2005

Behavioral Aspects and Collaboration Technologies for Process Innovation: A Grounded Theory Approach

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ABSTRACT

The objective of this paper is to develop a framework for an understanding of process innovation (PI) in teams with collaborative technologies (CT's) using a grounded theory (GT) approach. The scope of this paper is limited to teams within firms where goals are clearly mandated and constraints explicitly defined. Critical team functions such as communication, coordination and awareness are facilitated by the CT. A GT approach is proposed as a means of formulating a framework of behavioral aspects of such teams in order to capture the full range of interaction issues of people and information systems. The framework that is generated as a result of this study will contribute to an understating of team use of CTs as well as clarify the strategic value of information systems as a vehicle for constant improvement.

Keywords (Required)

Collaboration, collaborative software, grounded theory, process innovation, strategy and teams.

INTRODUCTION

Team members share goals and task knowledge while fulfilling their tactical objectives in congruence with the strategic orientation of the organization. When collaboration technologies (CT's) and teams are components of a firm's infrastructure, emergent creative processes can be transformed into process innovations (PI). This study aims to understand team socializations and interactions with CT's. This paper begins with an exploratory literature review on team processes, collaboration and innovation in order to prepare the foundations of a more rigorous study with these themes as anchors. The rationale for a grounded theory (GT) approach to the study of information systems and possible contributions follow.

LITERATE REVIEW

A broad abstraction of this study is the understanding of organizational contexts and behaviors of people in CT environments where the use of CTs or their predecessors have been a part of the organizational culture. Entrenched collaboration cultures will facilitate the study of PIs in firms without the interference of learning effects of such tools and emergent cultures of collaboration. The research question that drives this study is the behavioral aspects of teams in CT environments that lead to PIs.

Process

Basu and Blanning (Basu and Blanning, 2003) and Malone (Malone, et al., 1999) describe decomposition and synthesis of processes relevant to the understanding of PI as shown in figure 1. Decomposition allows teams to identify specific components of the process to find the locus of organizational needs. Synthesis serves as a centripetal force bringing intellectual capital closer to allow the formation of creative linkages resulting in incrementally innovative processes. These steps externalize contexts for the operational as well as social aspects of processes. The CT may aid in the identification of redundancies and facilitate the formation of a common cognitive structure for teams thus forging unifying strengths of the *process need* into collaborative forces.

Evolutions of processes through reconfigurations of behaviors and decision-making systems are facilitated by creative linkages between process needs. Eden and Ackermann's (Eden and Ackermann, 2001) discussion of strategy formulation describing GDSS effectiveness in terms of a wider range of participation, alternatives, involvement and support for outcomes is a useful metaphor for understanding PIs

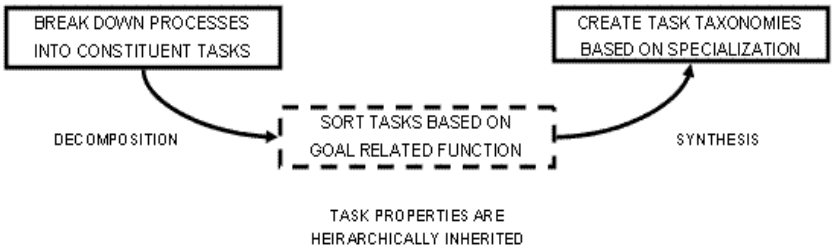

Figure 1. Process Decomposition and Synthesis

Collaboration

Socializations within teams as suggested by Luff et al. (Luff et al. 2003) and Reich and Kaarst-Brown (Reich and Kaarst-Brown 2003) are enhanced by enriching communications with sense making artifacts of collaborations such as use contexts for specific tools or mechanisms and decision algorithms used by team members. They provide markers for other members looking to innovate their processes and are analogous to dependencies that Malone et al. (Malone et al., 1999) discuss. It is imperative that these dependencies are coordinated because they help construct the storyboard of the decision processes of all teams across the organization. The storyboard may serve as a set of cues for PI scenarios as suggested by a study of collaboratories (Finholt, 2003) that presents approaches to understanding team interactions geared towards innovation where properties of the social structure are embedded into emerging collaborative artifacts. Team members working with CTs may externalize contextual and processual identity elements of the *role* they undertake while overcoming disruptions in their creative cognitive tasks (Denning, 2004) by collaborating with others operating in different processes.

Vidal's (Vidal, 2003) network approach describes a heuristic to understand agent processes across different operations where collaborations in team goal attributes lead to an evolved set of processes. Collaborations lead to goal familiarity and goal congruency as depicted by figure 2 that summarizes the findings of Brower (Brower, 2003) where two settings originally proposed by Gruber and Davis (Gruber and Davis, 1988) in the description of creativity as a process of evolution within a system are discussed.

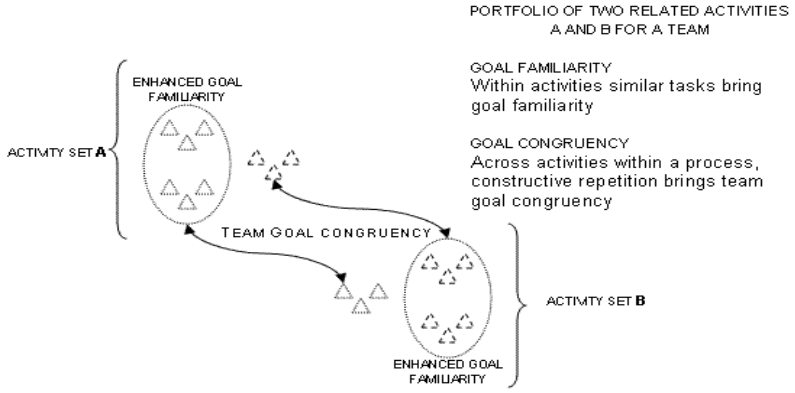

Figure 2. Collaborative innovation framework

Innovation

A working definition of PI which is, "A relatively new process that has positive strategic implications for an organization over an entire portfolio of projects which are represented by groups of teams." has been developed for this study. The '*relative*' nature of innovation is that the novelty in process for one organization may be a common practice for another.

Denning (Denning, 2004) and Drucker (Drucker, 1993) propose two approaches to innovations that are relevant to the proposed study and are presented in table 1.

Collaboration Centric Approach (Denning, 2004)	**Transformation Centric Approach** (Drucker, 1993)
Organizational agents make new, contextually relevant and positive value adding linkages between artifacts of organizational intelligence	Organizational agents seek out opportunities for transformation of processes into new practices.
• Linkages Between processual elements • Linkages between other social networks	• Organizational processes are in a state of flux as agents constantly seek out opportunities • Both past usage and future needs drive process transformations
INNOVATION DRIVEN BY CREATIVITY	INNOVATION DRIVEN BY OPPORTUNITY

Table 1. Approaches to innovation

Creativity and innovation are not simply new linkages between processes using organizational intelligence artifacts but also new socializations between team members. Creative work in emergent processes translating into innovative processes results from a reorganization of the subjective experiences of team members that is facilitated by the CT. Decomposition (Malone et al. 1999) (Basu and Blanning, 2003) of team processes results in the integration of subjective experiences of team members. Stokols et al (Stokols et al., 2002) relate positive social climates to a greater perception of support for creativity at workplaces. CT use in creating such socializations, identifying mechanistic detractors and losses of subjective experience, simulating or recreating those experiences to trigger innovative processes is within the scope of this study.

INFORMATION SYSTEMS AND PROCESS INNOVATION

Simon (Simon, 1999) describes internal learning as the process of transmission of information between organizational agents where organizational roles serve as markers for agents, increasing their situation awareness about the location of information, frameworks for processing rules that are defined by goals and finally make contextually relevant decisions. Innovation is then a measure of the ability of teams within an organization to assimilate information and bring about change.

Kock (Kock, 2001) discusses two causal models of process improvements supported by CT's along the dimensions of efficiency and quality with the support of information systems. Fisher and Dourish (Fisher and Dourish, 2004) present a framework of collaboration intertwined with IT systems that has depended on passive yet mutual monitoring of activities with a focus on the tasks within processes. While collaboration translated into informal practices of situation awareness exercises, innovation required a more involved and structured situation awareness regimen that allows agents to see the context as well as actions of other agents so that they may be able to glean from them relevant process artifacts. Swan and Newell, (Swan and Newell, 2000) present a study of knowledge management (KM) practices for PI's and state context of use and the stage of innovation effect KM use.

The recommendations of Ghoshal and Nahapiet (Ghoshal and Nahapiet, 1998), Eden and Ackermann (Eden and Ackermann, 2001) and similar literature provide studies of a wider spectrum of opportunities to such tools that are in congruence with the strategic objectives of organization. zur Muehlen's (zur Muehlen, 2001) study presents some limitations of totally automated process evaluations using information systems where behavioral aspects of processes are not adequately monitored and offers scope for future study as proposed by this paper.

METHODOLOGY

Socialization architecture in firms determines the paths that business artifacts follow as they move between agents. The concept of creativity and creative linkages resulting in innovations is similar to team socializations. Interpretive methods of sampling across the organization as demonstrated by the study of CASE tools by Orlikowski (Orlikowski, 1993) are an

appropriate method of inquiry for this study. The study of team member behavior and use of CTs in the context of PIs suggests the use of interpretivist field studies as outlined by Klein and Myers (Klein and Myers, 1999).

The study of the research question proposed in this paper will be conducted using a GT approach where observations and interviews will be used to construct a theoretical framework of behaviors leading to PI in environments that are assisted by CTs. Glaser and Strauss's (Glaser and Strauss, 1967) discussion of the importance of describing 'structural boundaries' of phenomena and the incremental and iterative nature of GT make such a method relevant for this study. The goal of this study is a framework of team behaviors resulting in PT's; patterns of behavior, communication and socializations leading to innovative processes requires an iterative model that allows for an understanding of data that may be taken back into the field to interpret more phenomena.

Anderson, et al. (Anderson, et al., 2004) present the status of research into innovation within firms and propose, (a) triangulation, (b) meta-analysis and (c) multi level analysis (Across different organizational levels) as future research directions. GT provides an opportunity for a multi-level, iterative, data centric analysis of CT centric team behavior. In studies presented by McAdam (McAdam, 2000) and Kalling (Kalling, 2003) where knowledge management is studied as a social construction within firms, the value of using iterative models of a framework based on qualitative data collection methods is suggested. The particular phenomenon of interest is meso-level behavior and variations of interaction in environments with innovative processes.

Locke (Locke, 2001) states the process oriented nature of GT and describes interactions and compositions of these interactions. Andriopolous and Lowe (Andriopolous and Lowe, 2000) and Hargadon (Hargadon, 1999) prescribe the GT method and discuss the benefits of using an inductive research method to understand processes within knowledge driven firms. As GT suggests that there should be reciprocity between data collection and analysis (Locke, 2001). The following table is an adaptation of Locke (Locke, 2001).

Stage 1	Establish elements and categorize them Categories may be broadly described in the first phase to facilitate the observation of phenomena. This stage involves identifying elements of collaboration and emerging practices.
Stage 2	Integrating categories and properties The categories created are assigned properties to broaden the study. Properties give meaning to conceptual elements by describing the internal aspects of specific elements.
Stage 3	Determine interactions of elements Information needs of specific elements may be outlined in this stage in order to identify the loci of communication networks within the team.
Stage 4	Delimiting the theory The iterative process of comparison delimits theory. Categories should have reached a level where properties account for a reasonable number of incidents. At this stage, combinations of elements, properties and how they interact should be codified in order to define the boundaries of the framework.
Stage 5	Writing the theory and presenting the framework Memos from all stages should be included and content of properties put together. An open system approach may be used to account for emergent processes given the possibility of the changing nature of team behavior.

Table 2. Stages of GT: A research methodology

CONCLUSION

The study proposed in this paper aims to describe the manner in which teams supported by CT use the information system as tool to innovate current organizational practices. The role of the CT may be greater than the communication and

coordination roles that a groupware tool fulfills An inductive methodology guided by a GT approach to study interactions between these agents while they develop innovative processes has potential to contribute significantly to both the domain of knowledge that constitutes information systems as well as practitioners using these systems everyday as a part of their organizational activities. The value of this research is an understanding of team behavior leading to innovative processes as an element of dynamic strategy formulation at the firm level.

ACKNOWLEDGMENTS

The author appreciates the guidance and support of Dr. Barrett Caldwell, School of Industrial Engineering, Purdue University and Dr. Terry Ryan, School of Information Science, Claremont Graduate University.

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