E-Collaboration-Based Knowledge Refinement as a Key Success Factor for Knowledge Repository Systems

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INTRODUCTION

Electronic knowledge repository systems are fundamental tools for supporting knowledge management (KM) initiatives (Alavi, 2000; King, Marks, & McCoy, 2002). The KPMG Consulting Knowledge Management Research Report 2000 (KPMG, 2000) shows 61% of 423 firms surveyed in the United States and Europe have either implemented or expected to implement repository systems. A follow-up KPMG survey (KPMG, 2003) shows that more than 70% of the firms have either implemented knowledge repositories in the last 2 years or planned to implement them in the next 2 years. Compared to other IT systems for KM, repositories are one of the most widely implemented and used KM tools (KPMG, 2000).

While increasing availability of digitization has minimized the cost and effort needed to create and maintain knowledge repositories, it also results in an overflowing amount of knowledge codified with varying degrees of quality. Without an efficient and effective approach to manage knowledge quality and relevance, knowledge repositories can easily collect large numbers of documents that receive little use (Haas & Hansen, 2005; Hansen & Haas, 2001), especially when contribution leads to tangible rewards (Garud & Kumaraswamy, 2005), or when other competing sources of knowledge are more attractive (Gray & Durcikova, 2005).

Existing KM research suggests two dominant design options for knowledge refinement processes. A common practice advocated by KM researchers is *expert-centralized knowledge refinement*. This approach is characterized by the commission of a centralized review committee composed of domain experts to refine and approve knowledge before the knowledge enters a repository system (Goodman & Darr, 1998; Markus, 2001; Tobin, 1998; Zack, 1999). The other option with emerging presence is decentralized knowledge refinement, where the decision-making process is decentralized across refiners and the quality of contributed knowledge is determined collaboratively among participating refiners. When such a "collaborative refinery" (Ackerman & McDonald, 1996) is supported by electronic media, including telephone, e-mail, or computer technologies such as groupware, e-collaboration (Kock, 2005) becomes the foundation of the refinement process.

Compared to the dominant expert-centralized knowledge refinement, a decentralized approach can be a viable alternative to design and implement knowledge refinement processes, primarily because e-collaboration makes it possible to incorporate diverse perspectives in the process of knowledge refinement from knowledge user perspectives. Here we examine how e-collaboration tools have been applied to support both models of knowledge refinement.

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Knowledge refinement is the process of evaluating, analyzing and optimizing the quality of knowledge to be stored in a repository (Alavi, 2000; Cho, Chung, King, & Schunn, in press; Zack, 1999). Refinement mechanisms based on e-collaboration serve as a critical factor that determines the success of knowledge repository systems.

Codifying knowledge that is otherwise tacit provides many benefits, but achieving optimal usage is not easy (Conner & Prahalad, 1996; Hansen, Nohira, & Terney, 1999; Nonaka, 1994). Only when the content of a knowledge repository is accurate (Tobin, 1998), relevant and of high quality (Sussman & Siegal, 2003) are users motivated to access and reuse the content. Taking raw contribution as input material, refinement processes create value added by optimizing raw contribution for maximal usage, rendering the output refined knowledge—a more potent resource for KM efforts. As such, knowledge refinement supports quality assurance of knowledge repositories, an issue that stands as one of the most critical issues for KM practitioners and corporate executives (King et al., 2002).

E-Collaboration for Knowledge Refinement

Knowledge refinement is inherently a collaborative task between refiners and knowledge authors. Adapting Zigurs et al.'s (1998) definition of a task, knowledge refinement can be viewed as a set of behavioral requirements for accomplishing the goal of evaluating, analyzing and optimizing knowledge contribution for repository storage, using some process and given information. The process can involve one or more individuals. When more than one individual are involved in the process, knowledge refinement becomes a collaborative task. Information given in the knowledge refinement task includes the knowledge contribution, the target audience, and the purpose of the contribution.

The quality evaluation component of the knowledge refinement task can be conceptualized as a collaborative judgment task (Campell, 1988; Zigurs et al., 1998). When refining a knowledge object for repository storage, the refiner must consider and integrate information presented in the knowledge object, and to make a judgment about its quality, or to predict the likelihood that it will be useful to repository users for their tasks and in new contexts. If the knowledge object demonstrates room for improvement, the refiner then devises methods to improve the knowledge object.

Many information technologies can serve as e-collaboration media for knowledge refinement. These technologies vary with respect to the amount of communication, collaboration and process structuring they support (Kock, 2005; Zigurs et al., 1998). Research suggests that system features supporting communication and information processing best fit judgment tasks such as knowledge refinement (Zigurs et al., 1998). However e-collaboration technologies for knowledge refinement support more than simply the judgment process. They make democratic knowledge refinement processes possible by engaging authors and refiners from diverse backgrounds in improving knowledge when quality has been determined to be suboptimal. With the expert-centralized approach, the author is required to follow the expert refiner's' decision. In contrast, collaborative knowledge refinement assumes power balance between refiners and authors. For example, e-collaborative technology can hide the identity and status of the refiner, which prevents authors from being biased by refiners' authority and allows them to focus on the content of refinement.

E-collaborative technologies for knowledge refinement can be classified into two categories. The first is *direct refinement technologies*, where multiple participants refine and edit a codified document directly. The second is *indirect refinement technologies,* where participants refine the document indirectly by providing feedback to the author. The author then integrates the feedback and makes improvement to the knowledge object accordingly.

Direct refinement e-collaboration tools are exemplified by the wiki technology (Leuf & Cunningham, 2001). The best-known and most successful e-collaboration project using the wiki technology is Wikipedia (Wikipedia, n.d.), an online encyclopedia that allows anyone to edit the content. Wiki allows people from different functional, expertise, and cultural backgrounds to directly refine codified knowledge. Although wiki supports communication among users through the discussion threads behind the scene, for most documents users are allowed to directly modify the content without communication. For those documents, all users have the same role in refining knowledge quality, regardless of whether they are domain experts or not.

Indirect refinement tools for e-collaboration are widespread. SWoRD (Cho & Schunn, 2007) is a distributed system that allows non-expert reviewers to anonymously evaluate and comment on codified documents. These evaluations then help the authors improve document quality. Because the reviewers only provide feedback on the document, and do not directly edit the content, this approach to refinement is indirect. Indirect refinement using SWoRD has proven to be effective in terms of increasing document quality and creativity, especially if the reviewers are peers of the target knowledge users (Cho, Chung, King, & Schunn, 2006). Tools that support indirect refinement must also scaffold refinement process.