# 1 Introducing Knowledge Management

The scientific endeavor that culminated on July 20, 1969, with the first American walking on the moon is considered one of the most significant accomplishments in the history of humankind. What is especially noteworthy about this undertaking is that when President John F. Kennedy issued the promise in 1961 that the United States would land a man on the Moon and return him safely to Earth before the end of that decade, most of the scientific and technological knowledge required to take this "one small step for man, one giant leap for mankind" did not exist. The necessary science and technology knowledge had to be discovered and developed in order to accomplish this extraordinary task. However, many of those technological advances now have permanent presence in the landscape of our lives, from cordless tools to cellular phones. These first missions to space carried less computer power on board than what some of us typically lug around airports on our portable computers. The computers on board Apollo 11, considered "state-of-the-art" in the 1960s, had 4 KB of RAM, no disk drive, and a total of 74 KB of auxiliary memory! From the knowledge management (KM) perspective, how did they manage the extraordinary quantities of knowledge that had to be developed in order to accomplish the task? The required knowledge about space travel, rocketry, aerodynamics, control systems, communications, biology, and many other disciplines had to be developed and validated prior to being used in the space mission. From the knowledge creation perspective, this was an extraordinarily successful endeavor. On the other hand, a closer look reveals that attempts to elicit and capture the knowledge resulting from these efforts may have been largely unsuccessful, and some studies even suggest that NASA may have actually lost that knowledge. In fact, in the words of Sylvia Fries, who was NASA's chief historian between 1983 and 1990 and who interviewed 51 NASA engineers who had worked on the Apollo program:

> The 20th anniversary of the landing of an American on the surface of the Moon occasioned many bittersweet reflections. Sweet was the celebration of the historic event itself. . . . Bitter, for those same enthusiasts, was the knowledge that during the twenty intervening years much of the national consensus that launched this country on its first lunar adventure had evaporated . . . a generation of men and women who had defined their lives to a large extent in terms of this nation's epochal departure from Earth's surface was taking its leave of the program they had built (Fries 1992).

In this book, we hope to impart what we know about the important field of knowledge management—what it is and how to implement it successfully with the tools provided by the technological advances of our times. The book presents a balanced discussion between theory and application of knowledge management to organizations. The reader will find an overview of knowledge management theory and implementation, with a special emphasis on the technologies that underpin knowledge management and how to successfully integrate those technologies. The book includes implementation details about both knowledge management mechanisms and technologies.

In this chapter, we first discuss what knowledge management is and what the forces are that drive it. We also discuss organizational issues related to knowledge management. Specifically, we introduce knowledge management systems and their roles in the organization. Finally, we discuss how the rest of the book is organized.

## WHAT IS KNOWLEDGE MANAGEMENT?

**Knowledge management (KM)** may simply be defined as *doing what is needed to get the most out of knowledge resources.* Although KM can be applied to individuals, it has recently attracted the attention of organizations. KM is viewed as an increasingly important discipline that promotes the creation, sharing, and leveraging of the corporation's knowledge. Peter Drucker (1994), whom many consider the father of KM, best defines the need for it:

> Knowledge has become the key resource, for a nation's military strength as well as for its economic strength . . . is fundamentally different from the traditional key resources of the economist—land, labor, and even capital . . . we need systematic work on the quality of knowledge and the productivity of knowledge . . . the performance capacity, if not the survival, of any organization in the knowledge society will come increasingly to depend on those two factors (pp. 66–69).

Thus, it can be argued that the most vital resource of today's enterprise is the collective knowledge residing in the minds of an organization's employees, customers, and vendors. Learning how to manage organizational knowledge has many benefits, some of which are readily apparent, others not. These benefits may include leveraging core business competencies, accelerating innovation and time-to-market, improving cycle times and decision-making, strengthening organizational commitment, and building sustainable competitive advantage (Davenport and Prusak, 1998). In short, they make the organization better suited to compete successfully in a much more demanding environment. Organizations are increasingly valued for their intellectual capital. An example of this fact is the widening gap between corporate balance sheets and investors' estimation of corporate worth. It is said that knowledge-intensive companies around the world are valued at three to eight times their financial capital. Consider for example Microsoft Corporation, the highest-valued company in the world, with a market capitalization that was estimated at around $282 billion as of April 2007. Clearly, this figure represents more than Microsoft's net worth in buildings, computers,

and other physical assets. Microsoft's valuation also represents an estimation of its **intellectual assets**. This includes structural capital in the form of copyrights, customer databases, and business-process software. Added to that is human capital in the form of the knowledge that resides in the minds of all of Microsoft's software developers, researchers, academic collaborators, and business managers.

In general, KM focuses on organizing and making available important knowledge, wherever and whenever it is needed. The traditional emphasis in KM has been on knowledge that is recognized and already articulated in some form. This includes knowledge about processes, procedures, intellectual property, documented best practices, forecasts, lessons learned, and solutions to recurring problems. Increasingly, KM has also focused on managing important knowledge that may reside solely in the minds of organizations' experts.

Consider, for example, the knowledge of the Shuttle Processing Director at NASA-Kennedy Space Center (KSC). By 1999, the Shuttle Processing Director at NASA had been supervising shuttle launches for twenty years and had supervised each of the shuttle launches until its lift-off (Becerra-Fernandez and Sabherwal 2005). During the countdown, he was responsible for making the final call if an anomaly justified calling off the mission. As Shuttle Processing Director, he depended on his experience in order to weigh the severity of the problem and decide on the spot if indeed it required stopping the mission. A decision to stop the launch could cost the organization millions of dollars, but on the other hand it could save lives—a priceless alternative. With retirement looming, how can an organization like NASA KSC elicit and catalog this person's knowledge so that new generations may benefit?

KM is also related to the concept of **intellectual capital**, which is considered by many as the most valuable enterprise resource. An organization's intellectual capital refers to the sum of all its knowledge resources, which exist in aspects within or outside the organization (Nahapiet and Ghoshal 1998). There are three types of intellectual capital: human capital, or the knowledge, skills, and capabilities possessed by individual employees; organizational capital, or the institutionalized knowledge and codified experience residing in databases, manuals, culture, systems, structures, and processes; and social capital, or the knowledge embedded in relationships and interactions among individuals (Subramaniam and Youndt 2005).

## FORCES DRIVING KNOWLEDGE MANAGEMENT

Today, organizations rely on their decisionmakers to make "mission critical" decisions based on inputs from multiple domains. The ideal decisionmaker possesses a profound understanding of specific domains that influence the decision-making process, coupled with the experience that allows her to act quickly and decisively on the information. This profile of the ideal decisionmaker usually corresponds to someone who has lengthy experience and insights gained from years of observation. Although this profile does not mark a significant departure from the past, the following four underlying trends are increasing the stakes in the decision-making scenario:

## 1. Increasing Domain Complexity

The complexity of the underlying knowledge domains is increasing. As a direct consequence, the complexity of the knowledge required to complete a specific business process task has increased as well. Intricacy of internal and external processes, increased competition, and the rapid advancement of technology all contribute to increasing domain complexity. For example, new product development no longer requires only brainstorming sessions by the freethinking product designers of the organization, but instead it requires the partnership of interorganizational teams representing various functional subunits—from finance to marketing to engineering. Thus, we see an increased emphasis from professional recruiters around the world seeking new job applicants who not only possess excellent educational and professional qualifications, but who also have outstanding communication and team-collaboration skills. These skills will enable them to share their knowledge for the benefit of the organization.

## 2. Accelerating Market Volatility

The pace of change, or volatility, within each market domain has increased rapidly in the past decade. For example, market and environmental influences can result in overnight changes in an organization. Corporate announcements of a missed financial quarterly target could send a company's capitalization, and perhaps that of a whole industry, in a downward spiral. Stock prices on Wall Street have become increasingly volatile in the past few years resulting in the phenomenon of day trading, where many nonfinancial professionals make a living from taking advantage of the steep market fluctuations.

## 3. Intensified Speed of Responsiveness

The time required to take action based upon subtle changes within and across domains is decreasing. The rapid advance in technology continually changes the decision-making landscape, making it imperative that decisions be made and implemented quickly, lest the window of opportunity closes. For example, in the past, the sales process incorporated ample processing time, thus allowing the stakeholders a "comfort zone" in the decision-making process. Typically in response to a customer-request, the sales representative would return to the office, discuss the opportunity with his manager, draft a proposal, and mail the proposal to the client, who would then accept or reject the offer. The time required by the process would essentially provide the stakeholders sufficient time to ponder the most adequate solution at each of the decision points. Contrast yesterday's sale process with today's, like for example the process required by many online bidding marketplaces thriving on the Web. Consider the dilemma faced by a hotel manager that participates in an Internet auctioning market of hotel rooms: "Should I book a $200 room for the bid offer of $80 and fill the room or risk not accepting the bid hoping to get a walk-in customer that will pay the $200?" Confronted with a decision to fill a room at a lower rate than what the hotel typically advertises poses an important decision that the hotel manager must make within minutes of a bid offer.

## 4. Employee Turnover

Organizations continue to face employee turnover due to voluntary (i.e., decided by the employee, for example, due to opportunities for career advancement) as well as involuntary (i.e., for reasons beyond the employee's control, such as health-related problems and termination of employment by the employer). Employee turnover is especially important in tough economic conditions such as those being faced in the 2008 to 2009 period, when several large companies laid off large numbers of employees. Such employee turnover inevitably leads to the organization losing some of the knowledge possessed by the departing individuals. Moreover, in some cases these individuals might have knowledge that would be valuable to competitors. According to Kenny (2007), "As staff leave, retraining is necessary. This strains company resources and hinders growth. Replacing a full-time, private-sector worker costs, at a bare minimum, 25 percent of his or her total annual compensation, estimates the Employment Policy Foundation. Productivity nosedives, ultimately cutting into profitability."

So, what does this mean? Faced with increased complexity, market volatility, accelerated responsiveness, and employee turnover, today's manager feels less adequate to make the difficult decisions faced each day. In the decision-making scenario described above, it is evident that knowledge can greatly assist the decisionmaker. In the past, this knowledge resided mostly in the decisionmaker. The complications seen above indicate that in modern organizations, the knowledge necessary to make good decisions cannot possibly all reside with the decisionmaker, hence the need to provide her with the requisite knowledge for making correct, timely decisions.

Perhaps nothing has made more evident the need for KM than the corporate **downsizing** trend at public and private organizations that marked the re-engineering era of the 1990s, a well-known feature of the economic landscape of the late twentieth century. The dominant driver of downsizing in most organizations is well understood: Rapidly reduce costs in order to survive against competitors. Clearly, a negative side effect of downsizing is the dissipation of the knowledge resources, resulting in devitalized organizations. Some of the symptoms of such organizations are: decreased morale, reduced commitment, inferior quality, lack of teamwork, lower productivity, and lost of innovative ability (Eisenberg 1997). The fact is, many individuals who were laid off as a result of downsizing had performed significant tasks and had acquired considerable and valuable skills over the years. Many companies are typically not prepared for downsizing, and few take any steps to prevent the escape of knowledge that usually follows. To minimize the impact of downsizing, organizations should first identify what skills and information resources will be needed to meet **mission-critical objectives**. Therefore, effective **methodologies**, including tools and techniques to capture vital knowledge, are essential for an organization to maintain its competitive edge.

KM is important for organizations that continually face downsizing or a high turnover percentage due to the nature of the industry. It is also important for all organizations since today's decisionmaker faces the pressure to make better and faster decisions in an environment characterized by a high domain complexity and market volatility, even