Chapter 134
The Role of Information and Communication Technologies in Knowledge Management:
A Classification of Knowledge Management Systems[1]

Irma Becerra-Fernandez
Florida International University, USA

Rajiv Sabherwal
University of Missouri-St. Louis, USA

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INTRODUCTION

Rapid changes in the field of KM have to a great extent resulted from the dramatic progress we have witnessed in the field of information and communication technology (ICT). ICT allows the movement of information at increasing speeds and efficiencies, and thus facilitates sharing as well as accelerated growth of knowledge. For example, computers capture data from measurements of natural phenomena, and then quickly manipulate the data to better understand the phenomena it represents. Increased computer power at lower prices enables the measurement of increasingly complex processes, which we possibly could only imagine before. Thus, ICT has provided a major impetus for enabling the implementation of KM applications. Moreover, as learning has accrued over time in the area of social and structural mechanisms, such as mentoring and retreats that enable effective knowledge sharing, it has made it possible to develop KM applications that best leverage these improved mechanisms by deploying sophisticated technologies.

In this article we focus on the applications that result from the use of the latest technologies used to support **KM mechanisms**. Knowledge Management mechanisms are organizational or structural means used to promote KM (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004). The

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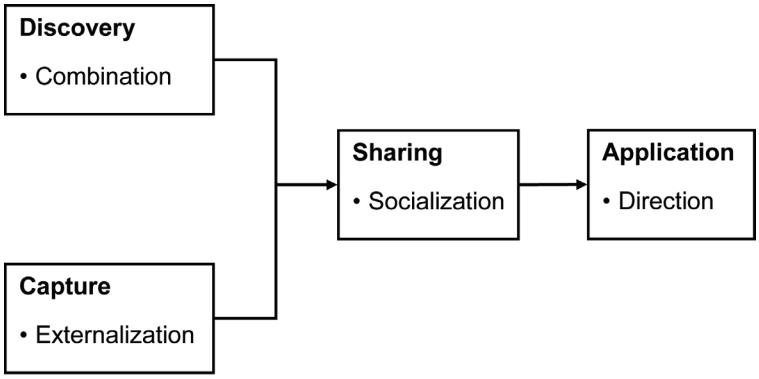
Figure 1. KM processes



use of leading edge ICT (e.g., Web-based conferencing) to support KM mechanisms in ways not earlier possible (e.g., interactive conversations along with instantaneous exchange of voluminous documents among individuals located at remote locations) enables dramatic improvement in KM. We call the applications resulting from such synergy between the latest technologies and social/structural mechanisms as ***knowledge management systems***. We discuss the topic of KM systems in detail in the next sections.

BACKGROUND

We describe the variety of possible activities involved in KM as broadly intending to: (1) discover new knowledge, (2) capture existing knowledge, (3) share knowledge with others, or (4) apply knowledge. Thus KM relies on four kinds of **KM processes**, as depicted in Figure 1 (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004). These include the processes through which knowledge is discovered or captured. It also includes the processes through which this knowledge is shared and applied. These four KM processes are supported by a set of seven **KM sub-processes**, as shown in Figure 1, with one sub-process – socialization – supporting two KM processes (discovery and sharing).

Polanyi's (1967) distinction between explicit and tacit is at the heart of most KM papers, these constructs follow in that explicit knowledge is 'knowledge about' and tacit knowledge is associated with experience. Nonaka identified four ways of managing knowledge: *combination, socialization, externalization, and internalization*. Of the seven KM sub-processes presented in Figure 1, four are based on Nonaka (1994); focusing on the ways in which knowledge is shared through the interaction between tacit and explicit knowledge. New explicit knowledge is discovered through *combination*, wherein the multiple bodies of explicit knowledge (and/or data and/or information) are synthesized to create new, more complex sets of explicit knowledge. Therefore, by combining, reconfiguring, re-categorizing and re-contextualizing existing explicit knowledge, data, and information, new explicit knowledge is produced. In the case of tacit knowledge, the integration of multiple streams for the creation of new knowledge occurs through the mechanism of *socialization*. Socialization is the synthesis of tacit knowledge across individuals, usually through joint activities rather than written or verbal instructions. *Externalization* involves converting tacit knowledge into explicit forms such as words, concepts, visuals, or figurative language (e.g., metaphors, analogies, and narratives) (Nonaka & Takeuchi, 1995). It helps translate individuals' tacit knowl-