

1 Introduction and overview

In an information economy, organizations compete on the basis of their ability to acquire, manipulate, interpret and use information effectively.

(McGee and Prusak 1993, p. 1)

While we will consider various knowledge transfer issues and strategies . . . many of them come down to finding effective ways to let people talk and listen to one another.

(Davenport and Prusak 1998, p. 88)

Building competitive advantage involves creating and acquiring new knowledge, disseminating it to appropriate parts of the firm, interpreting and integrating it with the existing knowledge and ultimately using it to achieve superior performance . . .

(Turner and Makhija 2006, p. 197)

The grand challenge is knowing what to deliver to whom using what mode when and how quickly.

(Satyadas, Harigopal, and Cassaigne 2001, p. 436)

The information context of the modern organization is rapidly evolving. Information technologies, including data bases, new telecommunications systems, and software for synthesizing information, make a vast array of information available to an ever expanding number of organizational members. Management's exclusive control over knowledge is steadily declining, in part because of the downsizing of organizations and the decline of the number of layers in organizational hierarchies. These trends make our understanding of informal communication networks, particularly those focusing on interpersonal relationships, the human side of knowledge management (KM), increasingly critical for understanding organizations. Knowledge is inherently social, with knowledge networks (KN) linked to innovation, learning, and performance (Swan 2003).

These trends have resulted in quicker response times and reduced coordination and relay costs because of the linkages that have been removed from the hierarchy. They are made possible by advances in information technology (IT). They put increasing responsibility on individuals to become active seekers, rather than passive recipients, of information, especially for decision support and problem solving. For technical and managerial positions, those most adept at identifying sources of information, who can then acquire and synthesize it, will be the most successful in these new organizational environments. KN have become a critical survival tool for individuals, facilitating uncertainty management, social

support, and, ultimately, advancement in careers. Those who have the appropriate synthetic abilities and information-seeking skills are likely to be more satisfied and productive, the targets of active recruitment and retention efforts.

Not too long ago, knowledge in organizations was the exclusive preserve of management. Still today, in many organizations, it is kept from people. In part, organizations are designed to encourage ignorance through specialization and rigid segmentation of effort (Kanter 1983). So there is a constant dilemma for organizations: the imperative, in part stemming from efficiency needs, to limit the availability of information, and the recognition that structural designs are flawed and circumstances change, requiring individuals to seek information normally unavailable to them. How these conflicting imperatives are resolved is a critical question for the contemporary organization and, perhaps, the central challenge for its management. Unfortunately, while volumes have been written on formal organizational design, comparatively little is known about the forces that shape the development of knowledge within organizations. The comfortable world where one's supervisor provided authoritative directives concerning organizational activities is changing to one where organizational members must make quick, informed decisions about how goals should be accomplished.

While "Man's very survival depends on paying attention to aspects of the environment that change" (Darnell 1972, p. 61), individuals have free access to an often bewildering wealth of information. They have to choose between a variety of information sources. There are literally millions of articles published every year in the organizational and technical literature, making it nearly impossible for even the most dedicated individual to keep abreast of recent advances. For example, it has been calculated that physicians need to read an average of nineteen original articles each day to keep abreast of their fields (Choi 2005). This overload of information forces decentralization of effort, with increasing responsibility passing to individuals, and organizational effectiveness being determined by their ability to gather and then act intelligently on information.

In effect, lower-level employees must often do the traditional work of management, who cannot possibly keep up with the in-depth information related to specific technical issues. Baldrige award winning companies recognize this in their total quality efforts, believing that empowering workers to solve problems is critical to their success (Hanson, Porterfield, and Ames 1995). In fact, managers are increasingly irrelevant to the information-seeking concerns of technical employees whom they supervise, because they lack the requisite technical knowledge. Recognition of the limits of management and other sources also requires individuals to confirm and corroborate information by using multiple sources, thereby creating complex KN.

Actors operate in information fields where they recurrently process resources and information. These fields operate much like markets where individuals make choices (often based on only incomplete information, often irrationally) that determine how they will act. This contrasts directly with formal approaches to organizations that tend to view the world as rational, known, and that

Table 1.1. *Formal and informal approaches and knowledge network concepts*

Knowledge network concept	Approach	
	Formal	Informal
Knowledge	Uniform	Contextual
Knowledge flow	Top-down	Multidirectional
Knowledge type	Explicit	Tacit
Design	Road map	Incomplete
Technology	Paper system	Digital
Dominant relational factor	Authority	Trust
Individual roles	Manager	Brokers
Who benefits?	System	Individual

concentrate on controlling individuals to seek values of efficiency and effectiveness, particularly regarding the timeliness of decision making (see Table 1.1).

In spite of (or maybe because of) the abundance of available information, organizational members' lack of knowledge about important issues is a significant problem confronting organizations. There is a growing recognition that information channels used by management can be easily avoided by certain groups, since they are not as captive an audience as they once were. As we shall see, the forces preserving ignorance may be far more compelling than those resulting in knowledge acquisition.

Most treatments of KN focus on their many benefits; yet, it can be viewed as having many negative consequences. Most threatening to management is their loss of control, since knowledge may be inherently destabilizing. Enhanced information seeking for one group in the organization also increases the possibility of collusion between members of informal coalitions, to the detriment of other organizational members, much as occurs with classic insider trading in financial markets.

The more control that managers have, the less effective their organizations may ultimately be, especially in terms of obtaining the critical answers that they need for pressing questions. Kanter (1983) has argued that a major barrier to innovation in American organizations comes from a narrow focus on departmental/unit/division concerns. Imbalances in the distribution of information in organizations are a key consequence of this differentiation which often benefits the interests of individuals in privileged or specialist positions (Moore and Tumin 1949). Organizational power structures, particularly management, reap benefits from hoarding information, since it is widely thought that information is power.

Segmented concern, as opposed to a concern for the good of the entire organization, is a direct result of the differentiation of the organization into specialized groupings that focus on particular tasks. In the classic formal organization, substantial barriers arise to the integration of organizational effort. This effect is often

related to the development of silos or chimneys around different organizational functions. These barriers include informal rules that discourage individuals from developing cross-unit relationships. But these relationships are the most critical ones for innovation since they are the vehicles for sharing information and perspectives. Diverse perspectives result in the development of synthetic ideas and approaches that are holistic and concerned with the overall organization and new directions for it.

On the other hand, with their increasing responsibility, there is also an increasing burden on individuals. It may be unfair to make employees responsible for every aspect of their performance, especially in these highly uncertain times. In this new era, individuals must confront the world very much as a scientist, constructing practical theories upon which they must act. This may be establishing a set of expectations that only the best educated can achieve. Will people make the right choices; do they know enough to weigh and decide between the often conflicting pieces of information they will receive? Human beings are far from optimal information seekers, and, while information is a multiplying resource, attention, by implication, is a zero-sum resource.

All of this also raises the question of whose information is it anyway? Knowledge that to an employee is necessary for the accomplishment of his/her job, may be seen by management as an intrusion into its prerogatives. In addition, the same piece of information may be irrelevant to one organizational member who has it, but critical to another who does not.

Knowledge

Increasingly, generating and manipulating knowledge is seen as a core function of our economy, the “only sustainable way for organizations to create value and profitability in the longer term” (MacMorrow 2001, p. 381). Managers who possess the judgment to act quickly to solve the various dilemmas associated with KN and develop approaches that best facilitate knowledge creation and transfer, resulting in continuous innovation, will have substantial competitive advantages over their fellows (Real, Leal, and Roldan 2006). Of course, in commercial settings this is not done for altruistic purposes, but to insure competitive advantage for the firm (Stewart 2001). In government and non-profit organizations the motives may be slightly different: enhanced prestige and better services for clients, as well as reacting to demands of stakeholders (Eisenberg, Murphy, and Andrews 1998). So we are often forced to ask the more functional question of KM to what end: be it fostering creativity, enabling innovation, or increasing competencies (MacMorrow 2001). As we shall see, the answer to this question is often quite complex, with multiple purposes, often representing different groups, simultaneously at play.

In Chapter 2 I will explore knowledge as a concept and its various manifestations in great detail. I will also trace its relationship to various other concepts

including data, information, and wisdom. I will contrast it to ignorance, which as we have seen is often encouraged in organizations for very sound reasons. Most of the recent excitement surrounding knowledge in organizations is associated with its management. KM has been loosely applied to a collection of organizational practices related to generating, capturing, storing, disseminating, and applying knowledge. KM can be viewed as a system for processing information. It is strongly related to IT, organizational learning, intellectual capital, adaptive change, identification of information needs, development of information products, and decision support, so intimately that it is often difficult to say where one approach stops and another begins.

In many ways KM can be viewed as an innovation that is rapidly diffusing among organizations. It also falls in a class of meta-innovations that enable other innovations to occur in an organization. Indeed, the pursuit of KM often is based on the premise that it will lead to better decision making and a flourishing of creative approaches to organizational problems. So, the ultimate outcome of effective KM is the rapid adoption or creation of appropriate innovations that can be successfully implemented within a particular organization's context. Greater knowledge intensity leads to greater profitability for commercial firms and higher levels of innovation. Ultimately, knowledge has become the source of wealth creation and economic growth (Florida and Cohen 1999; Leonard 1995; Stewart 2001).

Network analysis

Knowledge is also inherently a social phenomenon that develops from complex communicative interactions in social structures. Communication structure research, which encompasses hierarchies, markets, and networks, has been traditionally viewed as a central area of organizational communication theory. There are many different approaches to communication structure. The two used most frequently to analyze organizational communication systems are the formal approach, the primary focus of most traditional KM, and the informal approaches, especially network analysis, that I will focus on here. An organization's communication structure consists of both formal and informal elements, as well as other ingredients, and is not reducible to either (March and Simon 1958). However, to most organizational researchers this fundamental distinction captures two different worlds within the organization, worlds that have different premises and outlooks and, most importantly, different fundamental assumptions about the nature of interaction. These differences are highlighted in Table 1.1 and will be elucidated in more detail throughout this work.

Informal approaches recognize that a variety of needs, including social and individual ones, underlie communication in organizations and that, as a result, the actual communication relationships in an organization may be less formally rational than designed systems (Johnson 1993). Informal structures function to

facilitate communication, maintain cohesiveness in the organization as a whole, and maintain a sense of personal integrity or autonomy. KN are increasingly the means by which knowledge is diffused, disseminated, and created. They reveal how people actually go about seeking information, how it is distributed, and how people collaborate to create new knowledge.

In contrast to the paper system and rules technology of classic formal approaches, Nohria and Eccles (1992) suggested that several factors related to new technologies make entirely new organizational forms, such as networked organizations, possible. First, IT increases the possibilities for control and decreases the need for vertical processing (e.g., condensation) of information. Second, new technologies facilitate communications across time and space. Third, they increase external communication, thus blurring traditional lines of authority within the firm. Fourth, IT enhances flexibility within the firm by decreasing the reliance on particular individuals for specialized information. Electronic markets, which we will describe in more detail in Chapter 4, are increasingly the means by which industries collaborate to translate knowledge into action.

Network analysis represents a systematic means of examining the overall configuration of relationships, both formal and informal, within an organization. The most common form of graphic portrayal of networks contains nodes, which represent social units (e.g., individuals, groups), and relationships, often measured by the communication channel used to express them, of various sorts between them. Because of its generality, network analysis is used by almost every social science to study specific problems. It has become the preferred mode for representing informal, emergent communication and associated information flows.

Recent years have seen a resurgence of interest in network analysis in the social sciences and even in the natural sciences (Newman, Barabasi, and Watts 2006), in part because of the development of such heuristic concepts as social capital and structural holes. Social networking, Web 2.0, and other collaborative technologies are viewed as a key feature of modern business approaches to how knowledge spreads within a company (Cross, Parker, and Sasson 2003; Mead 2001; Waters 2004). Some theorists (Contractor and Monge 2002) have begun to talk about the essential characteristics of KN and these networks are seen as a critical element of KM. They provide the foundation of social capital that enables the sharing and exchange of intellectual capital (Nahapiet and Ghosal 1998). Ultimately, an understanding of KN is a fundamental step for truly moving beyond IT and hardware to understanding the deeper, more social side of knowledge.

Plan of the book

The first part of this book focuses on the fundamentals, establishing a foundation for our understanding of the remainder of this work. In Chapter 2 I will define knowledge, distinguishing it from such common terms as information and wisdom. This chapter will also talk about the various forms that knowledge

can take within organizations, critical distinctions that can be used in defining network linkages. Chapter 3 focuses on the burgeoning field of network analysis. It will describe how such basic concepts as entities, linkage, and boundaries can be used to build ever more sophisticated analyses of cliques, centralization, and integration, which are critical to understanding the transfer and diffusion of knowledge within organizations.

The next part focuses on the contexts within which knowledge is embedded. As Chapter 4 details, contexts shape and define knowledge, determining its distribution and the ways that people can be linked in organizations. Chapter 5 focuses on the the basic framework of an organization, its formal structure, and design issues that promote or inhibit the flow of knowledge. Much of the current excitement related to KN flows from new information and telecommunications technology which I will detail in Chapter 6. Chapter 7 dwells on spatial distributions that constrain the spread of knowledge. Organizational boundaries are becoming increasingly blurred, so in Chapter 8 we will focus on how firms bring the world outside into the organization through boundary spanning and the development of consortia.

The final part focuses on using knowledge and the pragmatic outcomes and policy issues associated with it. Chapter 9 develops a perspective on the role of KN in the critical organizational processes of creativity and innovation. Chapter 10 details the role of KN in productivity, efficiency, and effectiveness. We then turn to the related topics of the human and the dark side of KN. How people find knowledge and then use it for decision making are the subjects of Chapters 12 and 13 respectively. Finally, I sum up this work in Chapter 14 by focusing on policy issues, the importance of managerial judgment in dealing with KN dilemmas and paradoxes, and the future of KN in organizations.

Further reading

Choo, C. W. 2006. *The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge, and Make Decisions*, 2nd edn. Oxford University Press.

Textbook description of knowledge in organizations. However, it touches only tangentially and very indirectly on KN.

Davenport, T. H., and Prusak, L. 1998. *Working Knowledge: How Organizations Manage What They Know*. Harvard Business School Press.

One of the first popular book-length treatments of the management of knowledge in organizations. Useful general introduction for managers, although it does not focus on the role of social networks.

Lesser, E., and Prusak, L. (eds.) 2004. *Creating Value with Knowledge: Insights from the IBM Institute for Business Value*. Oxford University Press.

Based heavily on the editors' work with the IBM Institute for Business Value and the associated Knowledge and Organizational Performance Forum, the readings in this work touch on several of the themes in this book. Especially

important is the section on social networks that contains several of Rob Cross's early studies.

McGee, J. V., and Prusak, L. 1993. *Managing Information Strategically*. Wiley.

Drawn from the author's work with the Ernst & Young Center for Information Technology and Strategy, with roots in the management information systems perspective, this book focuses on the strategic advantages for organizations of managing knowledge. Useful examinations of individual roles and information politics in organizations.

Fundamentals

2 Forms of knowledge

In this and the following chapter on network analysis I will concentrate on building a foundation for what is to follow. I start this work by defining the key concepts associated with knowledge, drawing careful distinctions between them. Needless to say these terms are at times used interchangeably and at times are taken to be quite different things in the burgeoning literature in this area. I then move on to a discussion of various classifications of types of knowledge, starting with the foundational one between tacit and explicit knowledge. These types could serve as the starting point for the definition of relationships in network analysis, the most critical move in any project relating to it. Finally, in part to serve as counterpoint but also to focus on critical dilemmas and questions of balance in organizations, to which managerial judgment must be applied, I discuss ignorance and the positive role it plays in organizations.

What is knowledge?

Knowledge runs the gamut from data, to information, to wisdom, with a variety of distinctions being made between these terms in the literature. While there is a generally recognized ordering among these terms (see Figure 2.1), with wisdom having the least coverage of any of the sets in the figure, they are often used interchangeably and in conflicting ways in the literature, resulting in some confusion (Boahene and Ditsa 2003). The increasingly limited set, or domain coverage, associated with higher-order terms also can be associated with greater personal interpretation (and resulting idiosyncratic meanings) (Boahene and Ditsa 2003) as one moves from data, a special type of information, to wisdom. This parallels the distinction between tacit and explicit knowledge and represents a progression of states (Holsapple 2003). It has also been suggested that value and meaning increase as one limits the domain coverage, and not surprisingly so does the difficulty in developing KM systems that capture the higher-order terms (Burton-Jones 1999).

Information

One of the most frequently made distinctions in the literature is that between knowledge and information. The word information is ubiquitous; it has even