

SPECIAL ISSUE ON INFORMATION TECHNOLOGIES AND KNOWLEDGE MANAGEMENT

By: **V. Sambamurthy**
Michigan State University
Senior Editor, Special Issue

Mani Subramani
University of Minnesota
Senior Editor, Special Issue

Knowledge is a fundamental asset for firms in the contemporary economy. Increasingly, knowledge is distributed across individuals, teams, and organizations. Therefore, the ability to create, acquire, integrate, and deploy distributed knowledge has emerged as a fundamental organizational capability (Takeishi 2001; Teece 1997). To be successful, firms must not only exploit their existing knowledge, but must also invest in continually exploring new knowledge as strategic options for future strategies and competitive advantage (Sambamurthy et al. 2003).

The centrality of knowledge in firms is reflected in the emergence of the *knowledge-based view* (Conner and Prahalad 1996) as an important theoretical stance in contemporary organizational research. Theoretical proposals indicate that advantages for a firm arise from cooperative social contexts that are conducive to the creation, coordination, transfer, and integration of knowledge distributed among its employees, business units, and business partners (Ghoshal and Moran 1996).

Others have suggested that the sources of competitive advantage have migrated from being based on economies of scale to being based on economies of expertise that are derived by leveraging knowledge distributed in the organization's network through intra-organizational and interorganizational relationships (Subramani and Venkatraman 2003).

Knowledge is a complex concept and a number of factors determine the nature of knowledge creation, management, valuation, and sharing (Nonaka 1994). Drawing from prior discussions, we distinguish knowledge from data and information and view knowledge as a "fluid mix of framed experience, values, contextual information and expert insight that provide[s] a framework for evaluation and incorporating new experiences and information" (Davenport and Prusak 1997, p. 5). Knowledge can be either *tacit* or *explicit*; this attribute is also expressed as the distinction between *knowing* and *knowledge* (Brown and Duguid 1998; Cook and Brown 1999). Tacit knowledge refers to knowledge that has a personal quality that makes it hard to articulate or communicate or analogously, the knowing or the deeply rooted *know-how* that emerges from action in a particular context. In contrast, explicit knowledge refers to the codifiable component that can be disembodied and transmitted, a notion analogous to knowledge, the *know-what* that can be extracted from the knowledge holder and shared with other individuals. Further, knowledge can be conceived as existing

at multiple levels—not only at the individual level but also at the group and organizational levels.

Organizational knowledge is created through cycles of combination, internalization, socialization, and externalization that transform knowledge between tacit and explicit modes (Nonaka 1994). In this dynamic process of knowledge creation, linkages between individuals and groups sharing similar tasks, i.e., the *communities of practice* (Brown and Duguid 1991), play an important role in communicating, sharing, and integrating knowledge. Individual communities have their own unique and context-specific vocabularies that, while facilitating knowledge exchange within the community, impede communication between them. The overlapping of understanding provided by boundary objects spanning multiple communities (Boland and Tenkasi 1995) provides a basis for communicating, sharing, resolving, and combining disparate perspectives. These issues thus have an important bearing on the choice of information systems to accomplish the access and deployment of knowledge in different contexts. How should firms marshal their intra-organizational and inter-organizational cooperative contexts to facilitate the sharing, integration, and utilization of knowledge?

Knowledge management is of particular relevance to IS research because the functionalities of information technologies play a critical role in shaping organizational efforts for knowledge creation, acquisition, integration, valuation, and use. Information systems have been central to firm efforts to enable business processes, flows of information, and sources of knowledge to be integrated and for synergies from such combinations to be realized. The focus of the deployment of knowledge management systems in firms has been on developing searchable document repositories to support the digital capture, storage, retrieval, and distribution of an organization's explicitly documented knowledge. Knowledge management systems also encompass other technology-based initiatives such as the creation of databases of experts, the development of decision aids and expert systems, and the *hardwiring* of social networks to aid access to resources of non-collocated individuals (Alavi and Leidner 2001).

Information systems researchers have evolved several frameworks to articulate themes related to knowledge management. Earl (2001) suggests that knowledge management initiatives in firms can be classified into five distinct schools of knowledge management, each with differing orientations. Schultze and Leidner (2002) classify IS research in knowledge management published between 1990 and 2000 as belonging to four scientific discourses—normative, interpretive, critical, and dialogic—that vary in the metaphors used to depict knowledge and the implications of the different views of knowledge. Alavi and Leidner (2001) propose a process-based view to articulate the roles of information systems in creating, storing, transferring, and applying knowledge by individuals and groups in organizations. However, there are several disconcerting questions about conceptualizations related to the variety of problems that knowledge management solutions address within firms. For instance, consider the question raised by Michael Zack (2000): “If managing knowledge is the solution, then what's the problem?” While the lack of clear insight into this issue is problematic for practitioners, it is equally problematic for IT researchers because the diversity of organizational processes through which information systems affect the management of intangible assets in firms are not fully appreciated. This also indicates the lack of understanding of contextual nuances to articulate the role of knowledge management systems in firms and organizational networks. However, it is clear that the clarity we seek regarding the phenomena and processes related to the acquisition, integration, valuation, and use of knowledge must be situated in important phenomena related to individual, organizational, and business partnership network effectiveness and performance.

Further, although early work by information systems scholars was focused on the design of knowledge management systems, there is a growing realization that technical and social processes interact in complementarities to shape knowledge management efforts. For example, although information technologies foster electronic communities of practice, what are the social dynamics through which such communities become

effective forums for knowledge dissemination, integration, and use? Similarly, beyond the deployment of information technology, what are the systemic structures, processes, and incentives that work together in shaping effective knowledge management practices? Finally, what about the role of knowledge acquisition, integration, and transfer processes in the organizational assimilation of information technologies? Significant knowledge barriers characterize the organizational ability to make sense of complex information technologies (Purvis et al. 2001). How should such knowledge barriers be mitigated?

Overall, there is a clear sense that there are currently many unresolved issues, challenges, and opportunities for information systems researchers in the domain of knowledge management. The goal of this special issue is to provide a forum for scholars representing the broad spectrum of technical, economic, sociological, strategic, and organizational perspectives to examine phenomena related to information technologies and the acquisition, integration, valuation, and utilization of knowledge. We received 72 submissions that varied in their selection of the phenomenological context, theoretical foundation, and methodological biases. The submissions moved through three rounds of review and the net result is the publication of the special issue in two volumes. This volume contains six papers that were selected for the special issue.

In articulating the contributions of these six papers, we draw on prior literature (e.g., Markus et al. 2002) that emphasizes the need for a clearer understanding of how information systems support knowledge work. With reference to Zack's question about the problems that knowledge management research addresses, the papers in this volume collectively address three types of knowledge problems: knowledge coordination problems, knowledge transfer problems, and knowledge reuse problems. These problems arise from the complexities faced by individuals, groups, and organizations in recognizing the nature of knowledge needed to solve problems or make decisions, the difficulties in assembling the necessary dispersed components of this knowledge, and the

difficulties rooted in the ambiguity of adjudicating knowledge ownership and encouraging reuse of knowledge.

The Problem of Knowledge Coordination

Individuals or groups face knowledge coordination problems when the knowledge needed to diagnose and solve a problem or make an appropriate decision exists (or is believed to exist), but knowledge about its existence or location is not available to the individual or group. Knowledge coordination problems require a search for expertise and are aided by an understanding of patterns of knowledge distribution—of who knows what and who can be asked for help. Research suggests that personal, social, or organizational networks facilitate awareness about *knowing entities* and their possession of knowledge. Similarly, information technologies can facilitate the efficient and effective nurturing of communities of practice through which distributed knowledge can be coordinated. However, research is still needed to understand the social, cognitive, institutional, and technological processes through which the seekers of knowledge locate knowing entities.

The Problem of Knowledge Transfer

This problem is often faced by individuals or groups once an appropriate source of knowledge is located (generally after solving knowledge coordination problems). In particular, knowledge is found to be sticky and contextualized as a result of which it might not be easily transferable (Szulanski 2000). Further, the absorptive capacity of the individuals, units, or organizations seeking knowledge might either enable or inhibit their ability to make sense of the transferred knowledge. Research is still needed to understand what factors will facilitate knowledge transfer.

The Problem of Knowledge Reuse

These are problems of motivation and reward related to the reuse of knowledge (Markus 2001). This occurs when individuals or groups may prefer to devise a unique solution to a problem rather than reuse the standard knowledge available in repositories. Often, recognizing individuals for knowledge contributions (such as rewarding contributions to the organizational document repository or rewarding individuals for being helpful in sharing their expertise) appear to paradoxically create disincentives to reuse of the knowledge, particularly when reuse involves explicitly acknowledging the inputs or assistance received (Hahn and Subramani 2000). This is consistent with research suggesting that those who are helped are viewed as less competent than those who provide help. Research is needed on understanding the vicious and virtuous cycles of knowledge sharing and reuse.

Papers in this Issue

Four of the six papers are empirical papers in the positivist tradition of IS research, the fifth is an inductive field study of a global firm with an industry-leading knowledge management practice, and the final paper is an exploratory examination of dyads in the supply chain. Four of the six papers focus at the individual level of analysis, one focuses at the firm level, and one at the inter-organizational level. Three of the papers examine processes within firms, and two focus on group and individual dynamics. While they all contribute to the main challenge of articulating the role of information systems intermediation of knowledge management initiatives in organizations and collectives, they each address this challenge in different ways.

Raghu Garud and Arun Kumaraswamy ("Vicious and Virtuous Circles in the Management of Knowledge: The Case of Infosys Technologies") provide a systems perspective on the challenges that organizations face in harnessing knowledge. The

paper offers insights related to all of the knowledge problems: coordination, distribution, and reuse. They point out that organizational knowledge management transcends multiple levels, including individuals, groups, and institutional processes. They propose that effective actions for knowledge management at any one level could trigger unanticipated consequences that, over time, could emerge into pathologies. In other words, the organizational management of knowledge occurs through processes that have virtuous and vicious consequences. How should firms navigate their knowledge management efforts through the composite of information technology design, social processes, and institutional processes? Through a longitudinal case study at Infosys Technologies, an organization that is globally acknowledged for its leadership as a knowledge enterprise, they propose that knowledge management involves more than just the sponsorship of initiatives at and across different levels. It also involves an active process of steering around and out of vicious cycles that will inevitably emerge for any specific knowledge management initiative.

Molly McLure Wasko and Samer Faraj ("Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice") develop insights about the support by information systems for knowledge coordination and knowledge transfer problems. They define electronic networks of practice as computer-mediated discussion forums focused on problems of practice that enable individuals to exchange advice and ideas with others based on common interests. They examine why individuals in these electronic networks will share ideas with strangers when there are no immediate benefits to the contributor and free-riders are able to acquire the knowledge. They apply the theories of collective action to examine how individual motivations and social capital influence knowledge creation in these electronic networks. Using archival, network, survey, and content analysis data on knowledge sharing among members in an electronic network supporting a professional legal association, they highlight the complex intertwining of individual level and group level factors in influencing knowledge contributions. In particular, they highlight that interactions through message

posts in such forums can bind geographically dispersed and diverse members into a collective with norms of cooperation and reciprocity directed at helping members solve problems faced in the specific practice. Such collectives provide a shared context that aids knowledge transfer and helps the group leverage knowledge resources that are distributed among members and derive benefits that members could not have otherwise obtained. This paper provides evidence of information technologies enabling economies of expertise through the pooling of distributed complementary knowledge relevant to a specific practice.

Dong-Gil Ko, Laurie J. Kirsch, and William R. King ("Antecedents of Knowledge Transfer from Consultants to Clients in Enterprise System Implementations") examine knowledge transfer in an IT-mediated context involving the sharing of complex knowledge by ERP consultants with their client firms. Client firms expect consultants to transfer knowledge to their employees so that they can contribute to successful implementations and learn to maintain the systems independent of the consultants. Drawing from the knowledge transfer, information systems, and communication literatures, this paper develops an integrated model of how knowledge-related, motivational, and communication factors influence knowledge transfer. Data from 96 ERP implementation projects shows that the transfer of complex knowledge such as the nuances of enterprise software functionalities and procedures is influenced by factors such as individuals' communication capability and motivations as well as the nature of the interpersonal relationships among the consultants and the employees of the clients. The results are both illustrative of the potential as well as the limitations of IT-enabled knowledge sharing and reflect the intensely social aspect of the phenomenon. This feature is often inadequately stressed in the knowledge management literature.

Gee-Woo Bock, Robert W. Zmud, Young-Gul Kim, and Jae-Nam Lee ("Behavioral Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces, and Organizational Climate") develop an integrative understanding of the factors supporting or inhibiting individuals' knowledge-sharing intentions.

They recognize that individuals' knowledge does not easily translate into organizational knowledge despite the implementation of knowledge repositories because of the tendency to hoard knowledge. They draw upon the theory of reasoned action and augment it with extrinsic motivators, social-psychological forces, and organizational climate factors to develop an integrative model of factors that will influence individuals' knowledge-sharing intentions. Utilizing a field survey of managers from Korean organizations, they highlight the complex interplay of individual and contextual factors influencing knowledge-sharing behaviors. An interesting finding of the study is that, while anticipated extrinsic rewards negatively influence attitudes toward knowledge sharing, the expectation of reciprocity is positively related to positive attitudes toward sharing.

Atreyi Kankanhalli, Bernard C. Y. Tan, and Kwok-Kei Wei ("Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation") present insights on the role of information technologies in addressing both knowledge sharing and knowledge distribution problems. Given that a large number of knowledge management initiatives fail due to the reluctance of employees to share knowledge through electronic knowledge repositories (EKR), they seek to explain electronic knowledge repository use by knowledge contributors. Applying social exchange theories, they indicate the need for a consideration of both costs and benefits in understanding the use of these systems. The results of their large scale survey reveal that contextual factors such as generalized trust, pro-sharing norms, and identification moderate the impact of codification efforts on the use of electronic knowledge repositories. Further, they find that extrinsic benefits (e.g., organizational reward) impact EKR usage contingent on particular contextual factors whereas the effects of intrinsic benefits (e.g., enjoyment in helping others) on EKR usage are not moderated. The results also highlight that reciprocity is an important influence on EKR contribution when pro-sharing norms are weak. Overall, the paper enables a more nuanced understanding of the usage of what is increasingly becoming a ubiquitous knowledge management application in organizations.

Finally, Arvind Malhotra, Sanjay Gosain, and Omar A. El Sawy ("Absorptive Capacity Configurations in Supply Chains: Gearing for Partner-Enabled Market Knowledge Creation") examine the phenomenon related to knowledge creation and transfer as well as knowledge distribution at the interorganizational level. The authors use the lens of absorptive capacity to build a conceptual framework that links different configurations of supply chain partnerships with partner-enabled market knowledge creation. Their exploratory study in the context of the RosettaNet consortium effort in the IT industry supply chain uncovers five supply chain partnership configurations that differ in operational efficiency and partner-enabled market knowledge creation. This is one of the few empirical studies examining the complex phenomenon of firm leverage of knowledge occurring through interorganizational relationships. As interorganizational relationships in firm networks are increasingly recognized as central to performance in many contexts, the configurational approach adopted in the paper offers insights into the implications of different relationship management approaches for the creation and sharing of knowledge. The paper highlights fertile opportunities for advances in research on knowledge management through the study of supply chain contexts and other interorganizational partnering arrangements.

Collectively, the papers in this volume reflect the vitality of research on the role of information systems in supporting knowledge management, offer a rich set of findings, and raise a variety of interesting theoretical and empirical questions. A second volume will publish the remaining papers of the special issue.

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