

THE STRUCTURATION OF TASK-ORIENTED COMMUNICATION IN INNOVATIVE VIRTUAL TEAMS

Research-in-Progress

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Abstract

With advanced communication technologies, business managers can globally recruit talented members to form virtual teams and collaborate on innovative projects. While virtual teams enjoy superiority in their composition of talents, they also face more collaborative issues resulting from the diversity of members' backgrounds and the limitations of communication technologies. These issues include task conflict, coordination delays, and reduced consensus in group discussions. Formal task interventions, such as imposed temporal coordination mechanisms, have been suggested to mitigate the severity of these collaborative issues in virtual teams. In this study, we aim to investigate the underlying mechanisms through which task interventions compensate the limitations of communication technologies and facilitate the exchange of individuals' perspectives. By adopting the lens of structuration theory and focusing on task-oriented communication, we identify three patterns of task-oriented communication that are essential to the function of innovative virtual teams – the degree to which task-related issues are explored, the level of concern raising or attention switches, and the level of convergence on a common task view – as well as the structural properties of the team-task environment that influence the development of task-oriented communication. We hypothesize that task interventions establish or modify these structural properties of the team-task environment, which in turn shape virtual teams' communication patterns. This study can provide a better understanding of how virtual teams learn to coordinate their task work more effectively by initiating task interventions. The insights gained in this study can suggest the management support that an organization can offer to facilitate the communication of its virtual teams.

Keywords: Virtual team, task intervention, structuration theory, task-oriented communication, team-task environment

Introduction

In high-velocity industries, continuous innovation in product development is a critical capacity for corporations' survival and a major principle is to find effective designs that can link technological possibilities with market opportunities (Brown and Eisenhardt 1997; Dougherty 1992). The success of Apple's iPod, for example, is credited not only to its stylish technological design but also to an innovative business model that bundles the iPod with the inexpensive iTunes music and lures customers into buying it (Johnson et al. 2008). Discovering such unique linkages between technological and market opportunities requires (1) insightful reading of the environment from various kinds of expertise, including research and design, manufacturing, marketing, and sales, and (2) the ability to integrate those insights in a meaningful way. The composition of a virtual team provides a feasible and convenient means to meet these two requirements at once. Enabled by advanced communication and collaborative technologies, virtual teams offer an extended form of project collaboration that lifts temporal, geographical, and organizational restrictions on teammate selection and participation. Team members can coordinate and collaborate via emails, central data repositories, voice over IP services, and social media without being in the same office and meeting face-to-face daily. Hence business managers can flexibly assemble a virtual team from a global pool of available talents and recruit members with required expertise to work on innovative ideas.

While virtual teams may enjoy superiority in their composition of talents and competency, they also face more challenges than traditional face-to-face teams. Govindarajan and Gupta (2001) reported that only 18% of the virtual teams surveyed considered their performance successful. One factor for this low success rate is that team issues associated with team diversity are deepened in a virtual team setting. The diversity of team members in their training and background is a major source for innovation as it allows the innovative task to be examined from multiple perspectives and infused with fresh insights (Lovelace et al. 2001). Nonetheless, team diversity is also found to cause internal conflicts and disagreements. As Jehn et al. (1999) postulated, different social categories and assumptions about the task create relationship, task, and process conflicts in project teams. When a virtual team enables collaboration across geographical boundaries, it also increases the diversity of social category memberships, such as race, ethnicity, and culture, and potentially has more difficulties in reaching consensus (Hinds and Bailey 2003; Paul et al. 2004). If differences in task perspectives cannot be reconciled in time, the innovative project team may become less capable of teamwork and more open to political arguments, resulting in a delay in team progress (Lovelace et al. 2001).

Another factor that contributes to the low success rate of virtual teams is related to the constraints of communication technologies. Unlike traditional face-to-face teams, virtual teams typically rely on asynchronous communication media for daily communication, such as emails or discussion forums. Without physical gestures or other nonverbal cues to gain audience attention and facilitate turn-taking, conversations over asynchronous communication media can be disjointed in time and lack linkage among responses (Montoya-Weiss et al. 2001). This causes several collaborative issues in virtual teams, including information overload, coordination delay, and low synthesis in group discussions (Cummings et al. 2009; Montoya-Weiss et al. 2001). To alleviate difficulties in virtual collaboration, some studies suggested that formal task interventions help to reduce the level of task conflicts and regulate the tempo of team communication in virtual teams (Malhotra et al. 2001; Massey et al. 2003; Maznevski and Chudoba 2000; Montoya-Weiss et al. 2001). For example, Montoya-Weiss et al. (2001) found that imposed temporal coordination mechanisms prompted the consideration of divergent perspectives and smoothed the flow of task work, thus mitigating the negative impacts of conflict behaviors on virtual teams' performance. While this finding is insightful, no systematic theory has been developed to explain the underlying mechanisms through which task interventions compensate for the limitations of communication technologies and facilitate the exchange of individuals' perspectives in virtual teams.

In this study, we aim to fill this theoretical gap and investigate how task interventions help to structure or regulate virtual teams' daily communication. By adopting the lens of structuration theory and focusing on task-oriented communication, we identify three patterns of task-oriented communication that are essential to the function of innovative virtual teams, and three types of structural properties of the team-task environment that influence the development of task-oriented communication. By designing and conducting a case study, we will investigate the way that task interventions establish or modify these

structural properties of the team-task environment, which in turn shapes virtual teams' communication patterns. The remaining sections of this paper are organized as follows. First, we review literature and discuss the role of task-oriented communication in radical innovation. We then present a research model and design for our investigation. At the end of the paper, we summarize the expected contributions of this study.

Task-oriented Communication in Innovative Project Teams

Role of Task-oriented Communication in Radical Innovation

Interpreting outside environments to search for technological and market opportunities is identified as an essential process for pursuing radical innovation (Dougherty 1992). Numerous studies have recognized that individuals in different groups develop their own interpretive schemes to screen and make sense of the vast amount of information that could be received from outside environments (Daft and Weick 1984; Mohammed and Ringseis 2001). The differences in interpretive schemes at the functional area level (e.g., research and design, manufacturing, sales etc.) result in discrete "departmental thought worlds" that alienate team members from each other by their knowledge bases, preferences, and interpretations on a task (Dougherty 1992). But to coordinate and function as a coherent whole, the team needs a mechanism to discover and resolve those differences. Through exchanging their own perspectives via team communication, individual members assess what others know and identify mutual knowledge or common ground among them to build up a basis for collective action (Clark and Brennan 1991; Fussell and Krauss 1992). The results of team communication can be assessed through the development of team mental models and transactive memory systems – group cognitive structures hypothesized to facilitate team collaboration and complement teammates' knowledge limitations (Klimoski and Mohammed 1994; Wegner et al. 1991). While team communication typically includes both social and task topics (Jarvenpaa and Leidner 1999; Massey et al. 2003), we focus on task-oriented communication in this study for its specific functionality in team performance.

Various team activities have to be carried out via task-oriented communication to understand outside environments. These activities have profound impacts on the performance of innovative project teams. At the individual level, team members share their subjective interpretations of the task, exchange objective task-related information according to their expertise, and suggest potential performance strategies to organize their collective efforts (Ericksen and Dyer 2004; Jehn et al. 1999). The variety of individual perspectives injected into the project allows the task to be examined from multiple angles, a factor essential to the success of innovative tasks (Jehn et al. 1999; Lovelace et al. 2001). At the same time, it is also found that such diversity creates a cognitive barrier for individual members to understand and incorporate different points of view, potentially causing prolonged internal conflict and a delay in team progress (Dougherty 1992; Pelled et al. 1999). At the team level, innovative project teams are required to initiate collective learning opportunities early to reduce the uncertainty of the innovative task. The learning activities that a team may adopt include environmental data search, data analysis, and trial and error on the task (Daft and Weick 1984). While carrying out these learning activities, team members rely on task-oriented communication to interpret the environment via data collected, discover problems or issues to be solved, and receive feedback internally and externally (Daft and Weick 1984; McCaskey 1974). The earlier a team consolidates its diverse perspectives and initiates learning activities, the better its performance (Earley et al. 1989).

Patterns of Task-oriented Communication

Consolidating diverse points of view and reaching consensus on performance strategies is a critical step for innovative project teams to move forward with their tasks. To reach a common task view, individual members need to engage in collaborative discussions that promote clarification and elaboration on different ideas (Lovelace et al. 2001; Mohammed and Ringseis 2001). As Fiol (1994) suggested, a group of individuals may not be able to completely unify their diverse interpretive views on a task. But through listening to others' rationale for their positions, team members can incorporate different perspectives into their interpretations, collaboratively constructing an interpretive frame of issues that is broad enough to

encompass diverse arguments within the group (Mohammed and Ringseis 2001). Derived from Fiol's insights (1994) is a picture of group dynamics that innovative project teams constantly diverge and converge on their ideas on the task. The divergence in internal perspectives allows potential issues concerning the task to be explored and elaborated more thoroughly and improves the quality of group decision making in complex environments (Walsh et al. 1988). The development of a common task view prompts the team to recognize potential linkages among various issues and collaborate as a collective whole on its tasks, in turn increasing its capacity to generate and process more task-related information (Fiol 1994; Gersick 1988). Through this constant divergence and convergence in task viewpoint, three patterns of task-oriented communication emerged from the team literature and are believed to affect the performance of innovative project teams.

- Degree to which task-related issues are explored: Innovative tasks are characterized by the complexity of issues associated with them and potentially benefit from the divergence of task perspectives. It is theorized that the larger number of issues to which a project team attends to define its task, the better its decision quality and task performance (Fiol 1994; Walsh et al. 1988). For example, Ericken and Dyer (2004) found that high-performing teams gathered comprehensive background information about their tasks before the project launch project and encouraged their team members to examine the project from all potential angles.
- Level of Concern Raising or Attention Switches: Attention switches are conversation interruptions that cause a shift in discussion focuses and can increase the divergence of task perspectives. They are primarily initiated by team members' raising concerns, issues, or disagreements about the task. For example, group discussion may be interrupted when a member reminds the team about the shortage of time resource. After interruption, the team may switch its attention accordingly to the completion of task work. Attention switches are suggested to serve as opportunities for the team to stop and evaluate its progress, and can trigger a desirable midpoint transition (Okhuysen 2001; Okhuysen and Waller 2002).
- Level of Convergence on a Common Task View: Fiol (1994) suggested that more information alone does not lead to effective collective action until a common task view is developed among team members. One indicator of the convergence of viewpoints is the group deliberation of issues or concerns that team members raise. As Mohammed and Ringseis (2001) suggested, by inquiring about others' rationale for their different positions and listening to their elaborations, team members are more likely to incorporate different perspectives into their own and develop cognitive consensus. Another indicator is the development of a shared or common language (Fiol 1994; Malhotra et al. 2001). Fiol (1994) found that when the members of a business venture team discussed matters in a shared context or developed the same interpretive frame of issues, they employed a shared language to make arguments.

The degree to which task-related issues are explored and the level of concern raising or attention switches affect project teams' flexibility to adapt to changes and the level of consensus that teammates reach on performance strategies. Okhuysen (2001) noted that a greater concentration of attention switches prompts the project team to consider more areas of the group process, leading to greater flexibility of the team to manage unexpected situations. Fiol (1994) postulated that the access of more information is positively related to the development of consensus or a broader interpretive frame of issues in the team. Nonetheless, the effects of task-related issues exploration and concern raising on team performance have to be established under the condition that diverse perspectives within the project team have converged. As Lovelace et al. (2001) suggested, if an innovative project team is unable to resolve internal conflicting perspectives, it may become less flexible and more open to political argument, thus diminishing performance. A higher level of flexibility for adaption and consensus on performance strategies will result in better innovative project team performance (Ericksen and Dyer 2004; Okhuysen 2001).

Structuration of Task-oriented Communication

To systematically investigate the temporal development of task-oriented communication patterns in virtual teams, we adopt structuration theory (Barley 1986; Giddens 1984; Orlikowski 2000). From a structuration perspective, any social practice or behavioral pattern is not molded through the constraints of externally, independently existing structures. Rules and resources (e.g., land and raw materials) that

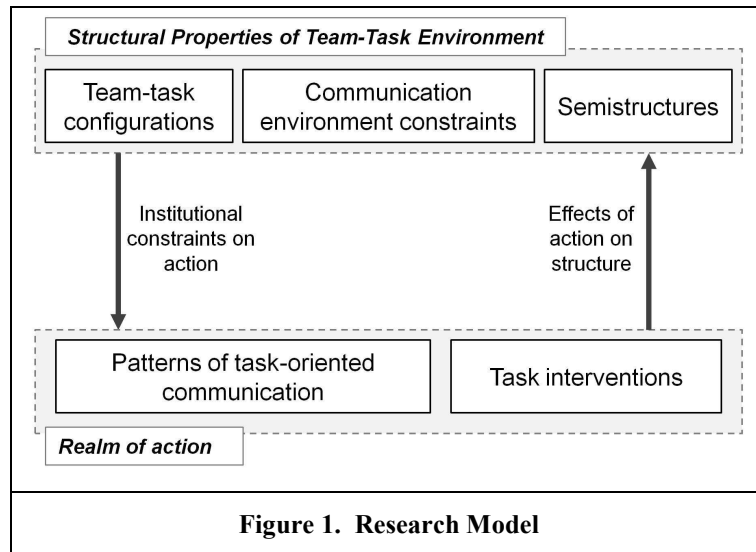
are typically perceived as playing a determinate role in the formation of social practices only constitute the structural properties of a social system that direct people's cognitive interpretations (Giddens 1984). Depending on individuals' reading and understanding of these structural properties, some of the structures implicated in these structural properties may be recurrently instantiated by individuals' actions during social interactions. Others' understanding and interpretation of these structural properties are subsequently influenced or enhanced through engaging in the interaction, creating an ongoing process of structuration of social practices (Orlikowski 2000). Based on this structuration point of view, the structural properties of the team-task environment are suggested to influence and shape the development of task-oriented communication patterns in virtual teams – the degree to which task-related issues are explored, the level of concern raising or attention switches, and the level of convergence on a common task view. From the team literature, we identify three categories of structural properties that are important in this structuration process:

- **Semistuctures:** According to Okhuysen and Waller (2002), semistuctures are “templates that help members make sense of an uncertain task without locking them into a strict complete path” (p. 1057). Semistuctures that have been suggested to interact with task-oriented communication are formal coordination mechanisms, individual role and team decision structures, communication protocols, repeated interaction patterns, familiarity, and leadership (Gersick 1988; Lovelace et al. 2001; Okhuysen 2001; Okhuysen and Waller 2002; Poole 1983). For example, Okhuysen (2001) suggested that prosocial norms or familiarity can help members to interrupt team activities and separate task from interpersonal conflict. Using jokes or daily topics, familiar members can better manage their disagreements regarding the task and engage in confrontational behavior during task related discussions. Accordingly, semistuctures are important to the performance of innovative tasks as they provide team members with legitimate reasons to interrupt task work and evaluate team progress.
- **Team-task Configurations:** Project teams' size, physical proximity, homogeneity, and configuration of task competency have been shown to affect team members' interactions and subsequently their contributions to the group discussion (Erickson and Dyer 2004; Fay et al. 2000; Malhotra et al. 2001; O'Leary and Mortensen 2010; Stasser and Titus 1987). For instance, Stasser and Titus (1987) reported that as group size increases, team members are less likely to bring up unique, unshared information in group discussion. This information sharing bias results in a decrease in the degree to which task-related issues are explored.
- **Communication environment constraints:** Communication technologies are crafted with material and symbolic properties to indicate the expected range of activities to be associated with the use of the technology (DeSanctis and Poole 1994; Orlikowski 2000). Consequently, they constitute the structural properties of the team-task environment. In this study, we consider a collection of communication technologies and collaborative platforms that a project team uses to facilitate information gathering and team communication on the task, including emails, video conferencing tools, and discussion forums. Instead of categorizing communication technologies according to their synchronicity or richness, we analyze their functional features that can influence the development of task-oriented communication – allowing simultaneous exploration of multiple issues, gaining audience attention to raise concerns, promoting the convergence on a common task view.

At the core of a structuration process is individuals' actions to instantiate structures and influence a group's interpretation and behavior. To capture this factor, we focus on task interventions. The idea of task intervention follows the insights of Orlikowski et al. (1995) that a group of intervention activities can structure users' interactions with a new information system and subsequently fit the system's patterns of use into particular organizational contexts. In this study, we shift the concept of such intervention activities from the context of system use to the context of task-oriented communication and broaden the range of its initiators from designated mediators to any personnel involved in a project, including team leaders, members, or project managers. In the virtual team literature, task interventions that have been investigated concentrate on the establishment of semistuctures, including imposed regular coordination meetings, scheduled deadlines, guidelines for coordinating the pace of efforts, and specifications for the time spent on tasks (Massey et al. 2003; Maznevski and Chudoba 2000; Montoya-Weiss et al. 2001). Maznevski and Chudoba (2000) found that imposing regular face-to-face coordination meetings in virtual teams can create a steady rhythm in team communication and help regulate the pace of project work. Massey et al. (2003) also reported a similar finding that suggested coordination mechanisms can make

asynchronous communication more predictable and prompt the team to allocate time more carefully on tasks according to their importance.

Following this concept of task interventions, we propose that in a virtual team setting, communication environment constraints, team-task configurations, and some imposed semistuctures constitute the basic structural properties of the team-task environment. Those structural properties shape or constraint the initial patterns of task-oriented communication. Emerged patterns may be seen by some team members as ineffective or problematic in pushing the task forward as the project allocated time diminishes. Task intervention activities may be initiated purposely or accidentally and result in the formation of new semistuctures or the modification of existing structural properties. The reconfigured structural properties give rise to the new patterns of task-oriented communication, which eventually determine the team performance. The research model of this study is summarized in Figure 1.



Research Method

The research site of this study is the iPlant Collaborative. iPlant is a NSF-funded initiative that aims to promote collaboration among plant scientists on break-through ideas by creating a unified cyber-infrastructure for the plant scientific community. It includes several Grand-Challenge teams that work on big problems in plant biology and project teams that develop new-generation computational platforms and tools necessary to solve those big problems. All teams are working in a virtual setting. Six virtual teams within iPlant have been selected according to the innovativeness of the project. In the current phase of the study, we are collecting qualitative data from team documents and interviews since some of the teams already completed their project work. For each team, we will invite five members for individual interviews. A total of thirty subjects will be recruited in this study. In a one-hour interview session, interviewees will be asked about their reflections on the dynamics of team interactions. Interview questions are designed to cover three time frames in the team's lifespan: (1) the initial phase during the first few weeks of the team, (2) the times that major collaboration issues emerged, and (3) the current or final phase of the team. For each phase, the subject is asked to reflect on team-task configurations (e.g., team size, physical distribution, and members' expertise), semistuctures established (e.g., familiarity, role assignment, and decision structures), communication environment constraints (e.g., communication technologies available, their functions, and usage), and group discussion patterns (e.g., major communication media used for holding group meetings, the general flow of group meetings, meeting atmospheres, the level of conflicts and concern raising, and the convergence of perspectives on the task). For the emergence of major collaboration issues, the time that the issue occurred, the nature of the issue, the task intervention taken to resolve the issue, and the impacts of the intervention on team interactions will be further investigated. At the end of the interview, subjects will be asked to evaluate and comment on their own teams' performance.

The qualitative data will be coded according to our research model (Figure 1) and analyzed with two analytical techniques – chronology and pattern matching. Since this study is aimed at investigating the formation of team communication patterns over time, organizing chronologies of team development can reveal important team events and their potential causal relationships (Yin 2009). To ensure the accuracy and coverage of a project team's chronology, each team member's narrative data will be compiled into a version of his/her team's chronology. The consistency among versions will be verified and second interviews may be scheduled to clarify some major discrepancies. After an authentic version of each project team's chronology is obtained, chronologies among teams will be analyzed through pattern matching to identify significant patterns in our research model. The consistent patterns between empirical data and a research model can help a case study to verify its internal validity (Yin 2009). In the future, we are planning to conduct longitudinal studies on new virtual teams from iPlant (or other organizations) and collect direct observations and communication logs for more closely examining the significant patterns identified in this phase of the study.

Expected Contributions

In this study, we adopt the lens of structuration theory and investigate the effect of task interventions on task-oriented communication. We hypothesize that task interventions can trigger changes in the structural properties of the team-task environment (i.e., semistructures, communication environment constraints, and team-task configurations), which in turn alter the patterns of task-oriented communication (i.e., the degree to which task-related issues are explored, the level of concern raising or attention switches, and the level of convergence on a common task view). This study can provide a better understanding of how virtual teams learn to coordinate their task work more effectively by initiating task intervention activities. Specifically, it will clarify (1) the relationship between collaborative issues and corresponding task interventions, (2) the role of task interventions in establishing or changing the structural properties of the team-task environment, (3) the effect of the structural properties – semistructures, team-task configurations, and communication environment constraints – on task-oriented communication patterns, and (4) the relationship between task-oriented communication and team performance. Regarding its contributions to theory, this study can help to identify from the lens of structuration which team factors constitute important structural properties of the team-task environment and shape the behavioral dynamics of virtual teams. Regarding its contributions to practice, the insights gained in the study can suggest management support that an organization may offer to facilitate the daily communication of its virtual teams.

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