COLLABORATIVE INFORMATION USE:

KNOWLEDGE CREATION IN TEAMS

Patricia Ruma Spence, Ph.D. Candidate, pspence@ist.psu.edu

College of Information Sciences & Technology, The Pennsylvania State University

ABSTRACT

With the importance of knowledge as a source of competitive advantage for organizations, the cultivation of organizational knowledge has received much attention in the information systems community. However, in response to complex, time-critical and high-reliability environments, teams are playing a more prominent role in organizational tasks and functions. Through my research, I seek to inform our understanding of knowledge creation at the team level. Through empirical analysis and a description of the work processes, I will provide insight into an important, but previously underexplored aspect of organizational knowledge – Collaborative Information Use (CIU). CIU is the process by which members of a team work together to incorporate the information found into the team's existing knowledge base. The domain of information technology teams in healthcare, with an emphasis on collaborative work and its safety-critical, information-rich environment, is the focus of this research. My research design is structured around two case studies. Through these case studies, I will generate a framework of CIU using the technique of constant comparative analysis known as Grounded Theory. This research is expected to make two main contributions to the information systems community: to provide empirical evidence of team level information use and knowledge creation, furthering our understanding of how organizational knowledge is created at the team level; and the articulation of a CIU framework will serve to inform understanding of the contexts and settings in which teams work together to use information and create knowledge.

KEYWORDS: collaborative information use, knowledge creation, collaborative information behavior, teams, healthcare, qualitative study

1. INTRODUCTION

An organization's capability to create and harness knowledge has been recognized as a core competency necessary to gain and sustain a competitive advantage in the global economy [10, 26]. The better an organization is at developing, applying and sharing knowledge, the better it can be at problem solving and innovation [41]. This can explain why the cultivation of organizational knowledge [6, 9, 19, 37-41] has received much attention in the information systems (IS) community. While much of this research views organizational knowledge as created through the identification, codification and dissemination of the knowledge and expertise of individual workers, in response to a complex, global, and competitive environment, teams are playing a more prominent role in organizational tasks and functions [20, 23]. Therefore, the it is imperative to also understand how organizational knowledge is created at the team level [37, 46].

This shift from individual to team-based work introduces further complications as new forms of organizations and teams emerge. Organizations are increasingly faced with complex situations where uncertainty, stress and time-criticality influence decision making and problem solving. Further, information is distributed across team members with different experience and expertise, who act with incomplete information in an uncertain environment [8]. The end result is a multifaceted organizational system where work is done by the careful coordination and collaboration of teams of knowledge workers [11].

My research focuses on how teams of knowledge workers collaboratively create knowledge as they resolve a shared information need. As part of my research, I have been studying this phenomenon in teams of information technology (IT) professionals supporting the information, communication and technology systems of a large healthcare organization.

2. THE CONTEXT: IT TEAMS IN HEALTHCARE

IT teams are an interesting site to study team level knowledge creation for a variety of reasons. First and foremost, IT team members work in information-rich environments where they must collaborate to carry out their work activities and tasks. Further, these IT teams are composed of IT professionals of different

disciplines, where each team member brings his own particular expertise, experience and perspective to the team. Moreover, these teams perform a common task, software and technology support and implementation, in a somewhat similar fashion, so by studying them, I can generalize across these teams. Finally, the IT team exists in nearly every business organization and is critical to the long-term success of the parent organization because "it houses critical data, drives the analytical capabilities of other departments and plays a crucial role in the communication network of the company" [3].

IT teams in healthcare play an even more important role in the organization because they are essentially the front-line information workers. Hospitals are information-intensive, safety-critical, high reliability organizations, and the growth of IT in this setting is such that the technology and information systems are pervasive to patient care [4]. Incorrect information or unavailable information can lead to inappropriate patient care decisions. Therefore, IT teams play a large role in ensuring the safety of patients because their work in supporting these systems and ensuring their availability has a direct impact on patient care.

3. PROBLEM STATEMENT

In their study of IT project development teams, Walz et al. [53] suggest that to be successful, IT teams must supplement their knowledge by acquiring information from a variety of sources including documentation, training, other team members and meetings. To achieve this goal, IT team members must learn effective coordination and collaboration practices. While there are numerous and well researched organizational knowledge perspectives including the knowledge-based theory of the firm [19], firms as knowledge-creating entities [41], organizational learning [46, 52], and communities of practice [54, 55] among others, there are few team-based perspectives on information use and knowledge creation [2, 5, 16, 21, 22, 24, 27]. This is acutely problematic in settings where teams and teamwork are an essential aspect of the organizational work and success of the organization, such as it is in IT teams in healthcare.

Alternatively, researchers have been studying collaborative information behavior (CIB), the totality of how people work together to identify a common information need, gather and share information with each other, and then utilize the found information [45] [42]. Further, these studies of CIB have focused

more on information seeking, retrieval and sharing, rather than on information use – the result of which is the creation of knowledge.

While there is considerable research on knowledge sharing in teams [7, 12, 13, 25, 32-34, 56], there is currently little research and understanding of team level information use and knowledge creation in organizational settings. This lack of insight has far-reaching negative consequences for team success in domains where teamwork and collaboration are required to deliver safety and reliability, such as in healthcare. Therefore, we must also develop processes and technologies that support team level information use and knowledge creation. However, before we can design team level policies, procedures and technologies, we must first understand the contexts and settings in which teams work together to create knowledge. Therefore, it is important to understand how people, in the course of their daily work, collaboratively use information and create knowledge at the team level in organizational settings, including the details of how this is accomplished and what can be learned from this understanding.

4. RESEARCH OBJECTIVE

Through my research, I seek to inform our understanding of knowledge creation at the team level by focusing on issues of computerization and collaboration in the context of Collaborative Information Behavior (CIB). Through empirical analysis and a description of the work processes, I will provide insight into an important, but previously underexplored aspect of CIB – Collaborative Information Use (CIU). CIU is the process by which members of a team work together, in a dynamic organizational setting, to incorporate information found into the team's existing knowledge base. This is accomplished through the evaluation of given information and from that evaluation, the determination of whether or not the information is actionable. If the information is found to be useful, new knowledge may be created as knowledge is actionable information. I emphasize that new knowledge *may be created*. In order for the newly created knowledge to be incorporated into the team's existing knowledge base, it must take the form of an external representation of that knowledge.

The objective of my research is two-fold. First, this study addresses the gap in the literature and research regarding the link between collaborative information use and knowledge creation in teams – as

presented in section 3 – and develops a theoretical approach to study the information use and knowledge creation processes at the team level. Two research questions emerge from this broader motivation and previous empirical research.

RQ1: What are the collaborative information use *practices* of organizational teams? More specifically:

RQ1a: Why do team members collaboratively evaluate information?

RQ1b: How is information collaboratively evaluated?

RQ1c: What affects the collaborative evaluation of information?

RQ2: In organizational team settings, how are collaborative information use and knowledge creation connected?

RQ3: What, if any, functions and aspects of organizational information systems support team level collaborative information use practices?

The remainder of this paper proceeds in four parts. First I provide a brief review of the theoretical literature. Second, I describe the research design, the appropriateness of the research methods to this study. Third, I review some preliminary findings. Lastly, I explain the expected results and contributions.

5. BACKGROUND

In this section, I draw on team and information behavior research not only to define an important set of terms used in this study, but also to position my work in the larger body of collaborative information behavior literature and team literature.

5.1. Definition of Terms

These definitions are provided as an aide for understanding the jargon used within this proposal:

- Knowledge: Knowledge, as defined by Drucker, is "information that changes something or somebody---either by becoming grounds for actions or by making an individual (or an institution) capable of different or more effective action" [11]. This definition assumes that at some point the information acquired is sufficient for the person or persons to do something with it, or to put it to use.

A person or persons have evaluated the usefulness of the acquired information. Seen in this way, knowledge is actionable information.

- Collaborative Information Behavior (CIB): CIB is the totality of how people work together to identify a common information need, gather and share information with each other, and then utilize the found information [42].
- Collaborative Information Seeking (CIS): CIS is the purposive seeking of information by two or more individuals because of an information need in order to satisfy a shared goal.
- Collaborative Information Use (CIU): CIU is the process by which members of a team work together, in a dynamic organizational setting, to incorporate information found into the team's existing knowledge base. This is accomplished through the evaluation of given information and through that evaluation, the determination of whether or not the information is actionable. If the information is found to be useful, new knowledge is created as knowledge is actionable information.

5.2. Teams, Information and Knowledge Creation

Organizational knowledge takes its form in a variety ways including practices to create, identify and distribute knowledge. These practices are meant to promote, facilitate and reward the creation, identification and distribution of knowledge, whether at the organizational, individual or team level. However, current research overwhelmingly focuses on practices at the organizational level and at the individual level, while the study of organizational knowledge practices at the team level is still in the early stages. Table 1 lays out the focus and characteristics of each level of knowledge management as we know them.

The relationship between organizational knowledge and individuals within an organization is most clearly exemplified by the studies of Nonaka et al. of the knowledge-creating company [37, 38, 40, 41]. The basic premise of these studies is that only individuals can create knowledge, and organizations exist to support, amplify and crystallize the knowledge created by individuals within an organization. How knowledge is converted from the individual to the organization is explained in their four mode model of knowledge conversion (SECI model) – a continuous spiral process that begins and ends with the

individual, but moves through the group and the organization levels as the knowledge is created. The socialization mode of the SECI model does take into account some group/team level concepts such as apprenticeships and shared mental models. Further, the combination mode of the SECI model takes into account the interactions of individuals via documents, meetings, conversation, etc. Yet, both of these knowledge exchange modes are overly simplistic and do not consider the details of the everyday interactions of team members as they work on issues to achieve a common goal.

Although still limited, there is a growing body of literature examining information use and knowledge creation at the team level [2, 5, 27, 31, 36]. From this prior research, we begin to understand the context and important concepts involving team level information use and knowledge creation. First, team member support is very important as it requires team members to help each other find, share and evaluate information [2]. Secondly, characteristics of team members themselves can support knowledge transfer, particularly the capability and credibility of team members [27]. Third, negotiation of common ground is important to the success of information use and knowledge creation and common ground can be achieved through the external representation of each members values and beliefs [5]. Lastly, boundary objects play a role in information use and knowledge creation as decontextualizing and recontextualizing information tools [31].

However, we still need further exploration on how team members interact and the nature of tasks on which people collaborate when using information and creating knowledge. For example, why and how do team members collaboratively use information and create knowledge? Do organizational factors, contextual factors or varied task types affect CIU practices in teams? What, if any, technological features and/or systems support the CIU activities of teams in organizational settings? These questions motivate my research.

5.3. Collaborative Information Behavior

Closely related to team level knowledge creation is the study of CIB. As people in organizations conduct much of their work in collaborative settings, information gathering and sharing has also become a collaborative activity. CIB can be seen as an iterative process that is triggered by an information need

[45]. As previously studied, the CIB process includes collaboratively seeking, retrieving and sharing information [42]. However, it can be argued that there is an additional step in the process – collaborative information use. Once team members successfully work together to gather and share information, they must collaboratively use the information. Collaborative information use includes the analysis, synthesis and evaluation of the gathered and shared information [1]. Viewed from this perspective, CIU is another step in the CIB process (see Table 2). More importantly, CIU is the step that connects CIB to organizational knowledge, as it transitions a team from information gathered to knowledge created and ready to be put to use.

6. RESEARCH DESIGN

This section provides an overview of the research methodology for the proposed study including a description of the data collection methods, the rationale for choosing these methods, data analysis techniques, methods employed for validity and reliability and an overview of the research site.

6.1. Research Approach

Using the research questions as a foundation, I created a research approach based on Lincoln & Guba's ten elements of a naturalist inquiry [28]. Specifically, because the phenomena under study, CIU, is nascent and poorly understood, Edmondson and McManus [14] suggest that qualitative methods be used to explore the phenomena. Qualitative research methods allow for an in-depth and thick description of the phenomena, getting beyond what the respondents want to share. Further, while considerable work has looked at organizational knowledge, very little research has been done investigating team level information use and knowledge creation. Therefore, in the case of this study, there is no substantive theory to guide the research, as the theory is to emerge from the inquiry at hand. For these reasons I have identified ethnographic methods [35] and case study method [57] as the appropriate methodologies around which to structure my research design and Grounded Theory (GT) [51] as the analysis approach.

6.2. Data Collection & Analysis

Data collection will focus on gathering evidence of organizational *processes* at work in the evaluation of information and the creation of knowledge at the team level. Each case study will collect multiple forms

of evidence from several sources. Typical case study data sources include artifact collection, interviews and direct observation [50, 57].

The case studies and ethnographic techniques generate in-depth understanding of the phenomenon while deriving emergent theories from the data itself using GT [51]. The underlying assumption of GT is that a deep understanding of social phenomena can only occur from real-world observations. It is an approach for analyzing qualitative data that foregrounds the data and helps create an evolving hypothesis through systematic data coding. In the course of this coding, patterns become visible giving rise to hypotheses. In turn, these hypotheses are strengthened or dismissed via further coding of the data and, in some cases, additional data collection. The strength of GT lies in the interaction between the data collection and the coding. The coding is a continual process that occurs not at the end of the data collection but during it; categories (e.g. themes) emerge from the data and are strengthened, modified, or discarded as more data is collected.

6.3. Validity and Reliability

This research will use several methods to increase the validity and reliability of the findings. First, in order to strengthen the internal validity of the research findings, I will perform both triangulation and member checking [29] of the data. Second, to ensure external validity, I will collect enough data to provide a thick description of the nuances of the context and the assumptions of the research study [17]. Third, to increase reliability I will use two case study tactics suggested by Yin, a case study protocol and a case study database [57]. These tactics for validity and reliability are detailed in Table 3.

6.4. Research Sites

The proposed research design is centered on two detail-rich case studies. The descriptive case study method has been identified as appropriate when a detailed description is sought [58] and when the phenomenon is not easily separated from its context [50]. The unit of analysis, which bounds the cases, is the multidisciplinary work team. Using theoretical sampling [15] I have identified the IT teams at Regional Health System and Teaching Hospital as the cases for this research. Preliminary data collection

on the first case (Regional Health System) was successfully completed as of February 25, 2009. Data collection on the second case (Teaching Hospital) is expected to begin January 2010.

The IT department at Regional Health System consists of approximately 60 employees responsible for all IT systems in the hospital. It is a very busy department dealing with approximately 120 calls per day, and sometimes as many as 250 calls per day during the upgrade or implementation of Soarian or a major application unanticipated downtime. The department is staffed 24 hours per day by a team of specially trained IT professionals. Customer issues remain open an average of 4.25 days.

The IT department at Regional Health System is divided into four teams: IT Clinical Software Services, IT Financial Software Services, Network Services and the Customer Service Center (CSC) (see Figure 2). IT Clinical and Financial Software Services are responsible for the development, implementation and support of all IT systems. Network Services ensure that all data, voice and image network systems are maintained and augmented at appropriate service levels. Additionally, Network Services also guarantee that physical hardware and logical utilization of the campus network is uniform and consistent with industry standards. The CSC serves as the link between the customer (technology users) and the IT department regarding issues that arise, taking customer calls, documenting issues and forwarding issues to the appropriate IT team.

Although providing appropriate IT support is at the heart of the department's work, each team has different objectives that guide their daily work. For the CSC team, the objectives include issue documentation and surge management. For the Clinical and Financial Software Services teams as well as the Network Services team, the critical objectives are issue management and resolution. These objectives naturally influence the four teams' information needs as well as their CIS and CIU activities. Collaboration is essential to meeting their team, as well as their individual and organizational goals.

7. PRELIMINARY FINDINGS

I am studying CIU as part of a larger research agenda regarding CIB. Thus far, we have focused our efforts on the initial stages in the CIB process including triggers, seeking, retrieving and sharing. Specifically, we identified situations that trigger collaborative information seeking activities [43, 45, 48,

49], team information needs [44, 45, 48], team characteristics that affect CIB [43, 47], and technological characteristics that support CIB [43, 49]. Further, we developed a model of CIB that considers behavior, context and characteristics of the environment [42, 43]. My research on CIU – the collaborative evaluation of information as knowledge creation – expands our knowledge on CIB and adds detail to the CIB process [49]. An example of preliminary findings from my CIU research can be found below in section 7.2

7.1. Data Collection Summary

With preliminary data collection on the first case (Regional Health System) successfully completed, analysis of this preliminary data is underway. For this case study, I spent well over 250 person-hours from September 2007 to February 2009 observing and interviewing members of the teams in the IT department as well as collecting artifacts. The observations and interviews yielded more than 400 pages of transcribed field notes and interviews for analysis. See Table 4 for more details about our data collection methods.

7.2. Preliminary Finding – Confirmation of Possible Solution

Team members bring their own particular expertise and perspective to a team [18, 30]. When a member seeks information outside his domain of expertise, he often turns to another team member who has that expertise for help. However, in many issues, IT professionals rely on their own expertise to troubleshoot the problem and develop a solution. Yet, they sometimes lack confidence in the solution that they have identified. In these situations, they often turn to other team members to validate that they have collected the right information and to confirm their solution. They often collaboratively evaluate the gathered information and work together to collect further information as needed to confirm the solution, as is demonstrated in the example vignette (see Appendix A) where two experts in Soarian Clinical Software and Assessments discuss possible repercussions of a selected solution and determine if there are alternative solutions.

LY, while proficient in workflows in Soarian Clinical Software and with the Foley workflow, lacked the confidence that her proposed configuration would suffice. Consequently, she turned to her colleague, KS. This vignette highlights the additional step in the CIB process – seek-retrieve-share-*use*. The analysts

took turns presenting and sharing information and their own knowledge with regard to the situation. This allowed team members to evaluate both the information and knowledge shared to resolve the issue. The interactions were predominantly verbal and face-to-face. The team members acted as "sounding boards" for each other in presenting information as a means of evaluating the solution.

Once information has been sought, the information collected must be evaluated for quality and usefulness – CIU is an important aspect of CIB. The evaluation of the information may take place in the form of a feedback session amongst team members, as each brings their own particular proficiency and viewpoint to the situation.

8. EXPECTED CONTRIBUTIONS

It is expected that this research will make two main contributions to the IS community. First, by providing empirical evidence of team level information use, evaluation and knowledge creation, this research will further our understanding of how organizational knowledge is created at the team level. Additionally, the articulation of a CIU framework will serve to inform understanding of the contexts and settings in which teams work together to create knowledge.

Second, this research will contribute to practice through detailed empirical examination of the functions and aspects of existing organizational information systems with regard to their support (if any) of team level collaborative information use and knowledge creation practices. Given that there is a lack of empirical analysis of CIU and team level systems to support it, it is critical to build the body of empirical work so that policymakers, managers, users, and designers can benefit from what has been learned. Building this empirical record and providing lessons learned from practice is critical if information system development practice is to avoid falling into the old pattern of ad hoc development, isolation, and poor support.

TABLES & FIGURES:

Table 1 – Levels of Knowledge Management

Level	Focus	Characteristics
Individual	The exchange of knowledge between individual workers, whether on the same team or not.	• Communities of practice • Models and systems to support knowledge exchange between individuals across communities • The utilization of experts and apprenticeships
Team	The interactions of team members as they collaboratively work together to evaluate information and create and manage knowledge.	• Team member support • Team member credibility, capabilities and communication • The negotiation of common ground and shared mental models • The use of boundary objects to support the contextualization of knowledge
Organizational	The mechanisms that can support and facilitate the distribution of knowledge across an organization of individuals.	• The adaptation of organizations • The utilization of routines, processes and systems • The implementation of team-based and cross-functional organizational structures as well as decentralized decision-making

Table 2 – CIB Process Steps

Collaborative Information Behavior			
Trigger	Problem Identification	Collaborative Information Seeking • Seeking • Retrieving • Sharing • Sensemaking	Collaborative Information Use • Analysis • Synthesis • Evaluation • Knowledge creation

Table 3 - Tactics for Validity and Reliability

Test	Tactic	Explanation
Internal Validity	• Triangulation	• Collect data on the same research topic from multiple sources and use multiple data collection methods
	• Member checking	• Test data collected or its analysis with members of those groups from whom the data were originally obtained
External Validity	• Thick descriptions	• Thorough details of the data collected and analysis will allow an individual to check for its appropriateness in other settings
Reliability	• Case study protocol • Case study database	• Guides the research • Provides a way of maintaining the "chain of evidence" allowing another individual to examine in detail the case study data and follow the logic of the analysis

Table 4 – Data Collection for Case Study 1

Data Collection Methods	Specific Examples	Time/Quantity
Observation	• IT work processes • Issue documentation • Issue resolution	18 months, ~ 250 hours
	• IT SW Services meetings • Software Implementation meetings • Siemens software meetings	15 meetings
Interviews (semi-structured)	• Formal	15
Artifact Collection	• Job descriptions • Computer Access Form • Org chart • Report Request Form • Job Status Form • Ticket Flow Chart • Services Excellence Plan	26

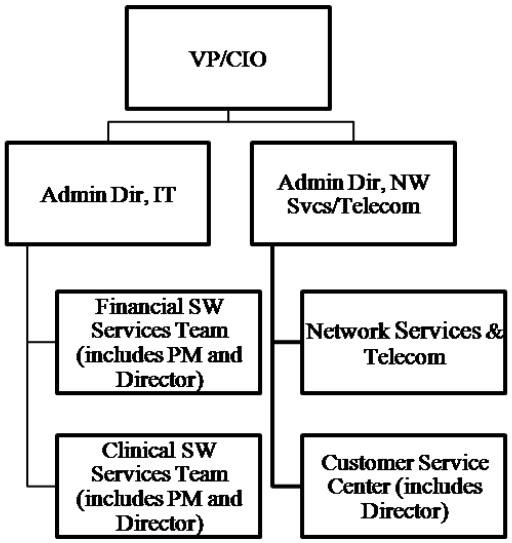

Figure 1 – Regional Health System IT Organizational Chart

REFERENCES

1. *Presidential Committee on Informaiton Literacy*. 1989, American Library Association: Chicago.
2. Alberts, D.J., *A Model of Multidiscipline Teams in Knowledge-Creating Organizations.* Team Performance Management, 2007. **13**(5/6): p. 172-183.
3. Bart, C. *Information Technology Team*. 2007 May 20, 2009 [cited; Available from: http://articles.directorym.co.uk/Information_Technology_Team-a1143267.html.
4. Bates, D.W., *The Quality Case for Information Technology in Healthcare.* BMC Medical Informatics and Decision Making, 2002. **2**(7).
5. Beers, P.J., H.P.A. Boshuizen, P.A. Kirschner, and W.H. Gijselaers, *Common Ground, Complex Problems and Decision Making.* Group Decision and Negotiation, 2006. **15**(6): p. 529-556.
6. Bhatt, G.D., *Management Strategies for Individual Knowledge and Organizational Knowledge.* Journal of Knowledge Management, 2002. **6**(1): p. 9.
7. Bystrom, K. and K. Jarvelin, *Task Complexity Affects Information Seeking and Use.* Information Processing & Management. **31**(2): p. 191-213.
8. Cannon-Bowers, J.A., E. Salas, and S. Converse, *Shared Mental Models in Expert Team Decision Making*, in *Environmental Effects on Cognitive Abilities*, R.J. Sternberg and E. Grigorenko, Editors. 2001, Lawrence Erlbaum Associates. p. 221-246.
9. Davenport, T. and L. Prusak, *Working Knowledge: How Organizations Manage What They Know*. 1998, Boston, Massachusetts: Harvard Business School Press.
10. Doz, Y.L. and G. Hamel, *Alliance Advantage: The Art of Creating Value through Partnering*. 1999, Boston, MA: Harvard Business School Press.
11. Drucker, P.F., *The New Realities in Government and Politics/in Economics and Business/in Society and World View*. 1994: Harper Business.
12. Edmondson, A., *Psychological Safety and Learning Behavior in Work Teams.* Administrative Science Quarterly, 1999. **44**(2): p. 350-383.

13. Edmondson, A.C., J.R. Dillon, and K.S. Roloff, *Three Perspectives on Team Learning: Outcome Improvement, Task Mastery, and Group Process. The Academy of Management Annals*, 2007. **1**.

14. Edmondson, A.C. and S.E. McManus, *Methodological Fit in Management Field Research.* Academy of Management Review, 2007. **32**(4): p. 1155-1179.

15. Eisenhardt, K.M., *Building Theories from Case Study Research.* Academy of Management Review, 1989. **14**(4): p. 532-550.

16. Eppler, M.J. and O. Sukowski, *Managing Team Knowledge: Core Processes, Tools and Enabling Factors.* European Management Journal, 2000. **18**(3): p. 334-341.

17. Erlandson, D.A., E.L. Harris, B.L. Skipper, and S.D. Allen, *Doing Naturalistic Inquiry*. 1993, Newbury Park, CA: Sage.

18. Faraj, S. and L. Sproull, *Coordinating Expertise in Software Development Teams.* Management Science, 2000. **46**(12): p. 1554-1568.

19. Grant, R.M., *Toward a Knowledge-Based Theory of the Firm.* Strategic Management Journal, 1996. **17**: p. 109-122.

20. Guzzo, R.A. and G.P. Shea, *Group Performance and Intergroup Relations in Organizations*, in *Handbook of Industrial and Organizational Psychology*, M.D. Dunnette and L.M. Hough, Editors. 1992, Consulting Psychologists Press: Palo Alto, CA. p. 269-313.

21. Haas, M.R., *Knowledge Gathering, Team Capabilities, and Project Performance in Challenging Work Environments.* Management Science, 2006. **52**(8): p. 1170-1184.

22. Haas, M.R. and M.T. Hansen, *Different Knowledge, Different Benefits: Toward a Productivity Perspective on Knowledge Sharing in Organizations.* Strategic Management Journal, 2007. **28**(11): p. 1133-1153.

23. Hackman, R., ed. *Groups That Work (and Those That Don't): Creating Conditions for Effective Teamwork*. 1990, Jossey-Bass Publications: San Francisco.

24. Hansen, M.T., M.L. Mors, and B. LØVÅS, *Knowledge Sharing in Organizations: Multiple Networks, Multiple Phases.* Academy of Management Journal, 2005. **48**(5): p. 776-793.

25. Hirst, G., D. Van Knippenberg, and J. Zhou, *A Cross-Level Perspective on Employee Creativity: Goal Orientation, Team Learning Behavior, and Individual Creativity.* Academy of Management Journal, 2009. **52**(2): p. 280-293.

26. Holsapple, C.W. and K.D. Joshi, *Organizational Knowledge Resources.* Decision Support Systems, 2001. **31**(1): p. 39-54.

27. Joshi, K.D., S. Sarker, and S. Sarker, *Knowledge Transfer within Information Systems Development Teams: Examining the Role of Knowledge Source Attributes.* Decision Support Systems, 2007. **43**: p. 322-335.

28. Lincoln, Y.S. and E.G. Guba, *Designing a Naturalistic Inquiry*, in *Naturalistic Inquiry*, Y.S. Lincoln and E.G. Guba, Editors. 1985, Sage: Beverly Hills, California, United States. p. 221-249.

29. Lincoln, Y.S. and E.G. Guba, *Establishing Trustworthiness*, in *Naturalistic Inquiry*, Y.S. Lincoln and E.G. Guba, Editors. 1985, Sage: Beverly Hills, CA. p. 289-331.

30. Lovelace, K., D.L. Shapiro, and L.R. Weingart, *Maximizing Cross-Functional New Product Teams' Innovativeness and Constraint Adherence: A Conflict Communications Perspective.* The Academy of Management Journal, 2001. **44**(4): p. 779-793.

31. Lutters, W. and M. Ackerman, *Beyond Boundary Objects: Collaborative Reuse in Aircraft Technical Support.* Computer Supported Cooperative Work (CSCW), 2007. **16**(3): p. 341-372.

32. Marks, M.A., J.E. Mathieu, and S.J. Zaccaro, *A Temporally Based Framework and Taxonomy of Team Processes.* The Academy of Management Review, 2001. **26**(3): p. 356-376.

33. Mathieu, J., M.T. Maynard, T. Rapp, and L. Gilson, *Team Effectiveness 1997-2007: A Review of Recent Advancements and a Glimpse into the Future.* Journal of Management, 2008. **34**(3): p. 410-476.

34. Mesmer-Magnus, J.R. and L.A. DeChurch, *Information Sharing and Team Performance: A Meta-Analysis.* Journal of Applied Psychology, 2009. **94**(2): p. 535-546.

35. Miles, M.B. and A.M. Huberman, *Qualitative Data Analysis*. 1994, Thousand Oaks, CA: Sage.

36. Mohammed, S. and B.C. Dumville, *Team Mental Models in a Team Knowledge Framework: Expanding Theory and Measurement across Disciplinary Boundaries.* Journal of Organizational Behavior, 2001. **22**(2): p. 89-106.

37. Nonaka, I., *A Dynamic Theory of Organizational Knowledge Creation.* Organization Science, 1994. **5**(1): p. 14-37.

38. Nonaka, I. and H. Takeuchi, *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. 1995: Oxford University Press.

39. Nonaka, I. and R. Toyama, *The Knowledge-Creating Theory Revisited: Knowledge Creation as a Synthesizing Process.* Knowledge Management Research & Practice, 2003. **1**(1): p. 2-10.

40. Nonaka, I., R. Toyama, and N. Konno, *Seci, Ba and Leadership: A Unified Model of Dynamic Knowledge Creation.* Long Range Planning, 2000. **33**(1): p. 5-34.

41. Nonaka, I., R. Toyama, and A. Nagata, *A Firm as a Knowledge-Creating Entity: A New Perspective on the Theory of the Firm.* Industrial and Corporate Change, 2000. **9**(1): p. 1-20.

42. Reddy, M.C. and B.J. Jansen, *A Model for Understanding Collaborative Information Behavior in Context: A Study of Two Healthcare Teams.* Information Processing & Management, 2008. **44**(1): p. 256-273.

43. Reddy, M.C., B.J. Jansen, and P.R. Spence, *Collaborative Information Behavior: Exploring Collaboration and Coordination During Information Seeking and Retrieval Activities*, in *Collaborative Information Behavior: User Engagement and Communication Sharing*, J. Foster, Editor. Accepted, IGI Global: Hershey, PA.

44. Reddy, M.C. and P.R. Spence, *Finding Answers: Information Needs of a Multidisciplinary Patient Care Team in an Emergency Department*, in *Proceedings of American Medical Informatics Association Fall Symposium (AMIA'06)*. 2006: Washington DC, USA. p. 649-653.

45. Reddy, M.C. and P.R. Spence, *Collaborative Information Seeking: A Field Study of a Multidisciplinary Patient Care Team.* Information Processing & Management, 2008. **44**(1): p. 242-255.

46. Senge, P.M., *The Fifth Discipline: The Art & Practice of the Learning Organization*. 1990, New York, NY USA: Doubleday Business.

47. Spence, P. and M. Reddy, *The "Active" Gatekeeper in Collaborative Information Seeking Activities*, in *Proceedings of the ACM Conference on Supporting Group Work (GROUP'07)*. 2007: Sanibel Island, FL. p. 277-280.

48. Spence, P.R., M.C. Reddy, and R. Hall, *A Survey of Collaborative Information Seeking Practices of Academic Researchers*, in *Proceedings of the ACM SIGGROUP Conference on Supporting Group Work (GROUP'05)*. 2005: Sanibel Island, FL, USA.

49. Spence, P.R., M.C. Reddy, and B.J. Jansen, *Collaborative Information Behavior in Organizations: A Study of Healthcare It Teams.* Information Processing & Management, In Review (Special Issue on Collaborative Information Seeking (Special issue Eds. M.R. Morris, G. Golovchinsky and J. Pickens)).

50. Stake, R.E., *Case Studies*, in *Handbook of Qualitative Research*, N.K. Denzin and Y.S. Lincoln, Editors. 1995, Sage: Thousand Oaks, CA, United States. p. 236-247.

51. Strauss, A. and J. Corbin, *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. 1990, Newbury Park, CA: Sage Publications.

52. Thomas, J.B., S.W. Sussman, and J.C. Henderson, *Understanding "Strategic Learning": Linking Organizational Learning, Knowledge Management, and Sensemaking.* Organization Science, 2001. **12**(3): p. 331-345.

53. Walz, D.B., J.J. Elam, and B. Curtis, *Inside a Software Design Team: Knowledge Acquisition, Sharing, and Integration.* Commun. ACM, 1993. **36**(10): p. 63-77.

54. Wenger, E., *Knowledge Management as a Doughnut: Shaping Your Knowledge Stratgey through Communities of Practice.* Ivey Business Journal, 2004. **68**(3): p. 1-8.

55. Wenger, E. and W. Snyder, *Communities of Practice: The Organizational Frontier.* Harvard Business Review, 2000. **78**(1): p. 139-145.

56. Wilson, J.M., P.S. Goodman, and M.A. Cronin, *Group Learning.* Academy of Management Review, 2007. **32**(4): p. 1041-1059.

57. Yin, R.K., *Case Study Research: Design and Methods*. Applied Social Research Methods Series, ed. L. Bickman and D.J. Rog. Vol. 5. 2003, Thousand Oaks, CA: Sage.

58. Yin, R.K., *The Role of Theory in Doing Case Studies*, in *Applications of Case Study Research*. 2003, Sage: Thousand Oaks, CA, United States. p. 3-27.

APPENDIX A – SUMMARY OF PRELIMINARY FINDINGS

Example Vignette – evaluation of information to confirm a solution

LY is configuring the Soarian Clinical Software to deal with an Assessments/Foley workflow issue. When a Foley is inserted in a patient, a checkbox must to be clicked and a date of insertion entered in the patient assessment record. The same must be done when a Foley is removed. Yet, neither is required by the system and these checkboxes trigger the workflow and send data to a log for reference. LY shares a cubicle with KS and asks her to review workflow scenarios with her using the configured solution. KS explains that the system most likely works off both the checkboxes and the dates, but she will need to confirm. While LY meets virtually with the clinical information specialist to review the Foley workflow, KS has a conference call with a Siemens technical specialist. In her meeting, KS gathers information that will affect the proposed solution. She finds out that the nurses must physically check the box on insertion, but the trigger can run off the DC (removal) date, not the DC (remove) checkbox. KS returns to her cubicle and shares this information with LY. Based on this newly gathered information, LY will rollback her configuration changes and wait for the Siemens technical specialist to get back to them with another potential solution.

APPENDIX B – ACCOMPLISHMENTS AND PLANS

Preliminary data collection on the first case (Regional Health System) was successfully completed as of February 25, 2009. Additionally, analysis of this preliminary data is underway and is expected to last through June 2009. The completion of my dissertation proposal is expected July 2009 with defense of the proposal in August 2009. Data collection on the second case (Teaching Hospital) is expected to begin January 2010 and to run through August 2010. Data analysis, writing and presentation of the dissertation will take place between June 2010 and March 2011. I expect to do my Final defense by March 2011.