new technology really slows you down and ultimately it should help. But, I have used some software that didn't do that, so that initial learning was very time costly and didn't have a benefit. And, so, you know, I hesitate to invest a huge amount of time...that's why I like the idea of having an administrator who is really good with the program and she can tend to the technical details. I've watched our administrator and learned a lot from her. I think that really helps you get through that period.

Overall, I've been a little disappointed in QP, based on the fact that it is not as fast as I'd wanted – disappointed in the speed and its accessibility remotely and for external partners. The time it takes to become comfortable with the stuff, I don't know if you can ever overcome that in today's environment, because we're just too busy.

One member states, "For our team, there was little commitment to use the technology, no new content and not enough prompts from the project leader. We didn't need QP for this project." He further explains that a large barrier to use was the lack of commitment and willingness to use the tool.

I think the leader has to set up expectations as to people putting on updates; and commitment to using QP – for example, every two weeks, put information on as to what's happening; what's moving forward – I don't feel very well informed about what's happening with the team. I was supposed to devote 10% of my time to this project, but haven't even done 1/10%. There could be prompts from the team leader.

Several new users commented that having to post something on QuickPlace rather than sending data by regular e-mail was an extra step and a barrier to using the technology, especially given that Lotus Notes was more efficient. QuickPlace was termed “cumbersome and too slow” as indicated in these interview dialogues:

With QuickPlace, it is a little frustrating because there is an extra step - you have to sign in each time and it takes time.

So far, the software for me has been mixed. It’s a really great philosophy, but I find that it’s much slower to post a message on QP than it is to post with traditional e-mail. It’s not a big deal: you are sitting there with a few seconds to think about it while you are waiting to send it off, but what I am finding a little cumbersome is the merge with the other e-mail system where it sends you notices that people were at the site. We’ve had a few people misinterpret the messages because of the headings, so that’s been a little bit cumbersome, and then I end up having to send e-mail through the traditional method or phone because they didn’t understand the QP message.

Maybe I am a product of my own expectations, that I didn’t give it a fair shake, but it is just, you know, it’s an extra step. You almost have to always have it running in the background; and you have to check it five or six times a day to see if there are any new messages if you really want to get anything out of it. And I don’t want to do that.

All team members in this phase of the project had access to Lotus Notes (LN) databases, even those organizational members in rural areas. Frequent comments were that it was more appropriate to use LN over QuickPlace for this project.

It is good to have our own [Web] page, but with current members we could also have done this [project] on the intranet.

If we had only one tool, and that was QP, it would be good; but we have such a good set-up in LN (with a fast network) and we don’t have outside partners participating, so it would work best to use LN for internal staff.

Participants also commented on frustrations with how other team members used the QP functions:

Also, perhaps people haven’t realized it, but you don’t have to send all messages to everyone. For example, replies for setting up a meeting can go to one person –

not everyone needs to read all the replies. Under the “publish” function, you can send to all or send to one. People may not realize this.

We get lots of extra e-mails on the system. We don’t need to get all messages and don’t want to hear from everyone if the message is not relevant.

One participant stated, “There is no substitute for direct interpersonal communication”.

If somebody wants to talk to me, I want him or her to come and talk to me or phone me. _____ and I have spoken directly when we were talking about some of the resumes; we just left voice mails and a couple of things [documents] got faxed – direct communication was just easier than scanning in things and posting them. Just worked better. If I need information from someone, I will contact them directly. I don’t want to post something there and have to wait to see if they will respond; and I’m sure it’s the same for people trying to contact me. I get the e-mail messages about what’s been posted and if it concerns me, I can click on the link and go there to see what’s new.

I still say there is no substitute for just direct interpersonal communication. E-mail is not the best, but it works. So I don’t really see us using QP a lot except if there are industry partners that don’t have access to [Lotus] Notes - our internal system. Then it would be used mostly as a document- sharing, information-sharing database.

There were a number of additional negative experiences noted. One member was not a strong computer user and when the technology did not function, he was not willing to continue using it.

My team in general was quite keen to use it. There is one member who gets frustrated. He says, “I clicked on this, and it [the file or document] won’t come up. Where is this? I can’t find it.” He’s not into technology. However, that probably doesn’t excite half the team.

Remote users (from rural offices) found the line speeds too slow and the infrastructure posed limitations. “They [rural lines] are probably down to 8K [kilobytes]. One guy said it took him fourteen minutes to close out a document. So, it wasn’t practical in that respect.” The sentiments from several users was, “if it’s not efficient, it’s not quick, it’s not going to be used.”

Two members stated, “Unless there is new content posted to the site on a regular basis, people will not bother with it. It’s another step.” And, “if the volume or frequency of information being shared or exchanged is too low, QP is probably not a suitable tool to use.”

Many users stated that everyone in the group needs to have training to gain computer competencies to function in a virtual team. One participant stated,

We believe that people generally are better computer users than in fact they are. And, the people who are having trouble using QP are the same people who are having trouble with e-mail and running a browser. Those of us who use this stuff all the time tend to forget that there are still people around who are rookies in using those technologies. One of the key ones is that if they are using QP, they need to make sure that everyone in the group has the computer skills that are necessary to at least run a browser, navigate a web site, using it [computer] proficiently.

Furthermore, if people do not use the technology, they will forget how to use the features. There needs to be a reason to use the technology and content needs to be posted to keep people using it.

I think the stumbling block is if people don’t use it [QuickPlace]. If they don’t use it, then they will forget about it. I think you have to have reason to put things on; since the presentations, I haven’t worked on it; there hasn’t been a need to use it; to be on it.

One team member explained that because this project was in its first phase, it was less interactive than the next phases of the project might be. It involved only gathering data and information. This individual explained further that

you are given a segment to do and then you go and do it; then you post your information and then it is gathered together for a final report. I think phases two and three of this project will be more interactive.

This participant was also very positive about using QuickPlace for ongoing projects and felt it was important for these virtual teams to first have face-to-face meetings where the team visualizes and develops their vision and gets to know the partners. She continues, “In the first phase of many of our projects, QP would be primarily used for posting and sharing information

articles, conference learnings and other related data. The virtual team usually decides what the site will look like and those who are computer savvy should help others to become familiar with the technology. This team member also felt it important to have a strong project leader and to include a site administrator to keep the site and content up to date by regularly posting new content and making sure information is archived and filed appropriately for the group's needs.

Discussion and Analysis

In this section, I will discuss and analyze the findings of this case study research and explain how the adoption of technology relates to whether it meets users' work needs. The expectations and baseline findings of new users' anticipation of how they would use QuickPlace will be discussed. Following that, I will review the actual experiences of experienced users and post-project new users with QuickPlace, categorized into four main factors that influence adoption of QP: commitment, ease of use, training and technical support and usefulness. Finally, I will tie these findings into the dual structuration theories.

Pre-Project New Users' Expectations About QuickPlace Use

All case study participants were internal staff of the study's organization. Although external partners were included as part of the initial planning meetings and it was anticipated they would play an active role, in the end, they were not involved in this project. This was an important factor in internal users' commitment to using this technology. Lotus Notes (LN) was an effective tool for internal staff to use, and without having to include external partners, many felt that using LN would have been equally or more effective than QP. While three new users had used other groupware for virtual team projects in the past, and one was simultaneously using QP with another group project, most had not used QuickPlace prior to this project.

Team members who were geographically dispersed had, in the past, typically accomplished collaborative work either through face-to-face meetings which involved travel, or through teleconferences; information was usually exchanged through traditional e-mail, telephone and fax and stored in Lotus Notes databases, part of the organization's intranet system. There were several case study participants who wanted to decrease travel time, the number of face-to-face meetings and have a central storage area for keeping relevant project documents. Therefore, they sincerely felt that QuickPlace would be a valuable tool for their virtual team members. Furthermore, the ability of QP to seamlessly include external partners was, at the onset, seen as a valuable asset. These were the primary incentives for using QP for this virtual teamwork.

Overall, new users' expectations about the potential use of QuickPlace ranged from mildly cautious to enthusiastically positive, with some specific reservations about its adoption. The findings of this case study can be categorized into four variables that closely parallel Kline's scale of groupware adoption: commitment, ease of use (including intuitive interface, freedom from technical difficulties, compatibility with existing hardware and software, acceptable learning curve); adequate training and technical support (sufficient time to learn the groupware, individualized training, follow-up technical support, having a site administrator); perceived usefulness of groupware (benefits are understood, work performance has improved, work needs are met for communication and collaboration, time and/or money are saved). While Kline separated 'training' from 'technical support', I merged these into one category. I also added 'communication and collaboration capabilities' to the usefulness category. Appendix I summarizes the new users' positive and negative expectations about the factors relating to QP's ability to meet their virtual teamwork needs.

Experienced and Post-Project New Users' Experiences with QuickPlace

In this section, I will discuss the four variables identified as factors relating to use of QuickPlace: commitment, ease of use, training and technical support and usefulness. Appendix J summarizes the experiences of post-project new users and experienced users according to these four categories of factors.

Commitment.

User commitment refers to not only using the technology, but also contributing to the collaborative efforts of the virtual team by adding content, seeking information and communicating with the team and having a positive attitude toward using the groupware and the virtual team tasks. It implies 'buy-in' from team members and project leaders and is often a result of users understanding the benefits of, and having a clear purpose for using the QP technology. In this case study, there was little commitment to using the technology for a number of reasons. The team's original project leader was a QP champion and was enthusiastically committed to using QP; however, he left this position and was replaced by another project leader who may have been somewhat less familiar with the potential of QP or was not convinced of its applicability to this phase of the project. This leader was also geographically closer to the majority of team members and was more willing to travel to meetings. Furthermore, a key advantage of QP is to include external partners who would normally be unable to access project files because of firewall security restrictions. For this case study, although external partners were originally included in the virtual team, they did not actively participate in this phase of the project meaning the team had little incentive to use QP. There was additional concern about security and confidentiality expressed by members of research networks. Finally, Lotus Notes, an effective and efficient technology that team members were familiar with, was a better choice

of technology for this project. Consequently, team members did not want to take the time to learn, commit to and use a technology that paralleled the one they knew and would require more time to learn, with little benefit. The team used QP primarily as a repository of information; they used other functions minimally, if at all. Therefore, commitment to using QP was low because it did not meet the team's work needs.

Ease of use.

Ease of use relates to having a friendly or intuitive user interface, an acceptable learning curve and technology software and hardware that are compatible, familiar and work effectively and efficiently.

IBM's promotional material states that QuickPlace (now called Team Workplace) is a web-based solution for creating team workspaces for collaboration. IBM Lotus Team Workplace is a self-service application so once administrators install the software on the server, users can take responsibility for creating a new team workspace and managing users for the workspace (IBM website).

While QP has a fairly intuitive interface, it still requires time for individuals to become familiar with its features and capabilities. In general, members were not willing to take time to learn a new technology without understanding clear purpose and benefits first. The learning curve ranged from low to high depending on the computer competence of users. Having a site administrator who could customize the site was a positive factor that led to acceptance. Members preferred not to spend time learning how to set up the site; rather, they wanted to be able to easily post, edit and access information quickly. The extra step of logging in and waiting for the groupware to open up was seen as a rather negative factor, even though it only took a few minutes and was a simple task. The time it took to log on to QuickPlace was a step that most did not like, stating it would be easier to use traditional e-mail. Again, because other technology was available that worked well, and was familiar to users, this posed a barrier to adoption. Some

managers, familiar with project management models, found QP's project management tools very useful and easy to apply and, thus, adopted them. They found the tools supplemented their usual way of working, a factor leading to acceptance.

Several interviewees, however, were not willing to change the way they managed projects in order to use the QP tools, primarily because of the time needed to learn to use them in a different way. Furthermore, users found they could not print the Gantt and milestone charts making that function less useful. Other technology glitches comprising non-compatibility of converting Microsoft Word tables to HTML also lead to non-use of QP for posting these types of files. Finally, the ability to easily customize the QP website was deemed a significant positive factor in meeting the work needs of virtual teams. Using team jargon, choosing appropriate organizational folder headings, determining where information should be stored according to a searchable index for easy retrieval and other document handling customization were seen as very significant in relation to use of the technology because it met users' work needs. Overall, ease of use seemed to play an important role in the acceptance and adoption of QP.

Training and technical support.

Both training and technical support are factors that influence adoption of groupware. Frequent comments from most research participants indicated a need for QuickPlace training for all team members. For this project group, training involved a one-hour teleconference session for new team members who, while sitting at their computers, were talked through a step-by-step process to log on with a user ID and password and given an opportunity to try out some of the basic functions. For those who were computer savvy and had experience in using Internet browsers and other similar software, this process was straightforward. However, for those with less skill or confidence in using computers, this process did not appear to provide enough

training to encourage adoption of the technology. While the learning curve was relatively painless for most members, it was difficult for others. For this case study, it was evident that members, who either had had no QuickPlace training or had limited computer capabilities, did not readily adopt the technology as suggested in one interviewee's comment:

The neat thing about QP is that it is a simple tool to use, but there still is a learning curve to it. And if you haven't taken that little bit of learning, it sounds like an impossible tool to use....in observing teams, the ones that have lots of content, are active, are those that went through the training process. They all showed up for the conference call. And so that says a whole bunch about the front end.

Most interviewees felt some training and follow up technical support was an important factor related to adoption. The type of training needed would depend on the user's current computer competence and how the technology is to be used. Several stated that having follow up technology support was essential and that a site manager, who could help with technology functions and keep the site organized, was a significant factor that had an impact on adoption. This parallels research by Orlikowski and others on the need of supporting roles for virtual teams using technology: champions, mediators or site administrators, translators and expert users who assist others, technology systems supports and chauffeurs (those who relieve others of using the technology).

Some users were not aware of all the features that QuickPlace offered. For example, one experienced team member, who had not engaged in training, did not know about asynchronous threaded discussions. This perhaps indicates need for more comprehensive training or increased education about capabilities of QP.

Usefulness.

This category refers to how useful the communication and collaboration functions of QuickPlace are to the work needs of team members. Coleman (1997) developed a generic

taxonomy of groupware applications. Appendix K compares these generic applications to those of QP and illustrates the features that were used by the virtual team members of this case study (see also Appendix B for in depth details). Customizing the website (e.g., page, room, folder, searchable index, colours, fonts, animation, the overall look, ability to limit access to user types, accessing a tutorial, creating links, enabling a weekly daily report of recent QP activities, etc.) was not included specifically in Coleman's taxonomy, but played a role in QP adoption and thus is included as a separate category in the list. The task–technology fit was particularly notable in this 'usefulness' category.

With the exception of desktop and real time conferencing, white boarding or instant messaging capabilities, electronic meeting systems and some levels of workflow applications, the QuickPlace functions parallel those generally deemed required and used by virtual teams. These include electronic messaging and automatic e-notification of new postings; group calendaring and scheduling; asynchronous and synchronous conferencing; customizing the website; group document handling (databases, repository, search, indexability); project management tools (Gantt charts, milestones, to do lists, task reminder notices); workgroup utilities (editing, publishing, presentations); and other collaborative Internet-based applications.

For this case study, most virtual team members stated that their main use of QP was as a repository of information, a central storage area customized to their group's needs and available to anyone at any time or as deemed appropriate. Other features that were useful to varying degrees included automatic e-notification to team members when new documents or discussion messages were posted; task deadline reminders; asynchronous threaded discussion to a limited degree; document handling; and project management.

There was frustration from those who felt some users did not understand how to use the QP features properly. For example, with automatic e-notification, you can send a message either to everyone or just to those that need the information. It was annoying to some to receive irrelevant e-mail on every topic. Others did not understand the notification message itself, and felt these should be made simpler. Some interviewees were unaware of some of the capabilities and features of QP, indicating that further training might be needed. By being more attuned to the various functions, users can differentiate between those features that work well for them and those that serve no purpose. Awareness is needed to increase understanding about all the technology capabilities. Decisions can then be made about whether QP would be useful and lead to more productive work. By being able to customize the folders and the way the site was set up, users were more apt to adopt the technology. It helped them to work in the way that was familiar and effective for them (e.g., jargon, headings, searchable database based on their search words). In other words, if there was a good fit between task and technology to accomplish the task, the adoption of the technology was more apt to occur. This leads us to discussion of structuration theories and the connection to groupware adoption.

Relating to the Structuration Theories

The dual technology and adaptive structuration theories posit groups choose technology such as groupware, according to whether the technology supports the way they work or can be changed to fit with how they normally interact and conduct business (Kline, 1999, p. 267). Therefore, if the technology does not allow the users to conduct their work in a productive and effective manner, they will not accept or adopt it. In this case study, we have seen that when individuals were able to customize the technology to meet their work needs, or they were able to adapt their way of doing work to use the technology, they were more willing to use it.

Consequently, team members largely used QuickPlace as a repository and for group document handling because it was relevant to their work needs and was familiar to them – it worked similarly to Lotus Notes databases and features. Likewise, experienced project leaders who were well versed in project management models and processes were enthused about and used the QP project management tools to their advantage. They were able to adapt the way they managed projects to the QuickPlace technology. Furthermore, being able to customize the pages, folders, rooms and searchable index made QuickPlace appropriate for knowledge management needs (i.e., information exchange, storage and retrieval). Therefore, the ease of use and ability to customize the QP website were definitely factors in determining whether individuals or groups used the technology. However, overall QuickPlace technology was only partially adopted in this case study project group.

While QP did meet the team's knowledge management needs, it was not deemed particularly useful for communication and collaboration as members had access to other technologies that met their needs better, such as Lotus Notes, telephone, traditional e-mail and even face-to-face meetings. Even though the time it took to log on to view the QP site was minimal, this seemed to be a barrier that many complained about. Members wanted instant, quick and easy access and they were unwilling to spend time upfront to learn the new technology because it appeared to have no clear purpose or benefit and did not help them achieve their work tasks for this project. The fit between tasks to be accomplished and the technology that contributes to doing those tasks was good for knowledge management but less appropriate for group decision-making, problem solving and communicating. Without this close fit, there appeared to be little overall acceptance and QP was used primarily for the repository function. This suggests the importance of the task-technology fit for successful adoption of technology.

Overall, the findings of this case study did generally support the dual structuration theories. Where QuickPlace suited the team's way of exchanging, storing and retrieving information, they were willing to use the groupware; or where they could adapt their method of working to use QP tools, they accepted it. Furthermore, the more customizable the technology, the more the team was apt to adopt it. For this phase of the project, the technology met only the repository function of team's work needs and thus, was not enthusiastically adopted or well used.

Conclusion

“The conventional way in which people work is coming unglued... People are now working in virtual teams that transcend distance, time zones and organizational boundaries (Lipnack & Stamps, 1997, p. 1). More and more, collaborative work is being done through the medium of electronic communication and digital technologies. It is imperative, therefore, for virtual teams to initially be aware of their work needs and the function and features of groupware, and whether they can commit to using these tools to their advantage to accomplish team collaboration and communication.

This research study explored the use of groupware for virtual teamwork, a workplace phenomenon that is becoming common in knowledge organizations. The research setting for this study was a large, bureaucratic public knowledge-based organization. The research participants were employees of this organization, including eight experienced users and four new users of QuickPlace technology. Choosing the right communication and collaboration technologies for specific work tasks is an important element to be considered by those undertaking virtual teamwork initiatives (i.e., using appropriate technology for virtual work effectiveness and efficiencies).

The research in this study looked at the task-technology fit to get a deeper understanding of why teams may or may not adopt and implement groupware to enhance collaborative work capabilities and productivity for virtual teamwork. Four main categories of variables were determined that affect whether individuals adopt or adapt technology to achieve their tasks: commitment, ease of use, training and technical support and usefulness. While every group is different, it is important for those considering use of collaborative technology to look at these four factors as common determinants of the fit between task and technology. If these elements are weak or cannot be put into place, there is a strong tendency for the non-adoption of the technology.

For this case study, the research questions asked were “How do Internet-based collaborative and communication technologies meet the work needs of virtual team members?” and “How do virtual team members change their work strategies to use this technology or adapt the technology to meet their work needs? The secondary research question was, “What are the communication and collaboration needs of virtual teams members?”

The findings indicated virtual team members need technologies that meet their work needs and these will vary from team to team and for different phases of a virtual team project. Generally, virtual teams need and use the following communication and collaboration applications for their virtual teamwork: electronic mail and messaging; group calendaring and scheduling; electronic meeting systems; desk top and real time conferencing, non-real time conferencing (asynchronous threaded discussions); being able to customize an online meeting place to the group’s preferences for searching, filing, accessing and sharing information; group document handling (building databases, repository, editing, revising, posting presentations); and groupware development tools for managing a project. QuickPlace provides most of these

applications with the exception of real time conferencing, electronic meeting systems and some higher end work flow applications. The virtual team members of this case study largely used the repository and group document handling features, and somewhat customized the website to their specific preferences (building a searchable index of folders and rooms so that posted information was accessible and easy to retrieve). Members of one research network were able to customize a type of electronic meeting place by combining technologies. They used a real time teleconference while team members sat at computers in different locations and viewed documents online as they were transferred back and forth. Project managers, who had multiple projects or large projects and expertise in managing projects, generally embraced the project management tools and capabilities. Overall, most team members, however, did not use this feature. They were either unwilling or unable to change the way they managed projects to use the technology. Some felt adding real time conferencing, such as instant messaging and white boarding capabilities, would enhance the usefulness of QuickPlace to accomplish collaborative tasks (i.e., simultaneous editing of documents). As this project did not include partners external to the organization, there was no pressing need for an Internet site like QP that enables multiple organizations to overcome firewall issues. Being able to accommodate external partners was viewed by the champions as one of the predictors for successfully using QuickPlace. As there was no need for this in phase one of the project, QP was perhaps not an appropriate technology and, therefore, was not used extensively.

Based on Kline's groupware adoption scale and Davis's technology acceptance model as guidelines, my research indicated four main categories of variables that determined adoption of QuickPlace technology. These comprised the level of commitment to, ease of use, training and technical support provided for, and usefulness of the features of QuickPlace. In this case study,

the team did not use the available QP features to its potential and, for the most part, did not adopt the technology. Commitment and buy-in was low, with team members preferring to use already established and effective technology available in the workplace. There were no clear benefits or purpose established for using QuickPlace other than as a repository (a central filing and storage place). Given this was the predominant, and frequently the only, use of QP for this phase of the project, Lotus Notes could likely have sufficed as the technology of choice. Members were limited by their inability or lack of desire to change the way they worked, or by low speed or narrow bandwidth in rural areas. Although they were able to customize the technology to some degree, for many it was not enough to enable them to work in the way they preferred (e.g., Gantt charts could not be printed out; there were glitches in being able to post tables and large graphics could not be downloaded by members in rural areas because of narrow bandwidth). In other words, their work needs and the features of the technology were not a good fit resulting in only partial adoption of QuickPlace.

Training and technical support were seen as important factors for adoption. Training was provided at an introductory level for regular team members. Those members who were skilled in computer use were able to learn the basics during an initial teleconference session. Contrarily, those who had limited computer competence, negative experiences with using new technology in the past, technical problems with either the QuickPlace software or their computer hardware to run the program, or had a skeptical attitude toward the technology, tended to choose other technologies to communicate and collaborate on team tasks. Some members did not know about some of the features available such as asynchronous threaded discussions. Therefore, there were likely a number of features that might have been used but were not because members were not aware they existed.

Researchers such as Orlikowski, Palen, DeSanctis and Poole posit modified and adaptive structuration theories that purport if individuals on virtual teams can customize or adapt the technology to meet their work needs, or can change the way they work to use the technology, they will likely adopt the groupware. In this case study, only a few individuals were able to use the technology to their advantage. Without total commitment from the team, and having too few players to make this an effective strategy for communicating and collaborating, QuickPlace did not meet the collective work needs of this team. Furthermore, there was little volume of content for this phase of the project resulting in infrequent and irregular addition of new content. Consequently, this technology was likely inappropriate for this phase of this virtual team project.

Interpolating from technology adoption studies in the literature and aggregating the findings of the champions, experienced users and new users in this study, we can suggest some predictors for successful adoption of groupware by virtual teams. Attitude toward and commitment from the organization, the project manager and the team members to use the technology are important adoption factors. This commitment derives from understanding a benefit and clear purpose of the technology to meet the identified work needs for collaboration and communication. It includes allowing members time to learn the technology (become aware of its strengths and weaknesses) and determining how work behaviours can be adapted to use the technology productively or how the technology can be customized to allow working in a preferred way. Commitment by the organization involves providing a dedicated champion, site administrator, trainer and technology support for the virtual project. The technology itself must be relatively easy to set up and use and be useful to the team.

Underestimating the complexity and scope of the work tasks and not having team members with competencies required to successfully use groupware can lead to poor or limited

use of groupware technologies and ineffective virtual teamwork. Therefore, it is imperative that team leaders understand clearly the specific tasks to be undertaken, the technical processes needed to complete these tasks, the abilities and skills of team members and the appropriate technologies and functions to ensure a correct fit between task and technology.

Comments and Considerations

A case study has obvious limitations, the main one being the inability to generalize findings to a larger application. Nonetheless, this qualitative research study does support and contribute to the vast literature that has looked at adoption of groupware and thus contributes a small piece to the larger complex technology adoption puzzle.

While doing this literature review, I discovered an extant body of work on groupware adoption, most of which has been found either in the field of information technology, computer technology, computer supported collaborative work or industrial psychology. However, there appears to be less research undertaken within the field of communications itself. Considering that teamwork technologies have been developed to enable and support collaborative work, and by its nature involves intense interpersonal and group communications, it seems unusual that limited research has been done in this discipline. Teams that are geographically distributed and who communicate through computer-mediated communication may rarely meet face-to-face making team dynamics and commitment to the project more complex than for regular teams. The social and relational variables and the importance of trained mediators become significant in the success of the virtual team. Therefore, I suggest that additional study could be undertaken from the communication perspective to address important communication and collaboration issues that pose the tension between human agency and technology.

References

- Ashkenas, R., Ulrich, D., Jick, T., & Kerr, S. (2002). *The boundaryless organization: Breaking the chains of organizational structure*. San Francisco, CA: Jossey-Boss.
- Allen, C. (Fall 1990). Definitions of Groupware. *Applied Groupware*. Retrieved on February 2, 2003 from <http://www.alacrityventures.com/DoG.html>.
- Cole, P. (1994). The impact of group context on patterns of groupware use: A study of computer conferencing as a medium of work group communication and coordination. *Centre for Coordination Science Technical Report #182*.
- Coleman, D. (1997a). *Groupware: Collaborative strategies for corporate LANs and intranets*. Prentice Hall.
- Coleman, D. (1997b). Groupware – The changing environment. *Strategies for electronic collaboration and knowledge management*. Retrieved on September 4, 2003 from http://www.collaborate.com/publication/publications_resources_groupware_book_section_1_2_1.htm
- Davis, F. (1986). *A technology acceptance model for empirically tested new end-user information systems: Theory and results*. Doctoral dissertation. Sloan School of Management, MIT, Massachusetts.
- Duarte, D. & Tennant Snyder, N. (1999). *Mastering virtual teams: Strategies, tools and techniques that succeed*. San Francisco: Jossey-Bass Publishers.
- Grudin, J. (January 1994). Groupware and social dynamics: Eight challenges for developers. *Communications of the ACM*, 37:1, 93 –105. Retrieved on March 1, 2003 from <http://www.ics.uci.edu/~grudin/Papers/CACM94/cacm94.html>.
- Igbaria, M. & Guimaraes, T. (Spring 1995). Testing the determinants of microcomputer usage via a structural equation model. *Journal of Management Information Systems*, 11:4. 87 – 115.
- Kline, T. (2001). The groupware adoption scale: A measure of employee acceptance. *Human Systems Management*, 20, 59-62.
- Kline, T. & Gardiner, H. (1997). The successful adoption of groupware: Perceptions of the users. *Human Systems Management*, 16:4, 301-306.
- Kline, T. & Johnson, R. (2001). What users think about groupware: A case study. *The Psychologist-Manager Journal*. 5:1, 21-37.
- Kline, T. & MacLeod, M. (1996). Team effectiveness: Contributors and hindrances. *Human Systems Management*, 15:3, 183. Academic Search Premier, University of Alberta.

- Kline, T. & McGrath, J. (1999). A review of groupware literature: Theories, methodologies and a research agenda. *Canadian Psychology*, 40:3, 265-271.
- Kornfield, J. (1993). *A path with heart*. New York: Bantam.
- Krasner, H., McInroy, J., & Walz, D. (1991). Groupware research and technology issues with application to software process management. *IEEE Transactions on Systems, Man and Cybernetics*, 21, 704-712.
- Krueger, R. & Casey, M. (2000). *Focus groups: A practical guide for applied research*. (3rd ed.) Thousand Oaks, CA: Sage Publications, Inc.
- Lipnack, J. & Stamps, J. (1997). *Virtual teams: Reaching across space, time and organizations with technology*. New York: John Wiley & Sons, Inc.
- McGrath, J., Arrow, H., Gruenfeld, D. Hollingshead, A., & O'Connor, K. (1993). Groups, task, and technology: the effects of experience and change. *Small Group Research*, 24, 406-420.
- Mark, G. & Poltrock, P. (2001) Groupware adoption in a distributed organization: Grassroots vs. management mandate. Retrieved on September 4, 2003 from <http://www.crito.uci.edu/consortium/0306mtg/Mark-Poltrock.pdf>.
- Okamura, K., Orlikowski, W., Fujimoto, M. & Yates, J. (1994). *Helping CSCW applications succeed: The role of mediators in the context of use*. Retrieved on March 2, 2003 from <http://ccs.mit.edu/papers/CCSWP171/CCSWP171.html>.
- Orlikowski, W. (August 1992). The duality of technology: Rethinking the concept of technology in organizations. *Organization Science*, 3:3, 398-427.
- Orlikowski, W., Yates, J., Okamura, K., & Fujimoto, M. (April 1994). Shaping electronic communication: The metastructuring of technology in use. MIT Sloan School working paper #3611-93. *Center for Coordination Science Technical Report #155*. Retrieved on February 26, 2003 from <http://ccs.mit.edu/papers/CCSWP167.html>.
- Palen, L. (1997). Groupware adoption and adaptation. *CHI 97 Electronic Publications: Doctoral Consortium*. Retrieved on February 26, 2003 from <http://www.acm.org/sigs/sigchi/chi97/proceedings/doc/lap.htm>.
- Palen, L. (1998). *Calendars on the new frontier: Challenges of groupware technology*. Ph.D. dissertation. University of California, Irvine.
- Parnisto, J. (1996). Factors affecting groupware success: A case study. *Institute of Information Systems Science*. Retrieved on February 26, 2003 from

<http://hsb.baylor.edu.htm/ramsower/ais.ac96/papers/PARNISTO.htm>.

Prbhakar, B. & Litecky, C. (1997). Adoption of internet based software: A field study. Retrieved on February 26, 2003 from <http://hsb.baylor.edu/ramsower/ais.ac.97/papers/prahak.htm>.

Rossmann, G. & Rallis, S. (1998). *Learning in the field: An introduction to qualitative research*. Thousand Oaks, CA: Sage Publications, Inc.

Synteta, V. (1998). *Summary: Groupware*. Retrieved on February 26, 2003 from <http://tecfa.unige.ch/staf/staf-e/paraskev/staf14/ex8/article2.html>.

Thompson, A. (Fall 1998). *Applying groupware to managing distributed teams*. Retrieved on March 1, 2003 from <http://www.netspace.org/~athomps/cs776/application.html>.

Usability First (n.d.). *Groupware: Introduction*. Retrieved on August 24, 2003 from <http://www.usabilityfirst.com>.

Warkentin, M. & Beranek, P. (1999). Training to improve virtual team communication. *Info Systems Journal*, 9, 271-289.

Appendix A.A Quick Look at QuickPlace

QuickPlace is a collaborative communication technology designed by Lotus-IBM for use by virtual teams in managing projects. It is considered quick because it can be created in less than sixty seconds, thus allowing a virtual project team to start up quickly. It is a place on the Web where virtual team members can meet and develop their own meeting space. This means they can modify, customize and shape the meeting place for their own work and personal work preferences.

QuickPlace was designed to support collaboration and teamwork. It provides a flexible, customizable platform from which members can work together online to organize, launch and manage collaborative activities. For example, it supports multiple authors who can edit each other's work and contribute to threaded discussions. It also supports other interactive activities and services such as chat, calendar, project tasks (Gantt charts, highlight milestones, to do tasks), index, and decorating of rooms by changing colour, font and adding animation.

In many ways, QuickPlace is similar to Web CT and other collaborative groupware. The major distinction is that QuickPlace is Web-based so that users can avoid the obstacles of firewall security for partners who are not within a specific organization. It can be set up and customized by users without need of technical support. Another difference is that it supports all platforms (Unix, DOS, PC, Mac). There are various levels of security for the meeting place, starting with an URL, password and identification that are available only to QP members.

Account Types

There are three account types including readers who can view and read pages; authors who can read, add and edit pages in a folder; and managers who can read, add and edit pages in a folder and create and provide access to rooms.

Storage and Access Components

There are three levels of document storage and access in QuickPlace: page, folder and room. A page is either internally created (e.g., Welcome, About Our Group, etc.) or linked to external Web pages. Only authors and managers can create new pages. A folder contains one or more QP pages and only managers can create folders for different activities. A room is like an apartment complex. The manager is the apartment superintendent and can give keys (or access) to any of the apartments (rooms). This has been described as a QuickPlace within a QuickPlace. The entrance to a room can be limited to specific members for security purposes.

Tools

Additionally, there are a number of tools that include search and advanced search; synchronous chat; notify, in which members may send an e-mail message to other members and include a link to the QP page; print; news which enables a daily or weekly report of recent QP activity; tutorial; and help.

Appendix B. Coleman's Taxonomy of Groupware Applications

Categories	Description
Electronic mail and messaging	Messaging infrastructures and e-mail systems
Group calendaring and scheduling	Products for calendar, meeting and resource coordination
Electronic meeting systems (EMS)	Real-time conferencing systems (local and remote) as well as collaborative presentation systems
Desktop and real-time data conferencing	Focus on real-time, rather than bulletin board discussion or Notes. All products in this category store documents, and or allow others to see and work on documents simultaneously, on each other's screen or on a white board
Non-real time conferencing	Synchronous conferencing is most like a bulletin board, where you carry on a conversation over time leave a message for someone and they answer it, and you can respond back to them later. These messages can be public or private.
Group document handling	Group editing, shared screen editing work, group document/image management and document databases.
Workflow	Workflow process diagramming and analysis tools, workflow enactment engines, electronic forms routing products.
Workgroup utilities and groupware development tools	Utilities to support group working, remote access to someone else's computer and specific tools for workgroup applications development.
Groupware frameworks	This metacategory focuses on products that help integrate "islands of collaboration" to make seamless across computer platforms, operating systems, e-mail systems and network architectures.
Groupware services	Services to support collaboration.
Groupware applications	Vertical applications that use collaborative technologies to either enhance processes or support collaboration in a specific work environment
Collaborative Internet-based applications	Many collaborative functions are moving on to the WWW and use the Internet as the input and output while still using traditional groupware on the LAN.

Coleman, D. (1997b). Groupware: The changing environment. *Strategies for electronic collaboration and knowledge management*. Retrieved on September 4, 2003 from http://www.collaborate.com/publication/publications_resources_groupware_book_section_1_2_1.htm

Appendix C. Ethics

FACULTIES OF EDUCATION AND EXTENSION RESEARCH ETHICS BOARD

Section 1: Overview of Research Project

Name: Carolyn (Carri) Deanne Andruski Hall

Project Title:

Using Dual Structuration Theory to Explore the Adoption of Teamware: The Role of Task-Technology Fit

Please provide a clear concise description of the purpose, significance and method of your research project. Give detailed explanations of how you intend to involve human participants, whether the participants are underage, legally incompetent, or otherwise could be considered “captive”, and the conditions of their involvement. Please try to confine your project overview to two pages (about 800 words) maximum.

This research project is a requirement of the Master of Arts in Communication and Technology program in the Faculty of Extension at the University of Alberta.

Overview of Purpose of Research Project

The purpose of this research project is to examine the adoption of communication and collaboration technology by virtual team members within a bureaucratic workplace setting. The technology software being examined in this project is called QuickPlace, an IBM-Lotus product. Using the theoretical framework of structuration, I will explore three main areas: the communication and collaboration needs of QuickPlace users; the ability of the QuickPlace technology to meet those needs; and whether users adapt their work strategies to use the technology or change the technology to meet their work needs (i.e. using the technology in ways different than its original intent).

Purpose Statement

The specific purpose of this research study is to explore and describe the phenomenon of the fit between work needs and technology capabilities for virtual team members and the ability of individuals to change their work strategies to use the technology. The virtual teams include individuals from both government and industry. It will use a case study design as the method of enquiry.

The task–technology fit will be defined as both ‘the ability of the technology, QuickPlace, to meet the communication and collaboration work needs of virtual team members’ and, ‘the ability of the individuals to adapt their work strategies in order to use the technology’. Thus, the primary research questions are “How does QuickPlace technology meet the communication and collaboration work needs of virtual teams?”; and “How do virtual team members change their work strategies to use the technology to meet their work needs?” The secondary research question is “What are the communication and collaboration needs of virtual team members?”

Significance of This Project

In today’s information age, it is essential for organizations to be able to share information instantly, in an organized, concise fashion. Knowledge management and communication technology are now inextricably linked. There is an intricate network of industry, business, government and educational organizations that, in order to remain viable, current and competitive must connect on a global level. Therefore, the swift movement towards virtual teams and virtual organizations is inevitable. Organizations, including government, are moving toward a boundaryless structure; value chain alliances are being touted as necessary to remain competitive; and inter-organizational collaborative projects are deemed essential at every

organizational level. This trend implies that today's knowledge workers must adopt and implement communication and collaboration technology that enables them to work in a virtual environment.

QuickPlace is teamware that enables virtual teams to access a mutual meeting place on the Internet without restrictions of an organization's firewall securities. It has been touted as user-friendly, easy to learn and manage software that provides the communication requirements of virtual teams. Despite the perceived need for these technologies, studies show there is strong resistance to adopting and using them. There are a number of factors that account for this. One of the major factors is that of the degree of fit between the virtual task and the ability of technology to help users accomplish that task. This is termed the task-technology fit and looks at whether the technology meets the work needs for communication and collaboration for virtual team projects.

Organizations need to be aware of these factors and address these concerns before investing in costly technology that may not meet the needs of virtual teams. The hypothesis of this research purports that if the need is not being met, the technology will not be implemented. Additionally, using structuration theory, I will also look at the phenomenon of adaptation of technology; that is, if the need is not currently being met, the user will either change their way of working to be able to use the technology, or change the technology in some way to meet their work need.

Method

The research project I am undertaking will explore the experiences of new virtual team members in using QuickPlace technology for their communication and collaboration needs. The term *new users* will define virtual team members who are using QuickPlace technology for the first time. The research will also describe the experiences of technology champions and experienced project team leaders and key users of QuickPlace. These are collectively defined as

experienced users. The champions are those individuals who have initiated the QuickPlace pilots, been involved in training team members or have lead QuickPlace project teams. The individuals who will be invited to participate in this research study are all competent adults who are employed in either the public or private sector related to this Ministry. The list of new and experienced users will be obtained through the cooperation and approval of the technology champions at the Ministry.

Section 2: Procedures for Observing Ethical Guidelines

You are required to follow the specific procedures for observing the University of Alberta Ethical Guidelines for Research Involving Human Participants. Please describe clearly and concisely how you intend to observe the guidelines by answering each of the six points below. The accompanying Background Principles document provides detailed information on each of the six points below and you can also consult the full document on the university web site at <http://www.ualberta.ca/~unisectr/policy/sec66.html>

A copy of the participants' consent form(s) and additional cover letter(s) are included in this application. The list of interview questions for individuals and focus groups will be developed in consultation with the supervising professor, Kirby Wright.

1. How will you explain the purpose and nature of your research to participants?

The purpose and nature of the research will be explained in a cover letter with an accompanying fact sheet (to be developed in consultation with supervising professor). This will include the nature of the study (i.e., pre- and post- project personal interviews, review of personal journals for new users; and focus group interviews for experienced users); the length (one hour interview before the project begins, one hour interview after or during the project, daily entry of journals, or as required). The focus group will take one to one and a half hours. A consent form will need to be signed. There should be an understanding that opting out of the project is possible but commitment to completing the study is requested. A copy of the cover letter and accompanying fact sheet will be included as part of the ethics approval process.

2. How will you obtain the INFORMED consent of the participants?

I will obtain informed consent by having participants sign a dated consent form after reading the form, cover letter and fact sheet. They will sign the sheet in front of a witness.

3. How will you provide opportunities for your participants to exercise the right to opt out?

Opting out will be exercised by providing written notice to the researcher. The cover letter will state that this is strictly voluntary and that participants have the right to discontinue participating with written notice.

4. How will you address anonymity and confidentiality issues?

I will be the only individual with access to the written and verbal interviews. All names and associations will be removed from any final documents that are available for public viewing or publication. My intention is to do the transcribing myself. If I need the assistance of a professional transcriber, I will obtain signed documentation that the data is confidential and cannot and will not be shared or disseminated to any other person or group.

5. How will you avoid threat or harm to the participants or to others?

No names will be used in any of the reports or research documents. How will you provide for security of the data?

I will be the only person collecting and analyzing the data. The data will be collected with strictest confidentiality – that is, in a manner in which no other party has access to it. There will be only one copy of the taped interviews; I will do the transcribing myself.

6. If you plan to use the information in other than the research report, how will you seek permission for secondary use of the data?

This will be part of the informed consent letter. In the informed consent letter, I will request that any data collected will remain anonymous and in strictest confidence so that no individual or group can be identified. I will request participants to give their permission to use the unidentified data for secondary use by signing a letter of consent that explains this.

7. If you involve assistants or transcribers in your research, how will you ensure that they observe the ethical guidelines?

This will be written into a signed contract with any assistants. See question #4.

8. Please describe any other procedures relevant to observing the ethical guidelines.

I will review the cover letter to research participants with the Knowledge Management champions at Alberta Agriculture to ensure their level of comfort with this information prior to sending out the invitations and letters of consent.

FACULTIES OF EDUCATION AND EXTENSION

RESEARCH ETHICS BOARD

Graduate Student Application for Ethics Review

Name: Carolyn D. Hall

Student ID: 1010224026011

E-mail: waycarri@oanet.com

Project Title: **Using Dual Structuration Theory to Explore the Adoption of Teamware: The role of Task-Technology Fit**

Project Deadlines:

Starting date July 2002 Ending date May 2002

If your project goes beyond the ending date, you must contact the REB in writing for an extension.

Status:

- Master's Project Master's Thesis Doctoral Thesis Other:
(Specify)

The applicant agrees to notify the Research Ethics Board in writing of any changes in research design after the application has been approved.

Signature of Applicant

Date

The supervisor of the study or course instructor approves submission of this application to the Research Ethics Board.

Signature of Supervisor/Instructor

Date

ETHICS REVIEW STATUS

- Review approved by Unit Statutory member/Alternate
- Review approved by Research Ethics Board
- Application not approved

Signature of REB Member

Date

Appendix D. Sample Cover Letter to Research Participants

Date

Name

Address

PC

Dear Name:

I am pleased to invite you to participate in a research study that I am undertaking which involves QuickPlace technology. This research will fulfill some of the requirements for the Master of Arts program in Communications and Technology at the Faculty of Extension at the University of Alberta.

My research will look at the collaboration and communication technology, QuickPlace, currently being used by virtual team members in various initiatives (e.g. agribusiness, research collaboration) between the _____ and other external partners in the _____ relevant industry. The _____ has provided me with your name. I understand that you will be involved in the _____ project as a participating member of a virtual team commencing on _____, 2002.

For this research project I would like to interview you two times: once prior to your using QuickPlace technology and once after you have been involved on the virtual team for at least three to four months (or after a minimum of four virtual meetings using QuickPlace). My intention is to get a deeper understanding of the communication and collaboration issues involved in using this technology.

Your time commitment would be two one-hour interviews and a e-mail check-in that would take just a few minutes. If you would be willing to participate in this study, please e-mail your reply by DATE to me at the e-dress below.

I have included the required participant consent form for your review. This provides more detail about the confidentiality and anonymity that I will offer to all participants involved in this research project. The University of Alberta Ethics Review Board has approved the research design.

2...

If you have any questions, please call me locally in Edmonton at 427-XXXX through the _____ number at _____ during the day; or at 9XX-XXXX in the evening or e-mail at one of the e-dresses below.

Thank you for considering being a participant in this study. I look forward to hearing from you.

Yours Truly,

Carolyn (Carri) Andruski Hall

Phone: 780-427-XXXX (day time) OR 780-9XX-XXXX (evenings)

E-mail: -----@-----

Appendix E. Sample Consent Form for Research Participants

Title of the Research Project: Using Dual Structuration Theory to Explore the Adoption of Teamware: The Role of Task-Technology Fit

Contact Information

Investigator: Carolyn (Carri) Andruski Hall

Phone: (780) 9XX-XXXX

E-mail: _____@_____

Purpose of the Study

This study is being undertaken to explore and describe the fit between the work needs of virtual team members and the capability of QuickPlace technology to meet those collaboration and communication needs. Additionally it will look at the ability of individuals to change their work strategies to use the technology or to change the intended use of technology to meet their needs.

Methodology

Participants will include new and experienced users of QuickPlace technology and experienced users of QuickPlace technology. As a new user of QuickPlace technology³, you will be interviewed once before using the technology for your virtual project and once after using the technology. Additionally, you will be encouraged to keep a daily journal to document your experiences with this technology. As an experienced user of QuickPlace technology, you will participate in one focus group interview with other experienced users of this technology.

Confidentiality

Research participants' identity will remain anonymous and confidential. Personal journals will be coded to correspond with the pre- and post-project interviews. Identifying labels and names will be removed prior to releasing publishing or releasing findings for public viewing. This study is being conducted under auspices of the University of Alberta research ethics review board and adheres to the legislation of the Freedom of Information and Protection of Privacy Act (FOIPP).

³ New users have not participated in a virtual team using QuickPlace technology.

Time Commitment

The time required for each personal interview is one hour (total of two hours for interviews). In addition, the daily journal will take a minimum of a few minutes each day, depending on the detail documented. The time required for the focus group interview is one and a half hours. A light snack will be provided.

Withdrawal From Study

You may withdraw from this research project without any adverse consequences. No known risks or personal benefits will be realized by your participation in this study.

Participant Informed Consent

The research methods have been explained to me and my questions regarding the research study procedures have been answered satisfactorily. For any further questions I may have, I acknowledge that I may contact the research investigator named in this document. I have received assurance that my personal record as part of this study will be kept anonymous. I understand that I may withdraw from the study at any time.

(Date)

(Name of Participant)

(Signature of Participant)

(Name of Investigator)

(Signature of Investigator)

Any Questions? Please contact
Carolyn (Carri) Andruski Hall
Title
Organization
Phone: (780) 427-XXXX

Appendix F: Sample Interview Questions

Interview Questions for Experienced Users (guidelines for semi-structured interviews)

1. What has been your overall experience in using QuickPlace technology for virtual teamwork?
2. What team project were you involved with? What training did you have? What worked? What didn't work?
3. What was the best part of using this technology?
4. What was the least useful?
5. What was the most frustrating?
6. What would you do differently?
7. What advice might you have for new virtual teams just starting on using QP technology?
8. What specific communications needs were required for your virtual team project?
9. How would QP meet these needs?
10. What additional technologies did you use to accommodate these needs?

Pre-Project Interview Questions for New Users

September 27, 2002

Interview with _____.

Thank you.

Sign consent forms. Any questions?

Okay to record? Also okay if take notes?

About one hour at this first interview, one hour after you have used QP three or four times (late November) and one or two e-mail messages to see how you are doing.

Informal – semi-structured interview with new users of QP – those who have not used QP before. Looking at your perceptions, understanding about, and reasons for using this technology (what are your expectations for how this technology might help meet the communication and work needs for virtual teams).

RECORD – turn on tape recorder!

1. When and how did you first learn about QP? What initially captured your interest in it?
2. Can you tell me about some of your past experiences or current methods of working with teams on a project where team members are working from a distance?
3. What type of technology did/do you use? (teleconference, fax, telephone, e-mail, face to face meetings?) What works well? What is missing? What other features might help? What is most overwhelming?
4. Can you describe your role in the Pulse Diversification project and how you think QP might be used to assist in that project?
5. What features should a groupware technology (like QP) offer to enable Virtual teams to communicate and share information and be able to work together at a distance? Which of these do you think are absolutely essential?
6. How important would it be to have synchronous chat? Asynchronous chat threaded discussions? Some sort of voice element? Repository storage place for information? Calendaring? Gantt charts and other project management tools? Ability to edit documents simultaneously?
7. What are your expectations regarding how you or your team will use QP technology? (to share documents and updated information; make decisions; solve problems; store and retrieve information; archive information; tasks and to do lists; e-mail alerts; calendars; meeting online)?
8. What type of **training have YOU** had for using QP? How important do you think it is for new QP users to be computer literate?
9. What other type of training do you think might be needed for virtual teams to work together successfully?
10. What **skills** do you think virtual team members need in order to be successful in using and adopting QP technologies? (communication, research, team building, sensitivity independence, interdependence)
11. What **communication or management issues** do you think may arise and need to be addressed? How do you think problem-solving, conflict resolution or decision making will or could be made by a virtual team?
12. What questions do you think new virtual teams should ask before deciding to engage in using QP technology?

13. What do you think will be the determinants of whether you or your team **fully adopt** or use QP for this or other projects?
14. Is there anything else you would like to share with me that we may have missed or should have talked about?

Thank you for your participation.

Post-Project Interview Questions

1. At the last time interview, in (month), you had some healthy scepticism about QuickPlace technology and were particularly concerned about accessibility. What's happening with QP for your _____ Team?
2. To what extent have you or your team used QP technology to date?
3. If you haven't used QP, why do you think that is?
4. For what purpose have you used QP?
5. What features have you used or have other team members used? Or found useful?
6. How did you use them?
7. How frequently have you used QP and the features?
8. Have most of your team members used QP? Or have they reverted to using other technologies? Telephone, fax, f2f?
9. What has been the biggest barrier to using this technology?
10. Since the last interview, you have inherited a new project leader. How do you think that affected the project and the use of QP?
11. What have you learned from your virtual team experience about the usefulness of this type of technology to meet the communication and collaboration needs of virtual team members?
12. What features or other technologies might be useful for virtual teams?
13. Anything else?

Appendix G. QuickPlace Research Case Study
 Example of Coded Categories and Quotes From Case Study Interviews

Categories	Examples	Comments & Quotes	Quote Location
<p>EXPERIENCED USERS' Experiences with QP</p>	<p>Research network – various partners outside the organizational culture; reluctance to consider technology at first</p> <p>First positive experience – “aha” moment – showed benefits, more willingness to use</p> <p>Member was walked through the process for posting a presentation from distance – members could share common document</p>	<p>“I think it worked extremely well for us in the beginning as we were developing the network. We developed and presented a proposal. And, one of the challenges was that it was new technology for lots of people and so we almost said [collectively], “This is never going to work.” And, then there was a situation where we had somebody down in ____ and we were up in the ____ [building in City] doing presentations and they were by their speaker phones. They were supposed to set their presentation up ahead of time, but didn't, and, we said, ‘Well, that's okay. Just go online and post it for us.’ And they said, ‘I don't know how’. We said, “We'll tell you how, and we went through step by step. A few minutes later - it didn't take lots of time at all – we just said, ‘Click on this, click on this, click on this’ and there it was. And here we were hundreds of miles away.”</p> <p>C: So, it was a really positive experience and actually quite simple to do?</p> <p>Yeah, and we needed that kind of ah-ha for the moment because up until then we went, “What the heck? Why are we doing this? You know. Why do we need another tool? Then, you have to have some of those moments to get the technology up and running.”</p> <p>C: That seems a really important part – where you can see how to use it and it's an advantage to use it.</p> <p>“It's got to help you do things you couldn't do otherwise. We were working with people all over the country and just a really good example where that person in ____ could help us develop that presentation from their desk and they could actually work sitting at their desk – it is like a video conference.”</p>	<p>B, p. 1, L 8-35</p>

Appendix H. The Long Table Approach to Data Analysis

The long table approach of focus group or interview analyses requires a long table (or floor space). The transcript is typed and each line is numbered – the line numbers allow quick location of quotes within a transcript (Krueger and Casey, 2000, p. 133). Two copies of the transcript are printed: one is left in its original form; the other will be cut apart and categorized into individual quotes. Newsprint is rolled out on a long table or floor space. A separate section or area of the paper is dedicated to each interview question. The question is written at the top of each section of the paper. Each sheet is divided into group categories to represent the two different group participant types (i.e., experienced users and new users).

Krueger and Casey (p. 135) suggest using the following questions to organize the strategies for analyzing the transcript:

“Point 1. Did the individual answer the question that was asked? IF YES, go to point 3. Don’t KNOW, set it aside; IF NO, go to point 2.

Point 2. Does the comment answer a different question? IF YES, move it to appropriate question. IF NO, go to point 3. (Answers don’t always follow questions logically or in sequence).

Point 3. Does the comment say something of importance about the topic? IF YES, tape it to the newsprint under the appropriate question category. IF NO, set it aside. These will be moved around later, so don’t need to be taped to the paper.

Point 4. Is it something that has been said earlier? IF YES, start grouping ‘like quotes’ together. Make piles or group in categories of ‘like’ things. IF NO, start a separate pile.”

Quotes will be arranged and rearranged until they fit into similar themes or categories. Then, a descriptive summary will be written from the comments on each theme area of what each group type (i.e., experienced and new users) said in response to the question. Weight or

emphasis will be given to certain comments or themes based on frequency, specificity and extensiveness. *Frequency* is the number of times a comment occurs. However, just because something is said frequently does not mean it is more important than some small gem of information that is mentioned only once. I will look at whether it was just one person bringing up the same topic repeatedly, or several people making similar comments. *Specificity* is providing examples that are detailed; these comments will be given more weight than general comments. *Extensiveness* describes how many different people said something about a topic (p. 136). Another way of assigning strength to comments is to check whether themes occur across questions. The analysis can then be structured around these themes rather than around the original questions. Usually three quotes per theme are used to capture the essence of the discussion (p. 137).

Appendix I. Expectations of New Users About Factors Affecting Use of QP

Factors Relating to Use of QP	Positive	Negative
Commitment	Should have commitment from all team members to use QP. If benefit noted, more commitment to use.	Lack of commitment from external partners. Individuals may not seek information on the site – extra step. Lotus Notes seen as more effective.
Ease of Use	Takes one hour to train new staff. Similar to other groupware interface; familiarity. Compatibility must be flawless. Need to have quick access, searchable database, and awareness of capabilities of QP. Important for team members to be computer savvy. Site administrators must be familiar with QP technology. Project Management skills important for project leaders. Technology champions needed.	Slow landlines in rural areas means negative use; slow downloads of graphics. If inadequate computer skills and have negative experience with technical problems, will not likely adopt. Probably won't use PM tools much; prefer working in their own style; calendaring and other PM tools will likely not be used unless everyone uses them.
Training and Technical Support	All team members should have at least minimal training. Site administrators available for technical support. Increase awareness about capabilities of QP.	Hesitant to spend time to learn technology.
Usefulness	Repository will be the most used feature. E-mail notification of and group e-mail for updates on the site will be a positive feature. Project management (PM) tools helpful for managers. Customizing the site makes it more useable.	

Appendix J. Summary of Factors Relating to QuickPlace Use by Experienced
and Post- Project New Users

Factors Relating to Use of QP	Experienced Users	Post-Project New Users
Commitment	<p>Understanding the benefits and having a clear purpose for using the technology must be established upfront – does it meet work needs? If yes, then members must commit to using the technology.</p> <p>Having a technology champion to support the use of technology is important.</p> <p>Content needs to be added on a frequent basis in volumes that merit use of the technology.</p>	<p>For this project, Lotus Notes would have worked effectively for internal staff.</p> <p>Therefore, there was no real commitment to using QP for communication or project management. There was hesitancy to spend time upfront to learn the technology because LN and regular e-mail or phone technology worked more effectively.</p>
Ease of Use	<p>Computer skills or willingness to learn the technology must be in place.</p> <p>Technology must be flawless. Slow rural landlines will be a negative factor.</p>	<p>The extra step of having to sign in to QP was seen as negative; seen as cumbersome and slow.</p> <p>Those who did not have computer skills or who had not had training found they did not use the tool much.</p> <p>Slow lines and technical glitches were frustrating.</p> <p>QP is not entirely compatible with MS word (problems inserting tables from MS word); problems with printing GANTT charts.</p>
Training and Technical Support	<p>Training is essential for successful adoption. Training should include practice.</p> <p>Administrative and technical support is necessary.</p>	<p>Teams who had little or no training were not using QP to its full capacity.</p> <p>Most felt it was important to have a site administrator who could set up and maintain the site and do the technical work of attaching files, scanning articles, setting up the site, etc.</p>
Usefulness	<p>Main function of QP will be as a repository. Save time, travel and have fewer meetings. Time must be built into the project management process for users to learn how to use technology.</p> <p>A site manager and a strong, skilled project manager are essential for QP to function effectively for virtual teams.</p> <p>Customizing the QP site with specific folders and subject headings that were relevant to the group was useful. Project managers were able to customize tools for their use: GANTT charts, to do lists, reminder notices, e-mail notification for the group.</p> <p>Threaded discussion (FAQs) is helpful.</p> <p>White boarding and synchronous discussion capabilities needed.</p> <p>Calendaring, scheduling useful if all committed.</p>	<p>QP was used as a database and repository. Given that the virtual team comprised only organization staff, Lotus Notes and intranet system would have sufficed to meet the work needs of this virtual team.</p> <p>Being able to customize the QP site with relevant folders, pages, subject headings was positive.</p> <p>Direct communication more efficient.</p> <p>Threaded discussion used minimally; several users were unaware of this function.</p> <p>Automatic e-notification when new postings are on the site was mostly positive; some found this negative because they received information that was not pertinent to them.</p> <p>Some would not use PM tools – have own way of managing projects.</p>

Appendix K. QuickPlace Applications: Features and Functions Used by Virtual Team Members

Groupware Applications Deemed Useful for Virtual Teams	Applications Offered by QuickPlace	QP Features Used by Case Study Virtual Team Members
Electronic mail and messaging	✓	✓
Group calendaring and scheduling	✓	✓ (used minimally)
Electronic meeting systems	NA	NA
Desk top and real-time conferencing	NA except chat	Some felt instant messaging and white boarding would be used if offered NA
Non-real time conferencing, asynchronous threaded discussions	✓	✓ (used minimally)
Customizing the website	✓	✓ (used largely)
Group document handling	✓	✓ (used largely)
Groupware frameworks, services, applications	✓	✓
Collaborative Internet-based applications	✓	✓
Workgroup utilities, workflow and groupware development tools (task reminders, duet dates,)	✓ (some)	✓ (used by some project managers)