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Knowledge and Performance in Knowledge-Worker Teams: A Longitudinal Study of Transactive Memory Systems

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This study examined how transactive memory systems (TMSs) emerge and develop to affect the performance of knowledge-worker teams. Sixty-four MBA consulting teams (261 members) participated in the study. I proposed that the role and function of TMSs change to meet different task and knowledge demands during a project. Hypotheses predicting that TMSs emerge during a project-planning phase as a function of a team's initial conditions, and later develop and mature as a function of the nature and frequency of communication were generally supported, as were hypothesized relationships between TMSs and team performance and viability. Findings suggest that teams with initially distributed expertise and familiar members are more likely to develop a TMS. Frequent face-to-face communication also led to TMS emergence, but communication via other means had no effect. Teams with more established TMSs later benefited from face-to-face communication, but they were less helped by frequent communication via other means, suggesting that transactive retrieval processes may have been triggered during face-to-face communication and suppressed during other types of communication. TMSs were positively related to team viability and team performance, suggesting that developing a TMS is critical to the effectiveness of knowledge-worker teams.

Key words: knowledge-worker teams; transactive memory
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1. Introduction

Knowledge embedded in work teams is a source of value for many types of organizations. Leveraging this knowledge is especially critical in organizations that rely on knowledge-worker teams to deliver products and services, but the value of this knowledge often goes unrealized. Teams do not make full use of members' knowledge if members fail to share and integrate the unique expertise that each member possesses (Nonaka and Takeuchi 1995). Organizations unwittingly forgo opportunities to leverage team knowledge with practices that disrupt team structures, such as assigning members to teams and projects based on individual availability rather than on prior association with other team members, or failing to control member turnover in standing teams (Moreland and Argote 2003). Research on transactive memory systems (TMSs) has begun to address issues of knowledge utilization by explaining how team members develop, share, and efficiently integrate their expertise.

A TMS is the cooperative division of labor for learning, remembering, and communicating team knowledge (Hollingshead 2001, Wegner 1987); it is a form of knowledge that is embedded in team members and in a team's structure and processes. TMSs are thought to improve team performance because they give members quick and coordinated access to one another's specialized expertise, ensuring that a greater amount of task-relevant knowledge is brought to bear on team tasks. Teams that develop TMSs are more likely to fully utilize members' expertise and realize the value of embedded team knowledge, implying that TMSs represent an important point of leverage for team-based organizations.

Empirical research in the laboratory demonstrates that TMSs have powerful effects for task performance and expertise utilization (e.g., Hollingshead 1998a, b; Liang et al. 1995; Moreland 1999; Moreland and Myaskovsky 2000). Recent field studies also show that TMSs help ongoing organizational teams perform well, suggesting that TMSs may provide benefits across a general set of team tasks (Austin 2003, Faraj and Sproull 2000, Lewis 2003). Past research has not examined TMSs at different phases of a complex task, however, so we know little about how TMSs evolve. I propose that TMSs develop and evolve as knowledge demands change, and as interactions and processes change over the course of a project or set of tasks. The purpose of this study was to examine this evolutionary process and investigate some of the factors that contribute to TMS development.

I examine knowledge-worker teams (KWTs) because the effects of TMSs should be especially pronounced in teams whose outputs and performance rest on members' knowledge and expertise. The main purpose of KWTs, such as consulting teams, product development teams, research teams, and ad hoc project teams, is to leverage members' expertise to create new knowledge in the form of new products, services, or solutions (Nonaka and Takeuchi 1995). KWT tasks are complex, ambiguous, and require members to apply specialized knowledge gained through formal education and experience. Tasks are often organized as projects that progress in phases, with distinct milestones that mark the end of planning and various stages of implementation, and culminate in a final deliverable to an external or internal client. Within a single project, the pace, focus, and content of a KWT's work can change. These task characteristics make projects especially appropriate for studying how a TMS develops, as members may need to learn, recall, and apply knowledge differently in different project phases.

In this study, I focus on the initial conditions that affect early TMS development, and the communication processes that influence TMSs as they mature. I suggest that by affecting members' expectations and early interactions, initial conditions play a key role in developing the early structure of a TMS. Later in a project, combining and integrating members' expertise become key functions of a TMS, but the extent to which a TMS facilitates knowledge utilization and integration depends on the nature and frequency of team communication processes. Practically, understanding the initial conditions that contribute to TMS emergence should help managers staff teams so that TMSs develop more easily; understanding how communication processes influence TMS development in different stages of a project can help managers make decisions about how often and through what means team members should communicate and interact.

2. Conceptual Framework and Hypotheses

TMSs were conceptualized by Wegner (1987) to explain how people in close relationships organize and remember information important for joint tasks. Wegner argued that TMSs also operate in groups, observing that experienced groups seem to divide the cognitive labor for a task and rely on one another to learn, remember, and communicate information from different knowledge domains. The TMS itself consists of the set of members' individual knowledge repositories and a shared understanding about which members possess what knowledge. This shared understanding of member-expertise associations works like an indexing system that tells members who knows what (Moreland 1999, Wegner 1995).

TMSs are thought to improve team performance by enabling faster access to a greater amount of deep expertise and by improving integrative processes (e.g., Hollingshead 1998a, Moreland 1999, Stasser et al. 1995, Wegner 1995). Three reasons for these effects are: (1) Dividing up knowledge responsibilities allows members to focus on developing deep expertise in their individual domains, while still maintaining ready access to task-relevant knowledge possessed by others; (2) when members are clear about who is responsible for knowing and remembering what expertise, they can spend less time searching for necessary information during task processing; and (3) a shared understanding of member-expertise associations helps team members better anticipate how other members will behave, which in turn facilitates coordinated, efficient interactions (Cannon-Bowers et al. 1993). The quality and efficacy of a TMS, however, will evolve over the course of a team's interactions, and a team's initial conditions and communication patterns are likely to affect this evolution.

2.1. TMS Emergence as a Function of Initial Conditions

Two early tasks critical to a team's eventual success are breaking down a project into discrete activities and matching members to these activities (Arrow et al. 2000). Developing a functional TMS early in a project should help teams with these planning activities and can lay a foundation for a more functional and mature TMS later in the project. The extent to which a TMS emerges during the critical project-planning phase, however, may depend on how members' knowledge is distributed initially, and on what members know or perceive before they interact. Prior laboratory research suggests that the structure for a TMS can develop based on members' preconceptions about one another (Hollingshead and Fraidin 2003), based on direct information about who is expert in what areas (Moreland and Myaskovsky 2000), or based on task incentives to remember different rather than similar information (Hollingshead 2001). A division of cognitive labor emerged in these dyads and teams because these conditions influenced individuals' decisions to learn in some areas but not others, and influenced the extent to which individuals relied on others for different information. I propose that members of KWTs are similarly influenced by what they know or perceive about other members and their knowledge. In particular, members' expectations about the distribution of expertise and their familiarity with other members will affect to what extent TMSs emerge.

2.1.1. Distributed Expertise and TMS Emergence. KWTs are purposefully constructed to leverage the unique expertise of different members. KWT performance depends on the extent to which members contribute their specialized expertise and integrate knowledge that is distributed among members. Knowing the circumstances of their formation and the nature of their tasks, members of KWTs are likely to make the assumption that they possess unique knowledge that others do not, and that members need to contribute knowledge from different domains in order to accomplish the team's task. Empirical research suggests that such expectations help initial TMS structures emerge. Initial TMS structures begin as a framework of member-expertise associations, which individuals later use to access task-critical knowledge possessed by others. Studies conducted by Hollingshead (2000, 2001) and Wittenbaum and colleagues (described in Wittenbaum et al. 1998) find that individuals tend to learn more information in their own specializations if they believe that others possess different rather than similar expertise and when task outcomes depend on members (or partners) recalling different, but complementary, information. Expectations about the distribution of members' expertise help define the initial framework of a TMS because they affect individuals' decisions to take responsibility for information in some areas and not others and to rely on other members for information in complementary domains (Hollingshead 2001, Wegner 1987).

Initial TMS structures are more likely to form the basis for a reliable system of cognitive interdependence in a KWT if members' actual knowledge is consistent with their expectations for differentiated and complementary expertise. When expertise is distributed among members, members will be able to rely on their initial perceptions and use interactions to *refine* rather than *define* member-expertise associations. In contrast, if members' actual knowledge is initially overlapping, members may need to spend more time together to resolve ambiguities about who knows what. The more members' actual knowledge is consistent with members' likely expectations for distributed expertise, the more quickly a TMS will emerge.

Once members begin to interact and communicate, KWTs with initially distributed expertise may have another advantage over those with initially overlapping knowledge. The initial distribution of expertise can further affect the emergence of TMS by influencing how and to what extent unique information is shared among team members. Research on information sharing in groups finds that groups tend to underemphasize members' unique knowledge during interactions and overemphasize knowledge that members had in common prior to meeting (Gigone and Hastie 1993, Stasser and Stewart 1992, Stasser et al. 1989). The more overlapping knowledge members possess initially, the more likely this "common knowledge effect" (Gigone and Hastie 1993) is to occur. In contrast, distributed expertise can lead to constructive group processes that cause members to think about the task and others' expertise more carefully (Nemeth and Staw 1989). For example, Jehn et al. (1999) found that informational diversity (knowledge differences that arise as a function of differences in education, experience, and expertise, p. 743) was positively related to constructive disagreements about ideas or opinions about the group task. These researchers note that such disagreements may be essential to groups doing complex tasks because it helps members identify task strategies and develop accurate assessments of their task situation. In KWTs, where tasks are complex, initially distributed expertise may stimulate information sharing and task-related debates that help members refine their perceptions about member-expertise associations.

In summary, the extent to which members' expertise is initially distributed should help define the initial structure of a TMS. Once members interact, distributed expertise should encourage productive information sharing and task-related debates that elaborate and refine the TMS indexing system.

Hypothesis 1. *The extent to which members' expertise is initially distributed will be positively related to the extent to which a TMS emerges.*

2.1.2. Prior Familiarity Among Members and TMS Emergence. The effect of initially distributed expertise on the emergence of a TMS should be even stronger when members have firsthand knowledge about one another's expertise. Familiar members are more likely to have had a variety of experiences together that give them a more accurate view on the content, credibility, and depth of a members' expertise (Moreland 1999). Gruenfeld et al. (1996) suggest that familiar members are also more likely to offer, discuss, and consider unique information, being more likely than strangers to trust the source of potentially conflicting information. The Gruenfeld et al. (1996) study demonstrated that teams composed of familiar members with different task-critical information shared more unique information and performed better than did teams of strangers with similarly diverse information. This suggests that member familiarity will reduce ambiguity about *how* expertise is distributed among members and facilitate sharing of diverse expertise—both of which will help elaborate the initial structure of member-expertise associations.

In contrast, if members' initial expertise is overlapping rather than distributed, member familiarity could delay the emergence of a TMS. Members with strong ties to one another are more likely to have redundant information (Granovetter 1973) that could be overemphasized during task discussions (Gigone and Hastie 1993, Stasser and Stewart 1992). If a team's initial expertise is overlapping, high levels of familiarity could make it even more difficult to distinguish members' unique contributions. This could mean delays in defining who is responsible for what information and resolving ambiguities about how members' knowledge fits together. Although familiarity should help teams with initially distributed knowledge develop a TMS, high levels of familiarity in teams with initially overlapping expertise should cause a TMS to emerge more slowly.

Hypothesis 2. *The effect of distributed expertise on TMS emergence will be moderated by the extent to which members are familiar to one another, such that distributed expertise is more strongly positively related to TMS emergence when familiarity is high rather than low.*

Hypotheses 1 and 2 suggest that TMS emerges as a function of the initial distribution of members' expertise, and that the effects of initially distributed knowledge are amplified when members know one another prior to beginning their tasks.

2.2. Communication Processes and TMS Development

Initial conditions help define a TMS structure and influence the quality of information sharing among members once members interact. The frequency of these interactions is another critical factor influencing the extent to which a TMS emerges, because communication helps members to learn about others' expertise and develop shared perceptions about who knows what (Wegner 1987). Once a TMS has emerged, however, communication may play a different role in how it develops and matures. Task and knowledge demands change during the course of a project, as do the role and function of a TMS. Although *building* a functional TMS is important during the planning phase of a project, *elaborating* the TMS becomes paramount later, when members must retrieve and integrate their uniquely held expertise. The ways in which communication processes influence the efficacy of a TMS in different project phases are discussed next.

2.2.1. Early Communication Processes and TMS Emergence. Because matching team members to tasks is most efficient if responsibilities are assigned based on actual expertise, developing an accurate understanding of who possesses what knowledge is critical during the planning phase. Frequent interactions during this phase help develop accurate and shared perceptions of member-expertise associations by providing members with opportunities to explicitly establish who knows what. During early interactions members can describe their qualifications, state their lack of expertise in certain domains, respond to questions, and solicit information from other members (Hollingshead 1998b). Such exchanges help members learn more about the content and depth of one another's knowledge and help to elaborate, refine, and clarify members' perceptions of member-expertise associations. Frequent interactions also create implicit knowledge that is important for building a reliable TMS by helping members develop shared conceptualizations of the task and common interpretations about how members' knowledge fits together (Cannon-Bowers et al. 1993). Frequent communication early in a team's project should help a functional TMS emerge.

Hypothesis 3. *The frequency of communication during the planning phase will be positively related to TMS emergence.*

2.2.2. Later Communication Processes and TMS Development. Once planning is complete, team member activities are geared toward implementing tasks outlined during the planning phase. During the implementation phase a TMS needs to be (or become) functional in order for it to facilitate retrieval, utilization, and integration of members' expertise. If a team has not yet developed a clear division of cognitive labor, frequent communication may still be required during the implementation phase to elaborate, refine, and correct members' perceptions and to develop convergent expectations about member-expertise associations. If, however, a team has developed a functional TMS earlier in the project, subsequent interactions and communication can be geared toward *transactive retrieval* of knowledge embedded in the TMS.

Transactive retrieval occurs when members work together to retrieve uniquely held information. During interactions members cue one another by "verbalizing details about the context in which the knowledge was obtained, posing questions, or verbalizing associations with the question" (Hollingshead 1998b, p. 661). Cues from other members help individuals retrieve and share knowledge that they possess—uniquely held knowledge that would have otherwise remained unshared. Communication processes that aid in transactive retrieval are important for creating a TMS that facilitates knowledge utilization and integration during the implementation phase. Furthermore, the nature of this communication may be critical to creating a TMS that helps achieve high performance.

Organizational teams have a variety of communication modes from which to choose, including face-to-face meetings, electronic mail communication, and telephone conversations. According to Griffith and colleagues (Griffith and Neale 2001, Griffith et al. 2003), most teams in organizations use a combination of these, choosing to emphasize one mode over another depending on the needs of the project and team. Face-to-face meetings have the advantage of being the most information-rich communication medium (Daft and Lengel 1986) because they convey both verbal and nonverbal information (through body language, eye contact, facial expressions). Information richness is potentially important for transactive retrieval processes because members may have encoded information about others' expertise in nonverbal communication that occurred earlier in the project. Research by Hollingshead (1998a, b) suggests the relationships between communication medium, TMS, and performance are complex. Results of her studies imply that a team's choice between communicating face to face or through a less information-rich medium should depend on the extent to which a TMS has already developed.

Hollingshead (1998b) compared the transactive retrieval processes of dyads with and without a prior TMS in different communication conditions. She found that dyads that had previously developed a TMS (intimate couples) performed better on a knowledge recall test than did dyads with no previous TMS (pairs of strangers), but only when dyads were allowed to communicate face to face. There were no such differences when dyads communicated through a computer. Hollingshead reasoned that because intimate couples had many shared experiences and opportunities to develop implicit coordination mechanisms, these dyads would be more likely to use nonverbal cues to help recall important information. Without the ability to use these cues, however, intimate couples appeared less able to retrieve, communicate, and use the uniquely held information previously encoded in their TMS. This suggests that teams that have developed a functional TMS earlier in their project should be better able to retrieve, utilize, and integrate task-critical information when they communicate face to face rather than through other means (e.g., e-mail or telephone).

Other results from Hollingshead's (1998b) study show that communicating over the computer suppressed some communication behaviors important to TMS. Compared with members of face-to-face dyads, members of dyads using the computer were less likely to explain their answers and less likely to solicit task-relevant information from their partner. A reduction in such behaviors could have a dramatic effect on the maturity and efficacy of a TMS in a KWT. Without sufficient information about the content and depth of others' knowledge, members cannot establish an efficient division of cognitive labor that is clear to, and shared by, team members. This information suppression effect would be especially acute in teams that failed to develop a functional TMS during planning, because members may never acquire enough information to define a TMS that facilitates transactive retrieval. Thus, teams that have failed to develop a functional TMS during the planning phase and communicate predominately through means other than face to face should be least likely to develop a mature TMS capable of facilitating knowledge retrieval, utilization, and integration.

Hypothesis 4. *The interaction of the frequency of face-to-face communication, the frequency of non-face-to-face communication, and the degree to which members have already developed a TMS during the planning phase will influence the degree to which a team develops a mature TMS in the implementation phase of a project, such that*

- *the highest levels of implementation-phase TMS will be produced in teams that have already developed a functional TMS and that communicate frequently face to face and relatively infrequently through means other than face to face, and*
- *the lowest levels of implementation-phase TMS will be produced in teams that have not already developed a functional TMS and that communicate frequently via non-face-to-face means and relatively infrequently face to face.*

In summary, Hypotheses 1–3 assert that the initial distribution of members' expertise, familiarity among members, and frequent communication influence the extent to which a TMS emerges during the planning phase of a project. Hypothesis 4 suggests that developing a mature TMS that facilitates transactive retrieval processes depends on the extent to which a prior TMS emerged and on the frequency and type of communication a team engages in while implementing its tasks.

2.3. Effects of TMS Development

A mature TMS helps members share and integrate their expertise quickly and efficiently, helping KWTs achieve timely delivery of their products and services within resource constraints. A mature TMS also ensures that a greater amount of specialized knowledge is brought to bear on KWT tasks, resulting in higher-quality products and services that meet clients' needs. Thus, having a mature TMS in the implementation phase of a project should result in high team performance.

Hypothesis 5. *The extent to which an implementation-phase TMS has developed will be positively related to team performance.*

Having developed a functional TMS may also affect a team's ability to perform other tasks in the future.

Lewis et al. (2003) argue that TMSs enable individual-level and team-level learning that transfers to other similar tasks. Results of their laboratory study show that teams that developed a TMS on one task performed better on a subsequent task, especially when the division of cognitive labor remained stable across tasks. If KWT members maintain their specializations across projects, they may be able to leverage the TMS they have already developed to enhance performance on another project. Hackman and Morris (1975) described the capability of groups to continue to perform effectively in the future ("viability") as a key criterion of effectiveness. Having developed a functional and mature TMS on one project should position members to perform well on future tasks.

Hypothesis 6. *The extent to which an implementation-phase TMS has developed will be positively related to team viability.*

Together, Hypotheses 1–6 suggest that a TMS develops as a function of initial conditions and communication processes to positively affect team performance and viability. These hypotheses were tested in a field study of KWTs.

3. Methods

3.1. Participants, Tasks, and Procedures

Data for this study were obtained from members of MBA consulting teams and their corporate clients as part of a larger study examining team processes. The consultants were second-year MBA students of a large, mid-Atlantic university who were required to complete a semester-long consulting project with a client organization from the local community. I gathered data during the fall semester of two consecutive academic years. In the first year, 36 teams of 4–6 members were formed among 164 course enrollees. In the second year, 35 teams of 4–6 members were formed among 182 enrollees. There were thus 71 teams and 346 enrollees across the two data collection periods.

Out of the 346 enrollees invited to participate in this research, 268 actually completed the entire study (77.5% response). The nonresponders were distributed across 38 teams (in the other 33 teams, there was 100% response from team members). I examined the response rates in the 38 teams in which there were nonresponders, with the intention of dropping teams with fewer than three member responses. Seven teams had fewer than three member responses (each of these seven teams had only one response). These responses and teams were dropped from further analysis, bringing the total usable sample to 261 members of 64 teams. Out of 64 teams, 39 had a majority of male members, 15 had a majority of female members, and 10 had an equal number of males and females. Across all respondents, 29% were female. No gender composition effects were later noted in the results. The average age of respondents was 27 years, and respondents had an average of 4 years of full-time work experience.

3.1.1. Tasks. Each project team was assigned to a single client organization with a legitimate but short-term management problem. Client organizations, many of which are Fortune 500 corporations, worked with the consulting teams to jointly determine the scope of their projects and their deliverables and due dates. Teams and clients interacted as needed during all phases of the project. Examples of typical projects include designing a marketing plan for a new product, developing a strategy for addressing low employee morale after a restructuring, and creating a methodology for calculating cost of ownership of capital equipment. Projects required a mix of management expertise, including marketing, accounting, information systems, human resources management, finance, and organizational behavior.

3.1.2. Procedures. Consultants were assigned to teams by a full-time program director who coordinated the administration and operation of the consulting project course. Prior to forming teams and assigning projects, the program director had access to information about the knowledge, skills, academic achievement, and professional experience of individual consultants, as well as about the particular requirements of each consulting engagement. Teams were staffed to represent a balance of disciplines, including marketing, finance, accounting, information systems, and human resources management. Once team assignments were finalized, team members were notified of their assignments, their consulting engagements, and client organizations. Member assignments to teams and team assignments to consulting engagements were final—no changes in membership were made once teams were matched to organizations.

All consulting teams were required to produce a formal project plan by the end of a five-week planning phase and to turn in a set of final deliverables (client-specific reports, presentations) by the end of the 13-week semester. I timed data collection to coincide with these project phases and deliverables. An initial survey was given before projects began to collect information about demographics and familiarity among members of each team. The second survey focused on the project plan deliverable and the prior five-week planning period. The third and final survey focused on the final deliverables and the implementation period, which extended from planning to project completion (approximately eight weeks). The initial survey was a paper-and-pencil questionnaire asking about demographics and member familiarity; the second and third surveys asked about team processes, and were delivered via Web-based questionnaires. Participants were told that the purpose of the study was to examine team processes and help improve the consulting project program (neither the consultants nor their clients were aware of the study hypotheses). I assured participants that their responses would be kept confidential and that only their aggregated responses would be reported. To encourage responses, participants who completed surveys were entered in lotteries to win \$25 (second survey), \$50 (third survey), or \$100 (final lottery). I sent e-mail to participants to remind them to answer surveys within one week of the end of the planning and implementation phases.

3.2. Measures

Items for scale variables are shown in the appendix.

3.2.1. Initial Conditions. Initial conditions facing the team were measured by the extent to which members' knowledge was distributed (distributed expertise) and member familiarity (familiarity). Distributed expertise was computed as a heterogeneity index ($1 - \sum i^2$) (Blau 1977), where i is the proportion of the team with the same major (possible majors were accounting, finance, management, marketing, information systems, or logistics). Similar operationalizations have been used in past research on informational or functional diversity (see Arrow et al. 2000, Bunderson and Sutcliffe 2002, Jehn and Shah 1997). A high index score (near 1) would indicate dissimilarity among members' major, or distributed expertise; a low index score (near 0) would indicate similarity among team members, or overlapping expertise.

Familiarity was defined as the extent to which members knew one another before the consulting project began. Participants responded to the following question, "How well do you know each of the members of your team?" on a four-point scale (1 = do not know, 2 = acquaintance, 3 = know well, 4 = know very well) (Gruenfeld et al. 1996). Participants were instructed to list all of the members of their team and rate their prior familiarity with each of their teammates. I formed a composite familiarity score by averaging members' responses within a team. A high familiarity score would indicate that members knew each other well; a low score would indicate that the members did not know one another before the project teams were formed.

3.2.2. Communication and TMSs. Communication processes were measured as the frequency and type of communication among members in an average week. Participants were asked to report how often members communicated per week in face-to-face meetings, via telephone, and via e-mail for the weeks leading up to the end of the project-planning phase (second survey) and the implementation phase (third survey). Face-to-face (FTF) communication frequency in each phase was calculated as the mean of members' reports. Non-FTF communication frequency during each phase was computed as the average of e-mail and telephone conversations combined. High scores indicate frequent communication during the phase; low scores indicate relatively infrequent communication among team members. Interrater reliability (ICC(1)), computed from members' responses, suggested that the team means for FTF and non-FTF communication frequency were reliable[1] (ICC for $FTF_1 = 0.09$, $F_{(63,239)} = 1.37$, $p = 0.05$; for Non-FTF_1, ICC = 0.13, $F_{(63,226)} = 1.54$, $p = 0.01$; for FTF_2, ICC = 0.08, $F_{(63,246)} = 1.36$, $p = 0.05$; for Non-FTF_2, ICC = 0.34, $F_{(63,238)} = 2.98$, $p < 0.001$).

TMSs were measured twice, at the end of the planning phase ($TMS_{planning}$) and once a project was complete ($TMS_{implementation}$). I measured TMS using a 15-item scale developed by Lewis (2003), who validated the scale in both laboratory and field samples. Following Lewis (2003), I used a five-point disagree/agree scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) and averaged member responses to form a TMS composite score. The TMS measure was designed to be used at the team level, so I evaluated the homogeneity of member responses within teams using the r_{wg} index (George 1990) before aggregating scores.[2] The mean r_{wg} for $TMS_{planning}$ was 0.94, with 98.4% of the estimates above the 0.70 threshold. The mean r_{wg} for $TMS_{implementation}$ was 0.96, with 100% of the estimates above 0.70. These values suggested that members' responses on the TMS items could be aggregated to the team level. I computed team-level scale scores as the mean of member scores. Alpha reliability for the individual-level and team-level scales in the planning and implementation phases was high ($\alpha_{individual} = 0.92$ and $\alpha_{team} = 0.88$ for the planning phase, $\alpha_{individual} = 0.94$ and $\alpha_{team} = 0.91$ for the implementation phase).

3.2.3. Performance and Viability. Performance was measured by four items asking about the quality and timeliness of deliverables and about meeting client needs and goals, using a five-point disagree/agree scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Items were adapted from performance measures used in previous work on KWTs (Ancona and

[1] ICC(1) measures the degree of reliability associated with a single assessment of the group mean (James 1982). A significant F test indicates aggregation is warranted (Klein et al. 2001).

[2] r_{wg} measures the degree to which individual ratings within a team are interchangeable, with mean r_{wg} values of 0.70 or greater providing evidence of acceptable agreement among member responses on a scale (George 1990, Janz et al. 1997).

Table 1 Means, Standard Deviations, and Intercorrelations of Study Variables

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Year	0.44	0.50	1											
2. Task demand	3.33	0.74	0.16	1										
3. Distributed expertise	0.51	0.18	0.23	0.24*	1									
4. Familiarity	1.74	0.32	−0.11	−0.04	0.09	1								
5. FTF_1	1.81	0.57	0.31*	0.00	0.28*	−0.03	1							
6. Non-FTF_1	3.02	1.45	0.10	−0.09	−0.15	0.16	0.10	1						
7. TMS_1	3.63	0.38	0.12	0.24*	0.42**	0.08	0.32**	−0.07	1					
8. FTF_2	1.76	0.64	−0.12	−0.04	−0.10	−0.01	0.09	0.11	−0.15	1				
9. Non-FTF_2	6.97	3.40	−0.05	0.05	0.13	−0.01	0.03	0.36**	−0.02	0.36**	1			
10. TMS_2	3.71	0.41	0.08	0.11	0.25*	0.01	0.34**	−0.15	0.74**	0.07	−0.05	1		
11. Client-rated performance	4.10	0.72	0.05	0.15	0.10	0.06	0.21	−0.12	0.30*	−0.02	−0.16	0.40**	1	
12. Team-rated performance	4.01	0.45	0.01	0.09	0.33**	0.09	0.21	−0.13	0.70**	0.14	0.07	0.78**	0.26*	1
13. Viability	3.70	0.78	−0.01	0.19	0.29*	0.10	0.23	−0.06	0.63**	0.10	0.06	0.78**	0.36**	0.80**

Notes. Planning-phase measures are denoted with the subscript "1," and implementation-phase measures are denoted with the subscript "2." Face-to-face communication frequency is abbreviated as FTF.
* $p < 0.05$; ** $p < 0.01$.

Caldwell 1992, Janz et al. 1997). Teams and client organizations responded to these items at the end of the projects, after final deliverables were complete. The items form internally consistent scales ($\alpha = 0.82$ for team-rated performance, $\alpha = 0.82$ for client-rated performance), with team scores computed as aggregates (averages) of member responses (mean $r_{wg} = 0.93$, with 92% of the estimates above 0.70). Viability, or the team's ability to work well in the future, was also measured after project completion using assessments from team members (mean $r_{wg} = 0.74$, with 71% of estimates above 0.70). The viability scale was internally consistent ($\alpha = 0.97$). The r_{wg} values suggested that member-level scores for performance and viability could be aggregated to the team level.

3.2.4. Controls. I controlled for the year of data collection (dummy variable to account for a cohort effect) and variations in project difficulty in all analyses. Project difficulty was assessed by the program director within one week of the beginning of the consulting projects. Because the director was familiar with the tasks of each of the consulting projects, he was able to assess the relative complexity, difficulty, and uncertainty of each project, compared with other projects. I asked the director to compare the tasks of each project with those of an average project. To define "average," I asked the director to identify a project in the middle of the task-demand continuum (low to high task demand), and compare each project against this average project. Three dimensions representing the demands of the project (complexity, interdependence, uncertainty) were measured with six items. These dimensions have been identified as critical aspects of a task on which the process-performance relationship depends (Galbraith 1973, Lawrence and Lorsch 1967, Thompson 1967). The director assessed the degree to which the focal project was more (or less) demanding than an average project on each dimension, using a five-point disagree/agree scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). A composite scale score was formed by averaging the six item scores for each team. Alpha reliability for the scale is 0.72. A high score on task demand indicates that the project was more complex, required more interdependence, and involved more environmental uncertainty than the average project. A low score on task demand would indicate that the project was less demanding than the average.

4. Results

The means and standard deviations for the key variables, along with the correlations among them, are shown in Table 1. The correlations show that higher planning-phase TMSs are associated with initially distributed expertise and more frequent FTF communication. The bivariate correlations between communication frequency and implementation-phase TMSs were not significant, but this is not completely unexpected because I predicted that the communication variables would interact with $TMS_{planning}$ to affect $TMS_{implementation}$. Teams with more mature implementation-phase TMSs tended to be more viable and performed at higher levels (rated by clients and team members). Client and team ratings of performance were significantly correlated ($r = 0.26$, $p < 0.05$).

The means suggest there were changes in the frequency of communication between the planning and implementation phases and increases in TMSs over time. TMS scores increased significantly between the planning and implementation phases ($M = 3.63$ and $M = 3.71$, $t(63) = 2.11$, $p = 0.04$, two-tailed test), as did non-FTF communication frequency ($M = 3.02$ and $M = 6.97$, $t(63) = 9.94$, $p = 0.00$, two-tailed test). There was a slight decrease in FTF communication frequency between the measurement periods, but this difference was not significant ($M = 1.81$ and $M = 1.76$, $t(63) = -0.55$, $p = 0.58$, two-tailed test).

4.1. Hypothesis Tests and Results

I tested the hypotheses using hierarchical moderated regression analyses.[3] All analyses examined unstandardized regression coefficients after centering the predictor variables (Aiken and West 1991). Regression results are shown in Table 2.

Hypotheses 1 and 2 stated that distributed expertise is positively related to TMS emergence in the planning phase, and that member familiarity positively moderates that relationship. Results of a two-step hierarchical regression showed that the controls did not explain a significant amount of variance in the dependent variable, and that distributed expertise was indeed positively related to $TMS_{planning}$ [$t(60) = 3.03$, $p = 0.004$], supporting Hypothesis 1. Hypothesis 2 was tested by adding a third and fourth step to the regression, with familiarity entered in Step 3 and the interaction of distributed expertise and familiarity entered in Step 4. Results from Step 4 showed that the interaction was indeed significant [$t(58) = 2.05$, $p = 0.04$], as was the change in R^2 from the prior step ($\Delta R^2 = 0.05$, $\Delta F_{(1, 58)} = 4.21$, $p < 0.05$). I graphed the interaction after performing a simple slopes analysis (Aiken and West 1991) and found that the relationship between distributed expertise and $TMS_{planning}$ was stronger when initial familiarity was high than when familiarity was low. These results support Hypothesis 2.

Hypothesis 3, which predicted that frequent communication episodes during the planning phase would be positively related to TMS emergence, was partially supported. A hierarchical regression, with controls, initial conditions, and the frequency of both FTF and non-FTF communication entered in three separate steps, showed a positive and significant effect for FTF communication [$t(57) = 2.07$, $p = 0.04$], but not for non-FTF communication [$t(57) = -0.23$, $p = 0.81$]. These results suggest that FTF communication during the planning phase had a positive impact on TMS emergence. Hypothesis 4 proposed a three-way interaction of $TMS_{planning}$, FTF communication, and non-FTF communication on the extent to which TMS develops in the implementation phase. This hypothesis was tested in a five-step hierarchical regression, where the three-way interaction was entered in the fifth and final step. Results from this regression showed that the three-way interaction was significant [$t(50) = -2.02$, $p = 0.04$], as was the change in R^2 in the final step ($\Delta R^2 = 0.03$, $\Delta F_{(1, 49)} = 4.07$). I analyzed the simple slopes and graphed the three-way interaction. As predicted, when $TMS_{planning}$ was high, high levels of FTF and low levels of non-FTF communication produced higher levels of implementation-phase TMS. When $TMS_{planning}$ was low, the combination of frequent non-FTF communication and infrequent FTF communication produced the lowest levels of implementation-phase TMS. These results support Hypothesis 4.

Graphs of the interactions for Hypotheses 2 and 4 appear in Figure 1.

Another noteworthy finding evident from Step 2 of the Hypothesis 4 regression model is that planning-phase FTF communication was a significant predictor of implementation-phase TMS [$t(57) = 2.57$, $p = 0.01$]. The bivariate correlation between these variables was also significant ($r = 0.34$, $p < 0.01$). These findings suggest that, in addition to helping a TMS emerge (confirmed in tests of Hypothesis 3), frequent FTF communication early in a project can increase the likelihood that a mature TMS will develop later.

Hypotheses 5 and 6 asserted that implementation-phase TMS is positively related to team-rated and client-rated performance (Hypothesis 5) and team viability (Hypothesis 6). These hypotheses were tested using two-stage least-squares regression, estimated with $TMS_{planning}$ as an instrumental variable.[4] This analysis produced two regression coefficients: one for the instrumental variable $TMS_{planning}$, and one for the hypothesized predictor variable $TMS_{implementation}$. The coefficients of $TMS_{implementation}$ on client-rated performance

[3] The maximum number of predictors in any of the regression models tested was 13 (Hypothesis 4). Given the sample size of 64, a small-medium effect size of 0.35 (Cohen 1988), and an alpha level of 0.05, the power of a test with 13 predictors is 0.80, which is considered acceptable. Because all other regression models had fewer than 13 predictors, so acceptable power levels were achieved in all of the hypothesis tests.

[4] This technique is appropriate over ordinary least-squares regression when predictor variables have correlated errors (Finkel 1995). Because both $TMS_{planning}$ and $TMS_{implementation}$ are hypothesized predictors of performance and viability, and because the TMS measures are identical, it is likely that these variables have correlated errors. Two-stage least-squares regression uses an instrumental variable to estimate the first variable (TMS planning) so that it can be entered in a regression with the second variable (TMS implementation). The errors of these two variables are not correlated, resulting in unbiased estimates of the regression model. Following Finkel (1995), an instrumental variable for $TMS_{planning}$ was obtained by regressing $TMS_{planning}$ on all of the hypothesized antecedents, and setting the instrumental variable equal to those predicted values. The coefficient on $TMS_{implementation}$ produced by the two-stage technique provides a test of these hypotheses.

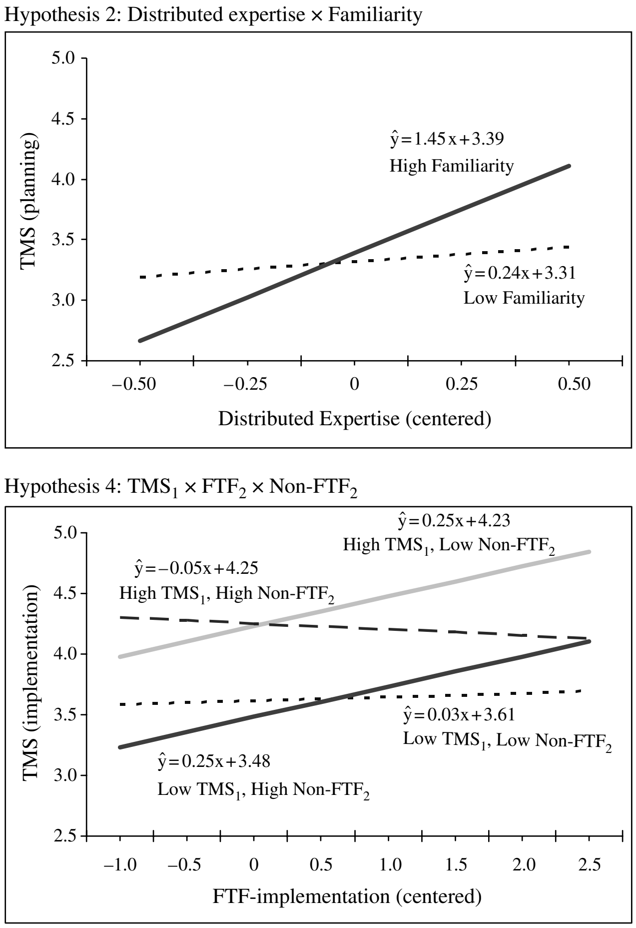
Table 2 **Hierarchical/Moderated Regression Results**

		DV = TMS_1 (planning)							DV = TMS_2 (implementation)				
	Variable Step:	1	2	3	4	1	2	3	1	2	3	4	5
Controls:	Year (dummy)	0.04	−0.01	−0.01	0.00	0.04	−0.01	−0.05	0.03	−0.05	0.01	0.01	0.01
		(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.11)	(0.11)	(0.08)	(0.09)	(0.08)
	Task demand	0.12	0.08	0.08	0.08	0.12	0.08	0.09	0.06	0.05	−0.03	−0.04	−0.06
		(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.05)	(0.06)	(0.05)
Predictors:	Distributed expertise		[H1] 0.79**	0.76**	0.85**		0.76**	0.61*		0.24	−0.21	−0.20	−0.19
			(0.26)	(0.26)	(0.26)		(0.26)	(0.27)		(0.32)	(0.24)	(0.26)	(0.25)
	Familiarity			0.10	0.12		0.10	0.12		0.08	−0.02	−0.02	−0.02
				(0.14)	(0.14)		(0.14)	(0.14)		(0.16)	(0.12)	(0.12)	(0.12)
	FTF_1							[H3] 0.17*		0.24*	0.08	0.08	0.08
								(0.08)		(0.09)	(0.07)	(0.08)	(0.07)
	Non-FTF_1							[H3] −0.01		−0.04	−0.04	−0.03	−0.03
								(0.03)		(0.04)	(0.03)	(0.03)	(0.03)
	TMS_1										0.84**	0.85**	0.92**
											(0.11)	(0.12)	(0.12)
	FTF_2										0.12*	0.12	0.12*
											(0.06)	(0.06)	(0.06)
	Non-FTF_2										−0.00	−0.00	−0.01
											(0.01)	(0.01)	(0.01)
Interactions:	Distributed expertise × familiarity				[H2] 1.86*								
					(0.91)								
	TMS_1 × FTF_2											−0.06	−0.06
												(0.17)	(0.17)
	TMS_1 × Non-FTF_2											0.01	0.03
												(0.04)	(0.04)
	FTF_2 × Non-FTF_2											−0.00	−0.01
												(0.02)	(0.02)
	TMS_1 × FTF_2 × Non-FTF_2												[H4] −0.10*
													(0.05)
R^2		0.06	0.19	0.20	0.25	0.06	0.20	0.25	0.01	0.17	0.60	0.60	0.64
ΔR^2		0.06	0.13	0.01	0.05	0.06	0.13	0.06	0.01	0.15*	0.44**	0.00	0.03*
F		1.98	4.57**	3.53*	3.82**	1.98	3.53*	3.16*	0.40	1.89	8.99*	6.39**	6.58**
ΔF		1.98	9.20**	0.53	4.21**	1.98	4.83*	2.13	0.40	2.58*	19.52**	0.06	4.07*

Notes. Regression coefficients are unstandardized, with standard errors in parentheses. Planning-phase measures are denoted with the subscript “1”, and implementation-phase measures are denoted with the subscript “2”. Face-to-face communication frequency is abbreviated as FTF.

* $p < 0.05$, ** $p < 0.01$.

Figure 1 Graphs of Interactions



Note. High levels of a variable are computed as one standard deviation above the mean, and low levels are computed as one standard deviation below the mean. Planning-phase measures are denoted with the subscript "1", and implementation-phase measures are denoted with the subscript "2".

[$t(57) = 1.95$, $p = 0.05$], team-rated performance [$t(60) = 4.31$, $p < 0.001$], and viability [$t(60) = 5.74$, $p < 0.001$] were all positive and significant as expected, supporting Hypotheses 5 and 6. These results are reported in Table 3.

5. Discussion and Implications

Knowledge-worker teams must be able to elicit, utilize, and integrate the specialized knowledge of members in order to perform well. Prior research on TMSs suggests that developing a TMS can facilitate such knowledge processes, but there has been little research on how TMSs develop and evolve in teams that are engaged in long-term tasks such as projects. This study's longitudinal design allowed for an investigation of the factors that affect both the formation and the function of TMSs during two critical points in a project. Team tasks and knowledge demands change during the course of a project, as do the role and operation of a TMS. A contribution of this study is that it provides insight into the mechanisms through which TMSs evolve.

I argued that teams need to build TMSs during the planning phase of their projects and later develop a mature and functional TMS during the implementation phase in order to fully utilize and integrate members' knowledge. Initially distributed expertise, prior familiarity, and frequent communication were hypothesized and found to affect the extent to which a TMS emerged at the end of the planning phase. I also predicted that frequent FTF communication would benefit teams that had already developed a planning-phase TMS, whereas more frequent non-FTF communication would not. Mature implementation-phase TMSs were hypothesized to be positively related to both client- and team-rated performance and team viability.

Results suggest a pattern of initial conditions and communication processes that help TMSs emerge and develop into fully mature systems of cognitive interdependence. First, initially distributed expertise was positively related to TMS emergence at the end of the planning period, suggesting that distributed expertise helps members define an initial framework of member-expertise associations. Compared to teams with initially overlapping expertise, teams with distributed knowledge seemed better able to develop a TMS. This effect was even stronger when members had some familiarity with one another before the project began. Prior familiarity may have helped reduce ambiguity about who possessed what information and strengthened member-expertise linkages in members' minds. However, prior familiarity combined with initially overlapping expertise produced low levels of TMS at the end of the planning period,

Table 3 Two-Stage Least-Squares Regression Results

Variable	DV = Client-rated performance	Team-rated performance	Viability
TMS_1 (instrumental)	0.01	0.32*	0.04
TMS_2	0.37*	0.54**	0.74**
R^2	0.15	0.63	0.60
F	4.83*	50.75**	45.41**

Notes. Standardized beta weights are shown. Planning-phase TMS is denoted with the subscript "1", and implementation-phase TMS is denoted with the subscript "2".

suggesting that familiar members had a particularly difficult time developing a division of cognitive labor when the initial functional specializations of members did not suggest a division along lines of expertise. It is interesting to note that distributed expertise exerted a slightly positive influence on TMS emergence even when familiarity among members was low. This supports the idea that the structure of members' initial knowledge alone has some influence on creating an initial TMS framework.

I expected that frequent communication episodes during the planning period would also help TMSs emerge because they gave members the opportunity to learn about the content and depth of others' knowledge and to develop shared perceptions about who knows what. Although frequent FTF communication was positively related to TMS emergence as expected, non-FTF communication via e-mail and telephone did not have an independent effect. Later in the project, the effects of non-FTF communication were more pronounced. Specifically, among teams that developed a TMS during the planning phase, frequent non-FTF communication during the implementation phase of the project appeared to hamper teams' ability to further refine their TMS. These results are consistent with Hollingshead's (1998b) finding that couples who had already established a TMS needed the nonverbal communication afforded by FTF contact to retrieve jointly held information. Retrieving and combining distributed knowledge is essential to KWT performance, but these results suggest that KWTs may not be effective at transactive retrieval processes if they do not communicate frequently face to face. It is interesting to note that the absolute frequency of non-FTF communication increased from the planning phase to the implementation phase. Although an increase in e-mail and telephone contact is not unexpected in later phases of a project, the findings suggest that if this contact supplants FTF meetings, some of the knowledge value embedded in a TMS will not be realized.

The results show that FTF communication during the planning phase can also affect the degree to which TMSs mature in the implementation phase, suggesting that a team's early communication patterns set the stage for TMS development throughout the project. Frequent FTF communication appears to be a major determinant of the extent to which TMSs initially emerge and then become mature enough to facilitate the transactive retrieval processes critical to team performance.

Finally, TMSs were positively related to ratings of performance and viability, highlighting the importance of TMSs to KWT effectiveness. Of particular importance is the fact that TMS was related to client assessments of team performance—assessments that most directly reflect the value created by consulting teams. Value accrues to clients if consultants' recommendations are of high quality and can be successfully implemented in their organizations. Value accrues to consulting organizations if teams produce excellent results more efficiently. Results from this study suggest that TMSs create such value.

5.1. Implications and Future Research

This study has several implications for theory and practice. First, this study highlights the need to examine TMSs over time, especially as knowledge and task demands change. Results from this study suggest that developing a TMS capable of facilitating transactive retrieval depends not only on the pattern of communication later in a project, but also on the extent to which a TMS developed originally. To fully understand how TMSs evolve, we first need a theoretical explanation of the emergence and evolution of TMSs. Some questions to be addressed by future research include the following: (1) At what points in a team's development should members focus on TMS emergence? (2) At what point is a TMS mature enough to facilitate knowledge retrieval and integration, and how is this maturity manifested? (3) Does the efficacy of a TMS diminish over time? If so, what are the markers and outcomes of this decline? Answers to these questions would help researchers better define how the structure of a team and its tasks influences TMSs and their impact on performance.

A major practical implication of this study is that FTF communication is critical to creating TMSs and utilizing the specialized expertise of KWTs. Early FTF meetings, in particular, seem important both for helping a TMS emerge and developing a mature and functional TMS later on. Once a TMS does emerge, FTF communication is, apparently, essential to capitalizing on the TMS that was built. The notion that even mature teams must continue to meet face to face is counterintuitive, but findings from this study suggest that teams may not be able to leverage their team-level knowledge unless they have access to the cuing mechanisms that FTF communication affords. Managers may be able to affect the performance of their teams by encouraging frequent and periodic FTF meetings throughout the project and by making sure that non-FTF communication does not supplant these meetings. Findings from this study also imply that TMSs may be difficult to create in virtual team environments, especially in those environments that prohibit FTF meetings early in a project. Even if a team has already developed a TMS, being geographically distributed may hinder the team's ability to facilitate integration of dispersed expertise. Given the proliferation of virtual and geographically dispersed teams, understanding the factors that help or hinder TMS emergence and efficacy seems especially critical.

5.2. Limitations

There are several limitations of the study that affect how its results can be interpreted. First, communication frequency was operationalized in broad categories, which prohibits a precise analysis of the effect of a particular communication mode on TMSs. The communication frequency variables also relied on self-reports from team members, making them less reliable than frequencies obtained through more objective means. Because the results of this study suggest there are differential effects of FTF and non-FTF communication, future research should focus on a more detailed set of communication modalities, one that includes other forms of asynchronous communication (e.g., communication software such as Lotus Notes) and different types of face-to-face communication (e.g., planned or formal meetings versus informal communication with members). A second limitation is that I examined only a few of the factors that may affect TMSs and KWT performance. We know from decades of research on groups, however, that many factors (e.g., demographic composition, goal alignment) and processes (e.g., external communication, relationship and task conflict) can affect how well groups perform. A more complete investigation of TMS development would include some of these variables. Finally, the sample of MBA project teams necessarily limits interpretations of this study's findings. MBA teams likely differ from professional consulting teams in terms of their work context (educational versus commercial), internal structure (equal-status groups versus hierarchical), and motivations (to earn a good grade versus to earn repeat business). The projects that the MBA teams tackled, however, were very similar to professional consulting projects, suggesting that my findings about TMS emergence and development may generalize.

The benefits of TMSs to organizational teams may be profound, but research has yet to explain how TMSs are best leveraged across time, in different organizational settings, and for different tasks that work teams undertake. Understanding the factors that explain how TMSs develop initially and evolve in KWTs is an important first step towards understanding how teams create value for knowledge-based organizations and their customers.

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Appendix—Scale Items

Transactive Memory Systems (Lewis 2003)[5]

1. Each team member has specialized knowledge of some aspect of our project.
2. I have knowledge about an aspect of the project that no other team member has.
3. Different team members are responsible for expertise in different areas.
4. The specialized knowledge of several different team members was needed to complete the project deliverables.
5. I know which team members have expertise in specific areas.
6. I was comfortable accepting procedural suggestions from other team members.
7. I trusted that other members' knowledge about the project was credible.
8. I was confident relying on the information that other team members brought to the discussion.
9. When other members gave information, I wanted to double-check it for myself. (reversed)
10. I did not have much faith in other members' "expertise." (reversed)
11. Our team worked together in a well-coordinated fashion.
12. Our team had very few misunderstandings about what to do.
13. Our team needed to backtrack and start over a lot. (reversed)
14. We accomplished the task smoothly and efficiently.
15. There was much confusion about how we would accomplish the task. (reversed)

Task Demands (Created for This Study)

Compared to the "average" project, this group's project:

Complexity:

1. Has a more complicated problem to solve.
2. Is fairly simple and straightforward. (reversed)

Interdependence: (adapted from Janz et al. 1997)

3. Requires that group members rely on one another's work products to succeed.
4. Demands that the ideas of all group members be shared in order to succeed.

Uncertainty:

5. Was well-defined by the client from the beginning. (reversed)
6. [Project's] client is apt to request significant modifications in scope during the course of the engagement.

Performance (Based on Ancona and Caldwell 1992, Janz et al. 1997)

1. The team's deliverables were of excellent quality.
2. The team managed time effectively.
3. The team met important deadlines on time.
4. The team did a good job of meeting [the client's] needs.

[5] The three dimensions of TMSs reflected by these items (specialized expertise, perceived credibility of others' expertise, and coordinated processes) were originally conceptualized by Moreland, Argote, and colleagues (see Moreland 1999, Moreland et al. 1996, Liang et al. 1995).

Viability (Based on Hackman 1987)

1. This team would perform well together in the future.
2. If I had the choice of working on this team again, I would do it.
3. If we were assigned to another project, I am confident that this team would work well together.

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