8-2005

An investigation of episodes of global interactivity: What collaborative processes effect the success of distributed project management?

Sajda Qureshi
University of Nebraska at Omaha

Cherie Noteboom
Dakota State University

An Investigation of Episodes of Global Interactivity: What Collaborative Processes affect the Success of Distributed Projects?

Conference Paper · January 2005

Source: DBLP

CITATION
1

READS
20

2 authors:

Sajda Shaheen Qureshi
University of Nebraska at Omaha
176 PUBLICATIONS **1,781** CITATIONS

SEE PROFILE

Cherie Bakker Noteboom
Dakota State University
45 PUBLICATIONS **100** CITATIONS

SEE PROFILE

2005

An Investigation of Episodes of Global Interactivity: What Collaborative Processes affect the Success of Distributed Projects?

Sajda Qureshi
University of Nebraska at Omaha, squreshi@mail.unomaha.edu

Cherie Noteboom
University of Nebraska at Omaha, cnoteboom@mail.unomaha.edu

An Investigation of Episodes of Global Interactivity: What Collaborative Processes affect the Success of Distributed Projects?

Sajda Qureshi
Department of Information Systems and Quantitative Analysis
College of Information Science & Technology
University of Nebraska Omaha
squreshi@mail.unomaha.edu

Cherie Noteboom
College of Information Science & Technology
University of Nebraska Omaha
cnoteboom@mail.unomaha.edu

ABSTRACT

The emergence and widespread use of collaborative technologies for distributed project management has created opportunities for offshore outsourcing and collaborative product development. Most tools and techniques for project management focus on categorizations, milestones and short term deadlines, resource allocation, size and risk calculations at a time when long term inter-organizational relationships and sourcing strategies are becoming more dynamic, geographically dispersed. As a result, the nature of project management is changing. This paper investigates collaborative interactions among globally distributed participants through a grounded theory analysis of interactions between participants in globally distributed teams. Following an analysis of interactions on the distributed virtual teams this paper delineates the collaborative processes that affect the success of distributed projects. This has implications for the successful management of distributed projects.

Keywords

Distributed Project Management (DPM), virtual teamwork, collaboration technologies, adaptation, communication, and coordination.

INTRODUCTION

Distributed virtual projects are making an impact in supporting formal and informal temporary alliances between organizations and teams. This provides organizations with the flexibility to meet changing customer needs and expectations. Current approaches to project management focus on command and control of distributed processes and not on facilitating distributed work. Research in virtual teamwork provides a wealth of insight into the ways in which distributed teams work. This concept has been developed through years of research in how people use various collaborative technologies to achieve their tasks and objectives (refer to Powell, Piccoli and Ives (2004) and Qureshi and Vogel (2000) for a review of this literature). Globalization and the changing structures of organizations have created virtual work groups distributed across space and time (Baker 2002). Collaboration among workers is vital to both ongoing organizational activities and project-based activities. Communication is seen as an important factor contributing to the success of individuals, project teams and organizational growth. Improved connectivity and the increase in groups and teams have resulted in increased interest in extending the usefulness of IT at the individual level to support the issues faced by dispersed teams. The trend toward distributed software development is growing (Audy, Evaristo and Watson-Manheim 2004). Although there are difficulties involved, this trend is here to stay. Organizations will continue to search for ways to develop software at lower cost and higher quality.

Current research primarily focused on the later stages of the software development life cycle, especially coding of software requirements. As organizations become more virtual, distributed development is becoming more apparent throughout the entire life cycle (Audy et al 2004). In developing the capability to effectively manage projects, organizations are faced with numerous decisions concerning issues such as the allocation of appropriate people to projects, project management systems, tools and techniques, organizational support to be provided to projects and the most effective governance structures for project based organizations (Crawford, Hobbs and Turner 2002). They suggest that problems associated with classification systems for projects include loss of autonomy, creation of barriers or silos, and visibility due to exclusion or inclusion in the

classification system (Crawford et al 2002). Organizations set up distributed projects to capitalize on globally distributed "Centers of Excellence" and to bring together dispersed resources (Barczak and McDonough 2003).

It appears from the challenges faced within distributed projects, that the use of collaborative technologies to support organizational processes has the potential to increase productivity in organizations. However, it does not always do so (Lipnack and Stamps, 1997; Robey, Khoo, and Powers, 2000; Nunamaker, Dennis, Valacich and Vogel, 1991). Collaboration technologies need to be matched to relevant collaboration process in order to achieve the productivity gains expected of the distributed project. Research uncovers processes such as the compensatory adaptation to lean media brings about a "positive" effect on the quality of outcomes (Kock 2001). It has been suggested that virtual teams go through processes of technological, work and social adaptation to their new work environments (Qureshi and Vogel 2001).

This paper draws upon research conducted in virtual teams and carries out qualitative research to investigate the question: What are the collaborative processes affecting the success of distributed projects? Comments elicited from participants interacting in a set of distributed projects are analysed using a grounded theory approach. Events, actions, happenings, or interactions identified from logs of participants' communication on the globally distributed teams are categorized using coding techniques from the grounded theory approach. The key concepts arrived at in this analysis are guided by a model of distributed project management (DPM) developed by Qureshi, Liu and Vogel (2005). This theoretical sensitivity enables greater reliability of the groupings to be attained (Straus and Corbin 1998). Following an analysis of interactions on the distributed virtual teams this paper sheds light on the collaborative processes affecting distributed projects and arrives at a set of implications for the successful management of distributed projects.

DISTRIBUTED PROJECT MANAGEMENT

The effects of rapid globalization and multiple sourcing of goods and services means collaborative technologies have become a key component of distributed projects. However, these teams must still build trust, meet schedules and adhere to budgets (Jarvenpaa and Leidner, 1999). Primary issues in DPM are coordination, deadline, and programmatic concerns (Ptak and Noel (1998) and Griffith, Sawyer and Neale 2003). Planning, size estimation, changing and producing software are identified as more difficult (Zanoni and Audy 2004). The challenges are due to requirement specification, test process and communication between participants being more difficult. Coordination in distributed context is challenging due to lean communication media, fewer opportunities for spontaneous interaction, less contextual reference and lack of other benefits of co-location (Evaristo and Carmel, 2004). The need for shared understanding in distributed projects is greater, but more difficult to achieve.

For DPM utilizing outsourcing relationships, it is important to define the relationships among the participants. Kern and Wilcocks (2002) found that both formal and informal information exchanges pervade all interactions. Information exchanges define a key operational effectiveness measure in outsourcing relationships (Kern and Willcocks, 2002). To ensure good communication is not an easy process, it requires thorough planning of an appropriate communication structure. The research indicated the traditionally problematic areas of the software development process become more critical. Problems such as specification, test process and communication require common language, shared understanding and collaboration. Human resources best practice study indicates globally distributed work requires an understanding across geographically dispersed areas. They feel we should be striving toward 'derived etics', and using constructs that make sense within and across the cultures under study. Developing effective 'best practices' for human resource issues such selection, compensation, training and others will allow global managers to create, understand and motivate global teams (Von Glinow, Drost and Teagarden, (2002); p.124).

The virtual team component of DPM appears to be vital for the effectiveness of distributed projects. Virtual teams have utilized the globally distributed programming resources to gain coding efficiencies (Barczak and McDonough, 2003). Global dispersion complicates the coordination of collective action in several ways. It implies physical distance and a shift towards remote communications (Evaristo and Fenema, 1999). The following section summarizes Qureshi, Liu and Vogel's (2005) model of DPM and uses this to guide a grounded theory analysis of virtual teams' interaction as they carry out their project in a distributed work environment supported by electronic collaboration.

MODEL OF DISTRIBUTED PROJECT MANAGEMENT

While a grounded theory approach assumes no a prior understanding of a phenomenon, this papers is a continuation of the research conducted by Qureshi, Liu and Vogel (2005) and ensures reliability through theoretical sampling (Straus and Corbin, 1998). The results research conducted by Qureshi, Liu and Vogel (2005) uncovered electronic collaboration affects

and their outcomes. The extent to which these affects influence the success of distributed projects and provide guidance for managing distributed projects is the subject to this and the following sections. A model of DPM is developed here to provide practical insight into the electronic collaboration effects and how they may be used to manage distributed projects. In particular, insight from this model can be used to manage projects across different organizations. Information and communication technology connects manufacturers, suppliers, customers, competitors and "complementors" to form a value network. A company in a value network can concentrate on the functions that it does best and rely on partners to carry out the other functions (as cited in Willcocks and Plant, 2003). For this value network to create value in its real sense, it requires cooperative attitudes, clear understanding of central objectives, electronic coordination and communication, adaptations and flexible modules, cultures and workforces (Willcocks and Plant, 2003). Qureshi, Liu and Vogel's (2005) analysis suggests that positive communication can bring about shared understanding and effective collaboration. Members in a DPM environments often have expertise in a specific area, so there is a great need for knowledge sharing via effective communication. Frequent and effective communication can solve coordination difficulties and help make the adaptation process smooth. These effects and their relationship to each other are illustrated in the following Model of Electronic Collaboration Effects in Figure 1 below:

This model suggests that exchanging information on each project member's schedule will help to coordinate the team. Sharing project schedules and task related information could help members to overcome their respective adaptation

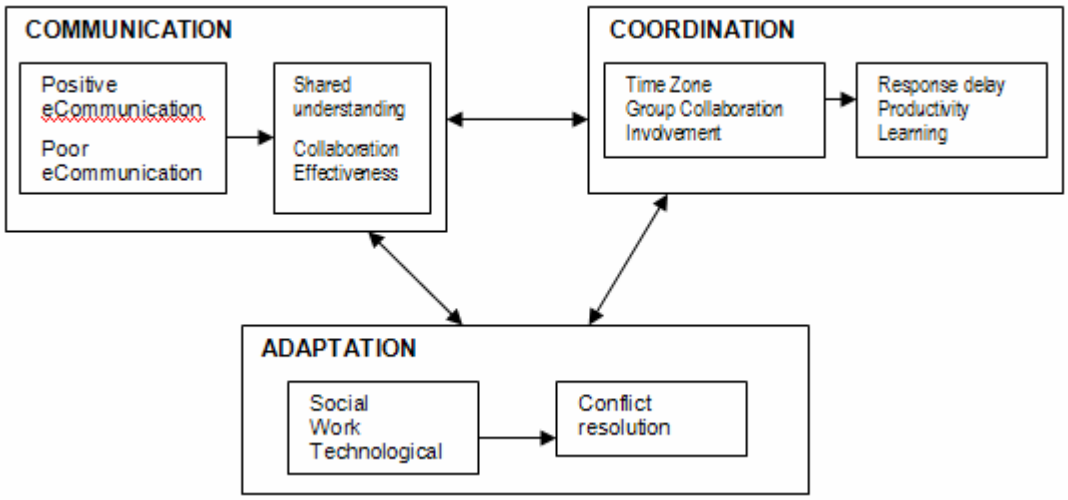

Figure 1: Model of Electronic Collaboration Effects (Qureshi, Liu and Vogel, 2005)

difficulties and enable conflicts to be resolved. DPM requires a high degree of communication and coordination. Distributed project decisions refer to the degree to which control over resources necessary to complete a project, such as software, hardware and data, are distributed among project participants (Tractinsky and Jarvenpaa, 1995). Communication decisions and information processing capabilities are major challenges to global organizations and are one of the most important factors that dominate distribution decisions in global projects. Through communication process, social structures can be produced, reproduced and changed (Sarker and Sahay, 2003). Tractinsky and Jarvenpaa's (1995) study suggests that global project management emphasizes more local units' responsiveness and the need for continuous, uninterrupted 24-hour services. Well-managed coordination process that follow mutually-agreed procedures and rules can encourage constructive communication and create a feeling of "closeness" despite the cultural, social and working differences.

Research Methodology

This research follows a qualitative approach known as interpretive research. According to Klein and Myers (1999) Information Systems (IS) research can be classified as interpretive if it is assumed that our knowledge of reality is gained through social constructions such a language, consciousness, shared meanings, documents, tools, and other artifacts. Interpretive methods of research in IS are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham, 1995). This research follows an interpretive approach in which a grounded theory approach is used for the discovery of theory from data systematically gathered and analyzed from the research process (Glaser and Straus, 1967; Straus and Corbin, 1998). Within

this approach, theory is discovered first, through conceptual categories and their conceptual properties; and second, through hypotheses or generalized relations among the categories and their properties (Glaser and Straus, 1967). Theory can be further refined through a process of disciplined imagination or "sense making" (Weick, 2001). This is a process of collective sense-making about what people have been doing, what they might want to do in the future, including how they might want to do it (Harmon, 1990).

This paper follows a grounded theory approach to discovering theory through the development of conceptual categories and their properties by remaining close to the data. Data was collected on 12 distributed virtual teams comprising of students from Erasmus University in the Netherlands and from the City University in Hong Kong. The students worked together using eRoom™ software that provided file sharing, discussion, and voting and chat tools. A particular feature of this software was that it provided each virtual team with its own "room" or folder equipped with these features. The data was collected over a period of three months in 2001. There were coded about 70 pages of electronic collaboration transcripts coded. These teams were comprised of executives in The Netherlands who were following an executive MSc. in Management degree and executives pursuing their MBA at the City University of Hong Kong. This sample was selected from a series of similar team interactions from 1999-2001 as it provided the most virtual interactions related to DPM. The distributed project involved the collaborative analysis of an organizational problem with a specific set of deliverables and milestones.

Data was gathered through observations and logs of electronic collaboration. Events, happenings, actions and interactions were identified from the logs of interaction and organized into transcripts. These were termed "episodes" and given labels that best described their meaning. Some of the comments in the logs were also evaluative, describing the nature of the collaborative experience. These comments were labeled and included in the analysis as they represented direct experiences of the events and actions identified. The data was organized into conceptual categories and their properties were identified in the transcripts of electronic collaboration. This transcript data was analyzed using Straus and Corbin's (1998) open coding method. Open coding was used to conceptualize raw data by naming and categorizing the phenomena through close examination of the data. During open coding, data were broken down into discrete parts, closely examined and compared for similarities and differences. The data representing events, happenings, actions and interactions that were found to be conceptually similar in nature or related in meaning were grouped under abstract concepts that best represented the phenomenon. According to Straus and Corbin (1998), although events or happenings might be discrete elements, the fact that they share common characteristics or related meanings enables them to be grouped. Based on their ability to explain what is going on, certain concepts were grouped under more abstract higher order concepts which Straus and Corbin (1998) term, category. Categories have analytic power because they can have the potential to explain and predict.

Reliability of these groupings was achieved through theoretical sensitivity, iterative coding and theoretical sampling. Straus and Corbin (1998) suggest that theoretical sensitivity is required to enable the researcher to interpret and define data and thus develop a theory that is grounded, conceptually dense and well integrated. Sources of theoretical sensitivity are the literature, professional and personal experience. Additional reliability was achieved through the iterative use of open and axial coding to bring out the concepts and discover any causal relationships or patterns in the data. Straus and Corbin, (1998, p.98) state "though open and axial coding are distinct analytical procedures, when the researcher is actually engaged in the analysis he or she alternates between the two modes". Along with the grouping of abstract concepts (open coding), identification of causal conditions (axial coding) that lead to the occurrence or development of a phenomenon was carried out iteratively using theoretical sampling. Further reliability was achieved through theoretical sampling, which is the sampling of data on the basis of concepts that have proven theoretical relevance to the evolving theory. The concepts with proven theoretical relevance were identified in the transcripts of electronic collaboration. The form of theoretical sampling used was open sampling which is associated with open coding. Open sampling was used to select additional transcript, observation and interview data (Straus and Corbin, 1998). In this way, the emerging concepts were developed in depth to reveal additional properties and dimensions. Categories were arrived at and refined by tabulating the number of times episodes of related concepts occurred. Together these concepts, categories, and causal conditions provided explanatory and predictive power to the theoretical model.

RESULTS

Given the space limitation of this paper, this section describes a selection of the total number of episodes. As this research is qualitative, the objective is not to test variables but to highlight concepts and describe relationships in episodes of transcripts. The electronic transcripts were obtained from logs of distributed interaction on the eRoom Software. As this software enabled interactive sessions to be carried out, we were able to find out about the participants' experiences using the software in a distributed work environment. Contrary to the results of the analysis by Qureshi, Liu and Vogel (2005), the interactions in this set of transcripts was more collegial and there was greater awareness of the circumstances of participants from different

parts of the world. One reason for this was that both sets of participants were working full time while pursuing an education at their respective universities. They may have had greater mutual understanding and shared goals. The three main categories of episodes that emerged from open coding related to and adaptation, communication, and coordination; were consistent with the Qureshi, Liu and Vogel's (2005) model. Within these main categories additional episodes emerged that represented the effects of collaborating electronically in a distributed environment. The numbers of episodes relating to each of the categories emerged from open coding of the 372 electronic transcripts and are illustrated in the following table 1 below:

	Social	**Work**	**Technological**	**Total**
Communication	62	102	46	210
Coordination	20	117	25	162
Total	**82**	**219**	**71**	**372**

Table 1: Number of Episodes per category

Adaptation

Adaptation is the process by which members of a group learn to engage with themselves, the distributed work environment and the collaborative technologies with which they work (Qureshi and Vogel, 2001). Adaptation was identified in episodes in which interaction took place. As much of the group interaction focused on getting the project completed on time and to specification, the majority (60%) of all the episodes related to the work adaptation. The degree of social adaptation (20%) did bring about a greater degree of cohesion that appeared to be an element of trust. Participants shared their ideas, resources and personal information freely and were motivated to contribute to the development of the group project to the best of their abilities. Comments such as *"Looking forward to working with you!!!"* exemplifies cohesion in the group. Perceptions of members' benevolence and integrity are important in the development and maintenance of trust (Jaarvenpaa and Liedner, 1999). It has been suggested that high levels of trust and cohesiveness reduce barriers to communication in virtual teams and are instrumental in promoting cooperation (Powell, Piccoli and Ives, 2004; Jarvenpaa and Liedner, 1999)). This is consistent with the findings of this study and did enable participants to adapt the technology to their own work arrangement and habits. This is technological adaptation and it accounted for about 20% of the total number of episodes.

Communication

Within each of the three forms of adaptation, episodes of communication were found that suggest the extent to which meaning was conveyed accurately between the sender and receiver effected the success of the projects. Effective communication did bring about a greater degree of shared understanding and thus a greater degree of task comprehension and completion. Teams operating in virtual environments face greater obstacles to orderly and efficiently information exchange because they rely heavily on information technology to communicate (Powell et al, 2004). Communication episodes for each of the forms of adaptation suggest that there were different types of communication processes that enabled shared understanding to be achieved. Of the total number of social adaptation episodes, 37% related to introductions and getting to know each other and the collaboration medium. Examples of communication episodes relating to social adaptation are as follows:

> *P.S. To make things more lively I've uploaded my (casual)picture to our Group 2 eRoom space. May I invite you to do the same?*
>
> *I am Menno and it's almost 10 pm here, here is The Netherlands famous about it's tulips and now most probably also the foot and mouth disease.*

The communication episodes relating to social adaptation were humorous, personal, supportive and often very entertaining. These interactions served to lighten the burden of carrying out what was for this group a difficult and unconventional project. Episodes of work adaptation were much more task focused and related to developing an understanding of the task to be accomplished. Examples of these episodes are illustrated as follows (the original expressions and grammar have been retained):

> *I think we will have to discuss the KPMG case in more detail which means we all have to read and internalize the case. we will have to discuss the various topics so who would like to start ???? Our friends from hong Kong ?*

Well for your / our portfolio on stocks question / advise: just buy the things you always wanted to have...

The above transcript illustrates a series of episodes relating to work adaptation. These episodes illustrate how the communication process was carried out to bring about shared understanding with respect to the tasks to be accomplished with the project. Being able to use the tools provided by the collaborative technology to support their ways of working was key to accomplishing the tasks. Episodes of technological adaptation involved accessing, using and managing interactions as some of the following examples illustrate:

Now, I am diving in Eroom and very happy to know R, F, M and H are with this virtual equipment. There will have other two members of our group from Hong Kong. They are A and B.

I have created a folder in our workspace named as "HKNL Project on K-World". If there is no objection, we can put our case study materials in this folder. Other folder for discussion can be created if needed.

My computer in work, somehow, did not allow me to get access to the eroom, while I have been almost living in my office for the last week. I'll do the catch up with you guys and contribute as much as I can.

Communicating enabled technology adaptation to take place and enabled participants to use the various features to suit their distributed ways of working.

Coordination

The coordination of the distributed processes in this study involved multiple types of episodes. Coordination episodes took place during social adaptation when participants were being supportive and thankful of each other's contributions. Coordination episodes were apparent during work adaptation. Of the total number of coordination episodes, 117 related to the coordination of work activities. An example of a coordination episode involving work adaptation is illustrated is follows:

Sorry that I take the action to simplify and modify a little bit of our folder since I've found it easier to gather our ideas.

And now we mainly have THREE major folders for our continuous communication:

1) Goal project

2) Idea (I think it should be the most frequently used one for these few days and I've formatted it as folder instead of discussion for everyone to add more ideas on it)

3)Member introduction (welcome other members to add your photo or other personal things into this)

Technological adaptation was apparent in the episodes relating to coordination and involved the coordination of activity on the electronic spaces. The electronic work environments evolved with the work behaviors of each group. Technological adaptation was prevalent as is illustrated by the following comments:

It is nice to see that some of you really can use this tool in the way it has to be used. Really good!

Ricky and Menno you have carte blanche to create our work environment. Let the rest know where it is. Just put that message on this site.

Many coordination episodes related to the handing over of tasks, setting of meeting dates, document sharing, and use of collaboration tools for structuring folders, voting and setting passwords. In this process, participants did develop relationships that enabled then to get their work done. This is consistent with Watson et al (1998) who found that employees develop relationships and coordinate work activities through encounters and informal discussion.

The above episodes represent a selection of interactions among members participating in distributed projects. The results indicate that the efficient and effective management of distributed projects require different types of adaptation, communication and coordination. While these concepts are not normally considered to be part of a an investigation of virtual teams, they are essential in the use of collaboration technologies for supporting distributed projects. In addition, the use of networking and collaborative technologies to support groups in the creation of shared understanding requires adaptation at all three levels.

ANALYSIS AND IMPLICATIONS FOR RESEARCH AND PRACTICE

This research has shown ways in which electronic collaboration processes that affect the success of distributed projects enable distributed projects to be managed effectively and efficiently. The answer to the question posed in this paper and implications of this answer for research and practice for DPM are provided in this section. The results suggest that electronic collaboration processes of adaptation enable effective communication and coordination in successful distributed projects. While these collaboration processes reflect those in the Qureshi et al (2005) model, the specific ways in which groups adapt, communicate and coordinate their activities varies. Communication and coordination allow effective adaptation to enable the virtual team to proceed from interpersonal to organizational and process level achievements.

Adaptation enables distributed projects to be managed by fostering new kinds of collective work made possible with advanced collaboration technologies. The uses of collaboration technologies "*enable conversations with new kinds of properties- these shift from being fixed to being externalized and negotiated*" (Schrage, 1990, p.102). Work adaptation provides a catalyst to lateral thinking that can provide crucial input to creative problem solving. As noted, technology plays a key role in adaptation. Adaptation implications for practice are that coordination of collaborative efforts should allow for changes in temporal and spatial conditions. Tools and techniques should be flexible enough to allow for changes in work and/or private conditions of participants.

Coordination of time zone differences, cultural differences, and lack of mutual knowledge can result in challenges for the management of distributed projects separated by time and physical distance, in which there is cultural diversity, language barriers, lack of fluency in a common language, differences in communication and decision making norms and technological infrastructure differences (Barczak and McDonogh, 2003). The ability to utilize technology as a tool to develop relationships and to coordinate work activities is imperative for distributed efforts. For practice, important coordination implications are: 1) Provide flexible collaborative technologies. These technologies can be used to structure group activity to support individual and groups' ways of working; 2) Facilitate the achievement of milestones. Provide task assignments, handover points and information sharing processes; 3) Provide clear responsibilities and targets to ensure accountability per task. For example, in globally distributed software design and development projects, one of the most important challenges is communicating requirements and arriving at specifications that all parties agree upon (Carmel and Sawyer, 1998). The technology must enable participants to complete their individual task assignments and contribute to the group output at key handover points.

Communication or the ability to exchange and understand messages by participants in a distributed project is important as it enables virtual teams to carry out their work because they cannot meet in face-to-face settings (Baker 2002). A noted success factor in virtual teams has been sustained communication in pursuit of shared understanding. Our analysis suggests effective communication was achieved and the findings indicate a higher-level collegiality and greater awareness of the circumstances of participants from different parts of the world. One reason for this was that both sets of participants were working full time while pursuing an education at their respective universities. They may have had greater mutual understanding and shared goals. Given the importance of communication in virtual teams, it is essential to provide side channels through which virtual team participants can engage in interactions other than direct task focus. Although historically seen as "noise" by some researchers and businesses, these non-task focused interactions play an important role in achieving team member trust and sustaining communication and involvement of distributed team members. In the absence of side channels and discouragement for non-task related communication in the context of focus on content and deliverables, disruption of project momentum can easily occur. Implications of this research for practice are: 1) an increase in social activities is needed to stimulate shared understanding. This increases the cohesion and ability of distributed groups to be on the same page at the same time; 2) Foster open communication among participants. Utilize the creation of electronic spaces to support social interaction, to enable work structure and to allow adaptation of the technology to the new work environment. The virtual teams represent a new form of organization that offers unprecedented levels of flexibility and responsiveness and has the potential to revolutionize the workplace (Powell, Piccoli and Ives (2004). The ability of the teams to communicate effectively impacts their ability to adapt.

The findings suggest social interaction leads to social adaptation and supports trust and relationships. The results appear to increase comfort for work adaptation and to achieve technology adaptation. It has been suggested that high levels of trust and cohesiveness reduce barriers to communication in virtual teams and are instrumental in promoting cooperation (Powell, Piccoli and Ives, 2004; Jarvenpaa and Liedner, 1999)). This is consistent with the findings of this study and did enable participants to adapt the technology to their own work arrangement and habits.

SUMMARY AND CONCLUSIONS

This paper has investigated collaborative processes in globally distributed projects and uncovered episodes through which such projects may be successfully managed. This analysis suggests that adaptation to globally distributed work environments is key to effective collaboration. Collaborative processes that affect the success of globally distributed projects involve social, work and technological adaptation. These collaborative processes influence communication and coordination by enabling distributed projects to be completed on time and to specification. The implications for the successful management of distributed projects include the development of shared understanding, open communication through greater social interaction, the provision of flexible collaborative technologies and accountability.

Lessons learned from this research are that different groups go through the processes of adaptation, communication and coordination in different ways. As this research has investigated the above concepts using a qualitative research approach, further research to test the validity of these variables in distributed projects using quantitative approaches should be undertaken. This may serve to ease the confusion that some researchers may have with qualitative concepts and add additional rigor to an understanding of how these concepts enable distributed projects to be managed more efficiently and effectively.

REFERENCES

1. Audy, J. Evaristo, R. and M. Watson-Manheim, (2004) Distributed Analysis: The last frontier? in R. Sprague and J. Nunamaker (Eds) *Proceedings of the 37th Hawaii International Conference on System Sciences,* January 5-8, 2004, Waikoloa, Island of Hawaii, USA, IEEE Computer Society Press, 1-9.
2. Baker, G (2002) The effects of synchronous collaborative technologies on decision making: A study of virtual teams, *Information Resources Management Journal*, 15, 4, 79-93.
3. Barczak, G. and McDonough, E., (2003). Leading global product development teams. *Research Technology Management*, 46, 6, 14-18.
4. Carmel, E. and Sawyer, S. (1998) Packaged software development teams: What makes them different?, *Information Technology and People*, 11, 1, 7-17.
5. Crawford, L., Hobbs, J., and J. Turner (2002). Matching people, projects, processes and organizations. *Proceedings of the Project Management Institute Annual Seminars & Symposium,* October 3-10, San Antonio, Texas, USA, Newtown Square, PA: Project Management Institute, 1-10.
6. Evaristo, R. and Carmel, E. (2004) The effect of time separation on coordination costs in global software teams: A dyad model, in R. Sprague and J. Nunamaker (Eds) *Proceedings of the 37th Hawaii International Conference on System Sciences,* January 5-8, 2004, Waikoloa, Island of Hawaii, USA, IEEE Society Press, 1-10.
7. Evaristo, R., and van Fenema, P. C. (1999) A typology of project management: Emergence and evolution of new forms, *International Journal of Project Management, 17,* 5, 275-281.
8. Glaser, B.G. and Straus, A.L. (1967) The discovery of grounded theory: Strategies for qualitative research, Aldine de Gruyter:New York.
9. Griffith, T., Sawyer, J., Neale, M. (2003) Virtualness and knowledge in teams: Managing the love triangle of organizations, individuals and information technology, *Management Information Systems Quarterly*, 27, 2, 265-287.
10. Harmon, M. M. (1990) Applied phenomenology and organization, *PAQ*, 10-17.
11. Jarvenpaa, S. and Leidner, D. (1999) Communication and trust in global virtual teams, *Organizational Science*, 10, 6, 791-815.
12. Kern, T. and Willcocks, L. (2002) Exploring relationships in information technology outsourcing: The interaction approach, *European Journal of Information Systems*, 11, 3-19.
13. Klein, H. K. and Michael D. Myers (1999) A set of principles for conducting and evaluating interpretive field studies in information systems, *MIS Quarterly, Special Issue on Intensive Research* 23, 1, 67-93.

14. Kock, N. (2001) Compensatory adaptation to a lean medium: An action research investigation of electronic communication in process improvement groups, *IEEE Transactions on Professional Communication*, New York: 44, 4, 267-285.

15. Lipnack J. and J. Stamps (1997) Virtual teams: reaching across space, time and organizations with technology, John Wiley and Sons.

16. Nunamaker, J., Dennis, A., Valacich, J. and Vogel, D. (1991) Information technology for negotiating groups: Generating options for mutual gain, *Management Science*, 37, 10, 1325-1346.

17. Powell, A., Piccoli, G. and Ives, B. (2004) Virtual teams: A review of current literature and directions for future research, *Database for Advances in Information Systems*, 35, 1, 6-36.

18. Ptak, R. and Noel, J. (1998) Issues in distributed IT management, *Information Systems Management*, 15, 3, 16-22.

19. Qureshi, S., Liu, M. and Vogel, D. (2005) A grounded theory analysis of e-collaboration effects for distributed project management, in R. Sprague and J. Nunamaker (eds) *Proceedings of the Thirty Eight Annual Hawaii International Conference on Systems Sciences*, January 3-6, 2005, Waikoloa, Island of Hawaii, USA, IEEE Computer Society Press, 1-10.

20. Qureshi S., and Vogel D. (2000) Organizational adaptiveness in virtual teams, *Group Decision and Negotiation*, 10, 1, 27-46.

21. Robey D., Khoo H.M. and C. Powers (2000) Situated learning in cross functional virtual teams, *IEEE Transactions on Professional Communication*, 42, 1, 51-66.

22. Rutkowski, A. F., Vogel, D. R., van Genuchten M., Bemelmans, T. and M. Favier (2002) E-collaboration: The reality of virtuality, *IEEE Transactions on Professional Communication*, 45, 4, 219.

23. Sarker, S. and Sahay, S. (2003) Understanding virtual team development: An interpretive study, *Journal of Association for Information Systems*, 4, 1-38.

24. Schrage, M. (1990) Shared minds: The new technologies of collaboration, Random House, New York.

25. Straus, A. and Corbin, J. (1998) Basics of qualitative research: Techniques and procedures for developing grounded theory, London: Sage, Thousand Oaks.

26. Tractinsky, N. and Jarvenpaa, S. (1995) Information systems design decisions in a global versus domestic context, *MIS Quarterly*, 19, 4, 507-534.

27. Von Glinow, M., Drost, E. and Teagarden, M. (2002) Converging on IHRM best practices: Lessons learned from a globally distributed consortium on theory and practice, *Human Resource Management*, 41, 1, 123-140.

28. Walsham, G. (1995) The emergence of intrepretivism in IS research, *Information Systems Research*, 6, 4, 376-394.

29. Watson, M.B. F., Narasimhan, S. and Rhee, H.S. (1998) Communication and coordination in the Virtual Office, *Journal of Management Information Systems*, 14, 4, l7-28.

30. Weick, K. E. (2001) Making sense of the organization, Oxford: Blackwell, Oxford.

31. Willcocks P. L. and Plant, R. (2003) How corporations e-source: From business technology projects to value networks, *Information Systems Frontiers*, 5, 2, 175-193.

32. Zanoni, R. and Audy, J. (2004) Project management model: Proposal for performance in a physically distributed software development environment, *Engineering Management Journal*, 16, 2, 28-34.