Knowledge sharing in the age of the web 2.0: a social capital perspective

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ABSTRACT

Web 2.0 tools are more and more prevalent in organizational life, and this chapter identifies their multiple influences on knowledge sharing practices, as well as the main challenges of the social turn in knowledge sharing. Indeed, it is argued that social capital, a key concept from social sciences that recognizes the benefits practice derived from connections between people, also plays a role in the context of renewed (i.e. based on Web 2.0 technologies) knowledge sharing practices. Therefore, this study provides an analysis of the influence of social capital in leveraging knowledge sharing in a Web 2.0 context. Finally, using secondary data, this research details a specific case to illustrate how employees can benefit from new forms of knowledge sharing that rely on interactive tools and their social capital.

Knowledge Management (KM) has become of paramount importance for most companies as they progress from the industrial to the informational age. Growing interest in KM resulted from both the conceptualization of knowledge as a source of competitive advantage and the evolution of information systems during the 1990s. Accordingly, KM has progressed through several development phases, overcome several barriers, and arrived at using Web 2.0 tools that reflect the evolution of Information and Communication Technologies (ICT). Knowledge management encompasses several processes, including knowledge creation, diffusion, and integration, though knowledge sharing appears particularly relevant and critical to strategic aspects of business life such as project management, innovation or new product development. In a context of technological evolution, knowledge sharing also confronts several challenges: *"The tricky part isn't creating web sites to bridge distance and time zones, though they help, but finding ways to motivate proud, skilled professionals to share expertise and to cooperate to advance the frontiers of knowledge for the benefit of the shareholders and society"* (Wessel, 2005) **{AU: please provide page number of quote}**. That is, knowledge sharing is a matter of both technological tools and human interactions. Thus, the notion of social capital has emerged as a promising concept to understand knowledge sharing practices.

This chapter aims to understand how social capital influences knowledge sharing in a Web 2.0 context and to analyze interactions between social capital and Web 2.0 tools as means to leverage knowledge sharing. Accordingly, the first part of this chapter is dedicated to defining and gaining an understanding of knowledge sharing 2.0 (i.e. knowledge sharing in a Web 2.0 environment). Then, we define social capital and propose that it could be useful as a means to understand knowledge sharing practices based on Web 2.0 tools. Finally, we illustrate our findings with the experience of a French firm, Schlumberger. Thus we derive main issues, managerial implications, and direction for further research from our findings.

RENEWING KNOWLEDGE SHARING THROUGH WEB 2.0 TOOLS

The stakes of knowledge sharing

Knowledge distribution across space and time is crucial to ensure the value and development of firms' activities (Vignette 1). Such a distribution of knowledge is possible through knowledge sharing within companies, defined as "*the idea that knowledge, no matter how intangible or fuzzy, is capable of being*

disseminated, transferred, diffused, shared and distributed within and between organization, communities of practices and departments" (Kalling and Styhre, 2003, p. 57).

Vignette 1: The importance of knowledge sharing

The results from OECD surveys in Canada, Denmark, and Germany show that the primary goal and motivation for implementing knowledge management practices is to facilitate knowledge sharing. For example, 91% of German companies claimed to use knowledge management because they expected to speed up and improve their knowledge transfer. Other benefits included avoiding the same mistakes and preventing the reinvention of the wheel.

Source: OECD (2004)

Knowledge sharing largely depends on the intrinsic characteristics of the focal knowledge, such as its level of codifiability, degree of dispersion, contextualization, and accuracy. Codifiable knowledge may be explicit or tacit, though tacit knowledge is more than difficult to transfer. More explicit knowledge is easier for people to share or diffuse. By its very nature, knowledge is distributed across the organization, so knowledge sharing must overcome scattering and knowledge managers must develop tools to share knowledge in an efficient manner. Despite its benefits, knowledge sharing is often one of the most difficult steps to achieve in knowledge management, due to its stickiness (Szulanski, 1996, 2000) or given its embeddedness within individuals or contexts.

The role of information systems as means to overcome the difficulties in achieving knowledge sharing is evident (*e.g. MIS Quarterly, Special Issue on Information Technologies and Knowledge Management*, vol. 29, n°2, 2005). Many organizations have implemented ICT to provide technical support for knowledge sharing (Davenport and Prusak, 1998). Yet the use of ICT in knowledge sharing remains controversial because such support may not be obvious, and even might be counterproductive (McDermott, 1999; Kaiser et al., 2009). In particular, ICT can neither convince nor oblige employees to share their knowledge or decrease their reluctance to do so. Another controversy is rooted in users' assessment of knowledge sharing systems. Despite their popular diffusion among companies, users often express their dissatisfaction with such tools compared with other management

tools, such as the ones related to customer relationship management (Rigby and Bilodeau, 2007). For example, with the first generation of technological tools, users could access huge databases, gather data, and develop their knowledge, but they could not directly or collaboratively interact in a knowledge sharing process. Stated otherwise, Web 1.0 was about publishing, not participating.

Technological evolutions and new expectations

The shift from Web 1.0 to new collaborative tools based on Web 2.0 technologies has been significant (see O'Reilly, 2007). Web 2.0 can be defined as "*web that facilitates interactive information sharing, interoperability, user-centered design, and collaboration on the World Wide Web. A Web 2.0 site allows its users to interact with each other as contributors to the website's content, in contrast to websites where users are limited to the passive viewing of information that is provided to them. Examples of Web 2.0 include web-based communities, hosted services, web applications, social-networking sites, video-sharing sites, wikis, blogs and folksonomies* (Wikipedia, 2010).

We extend this list to include semantic widgets, tags, RSS flows, etc. Thus, Web 2.0 represents "the *business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them*" (Musser and O'Reilly, 2006**{AU: page of quote?}**). Web 2.0 is centered on users and allows them to participate directly and actively. These tools thus offer more decentralization, more transparency, and a global orientation toward social dimensions: Users add value through their collaboration. Because the tools are more flexible, easier to use, and more user-friendly, they might help reconcile knowledge users with available tools for sharing knowledge.

The people using these tools also have changed; for example, so-called Generation Y workers grew up with the Internet. Therefore, knowledge sharing tools need to offer personalization and more dynamic approaches to appeal to these young workers. The management of knowledge sharing in turn entails the management of both knowledge *per se* and the context of knowledge (which refers to the concept of Ba from Nonaka et al., 1996), as characterized by the social network. Web 2.0 tools are useful for sharing explicit knowledge through collaborative technologies such as wikis, blogs,

intranets, and so on. Moreover, they aid tacit knowledge sharing by supporting group work, communities of practice, or face-to-face collaborative work (Vignette 2).

Vignette 2: Benefits of knowledge sharing 2.0 tools: A user's perspective

Increased speed of access to knowledge	68%
Reduced communication costs	54%
Increased speed of access to internal experts	43%
Decreased travel costs	40%
Increased employee satisfaction	35%
Reduced operational costs	32%

Source: Bughin et al. (2009)

Web 2.0 tools seem to provide useful support in diffusing and sharing knowledge, though some contingencies demand questioning, in that the objective is not to eliminate former knowledge sharing tools but rather to improve their functionalities through the use of technological progress, exemplified by Web 2.0. The degree of maturity of knowledge sharing practices also may be key, because knowledge sharing depends on organizational variables such as the implementation process, the nature of work, previous experience with KM, and the organizational culture. Finally, the issue of how to assimilate knowledge based on Web 2.0 tools remains unresolved. Organizations must be aware of the buzz effect and carefully manage both mimetic phenomena and the change invoked by these new tools.

The mutation of knowledge sharing: towards knowledge sharing 2.0

The aforementioned features of Web 2.0 tools have led to several mutations in knowledge sharing practices, as listed in Table 1 and discussed next.

(1)	Change in the scope of knowledge sharing
(2)	Evolution of the knowledge manager role
(3)	Modification in knowledge structures
(4)	Modification of knowledge validity and accuracy
(5)	Evolution of the nature of knowledge sharing
(6)	Change in the role and perception of knowledge sharing tools
(7)	Modification of the temporality of knowledge projects

Table 1: The shift from knowledge sharing 1.0 to knowledge sharing 2.0

First, the scope of knowledge sharing is changing. Originally, knowledge sharing practices were implemented in a top-down approach. The use of Web 2.0 tools has changed this approach; they favor not only a bottom-up process but also transversal and interdisciplinary communication, including the emergence of collective forums, the development of communities of practice. People who use Web 2.0 tools in their daily lives can capitalize on this knowledge and transfer it to professional spheres.

Second, the role of the knowledge manager is evolving, from content manager to community or connection manager. A community manager facilitates links between people and creates the community of knowledge workers. The knowledge manager also trains people in the use of knowledge sharing tools. Then, it is legitimate to wonder who leads a knowledge sharing 2.0 initiative: stakeholders, the CEO, knowledge managers, or users?

Third, in modified knowledge structures, the useful life of knowledge is shorter and may even be superficial. Its organization is not hierarchical and appears independent from the company's organizational chart. Web 2.0 tools should help to open knowledge sharing to different services and functions and emphasize collective knowledge.

Fourth, whereas previously a knowledge manager ensured the validity, accuracy and update of knowledge databases, Web 2.0 allows the knowledge shared within a community to be validated directly by users. Therefore, this process is managed directly by the users of the knowledge.

Fifth, the nature of knowledge sharing is changing. Whereas first-generation knowledge sharing projects aimed to formalize knowledge and make it available to the largest number of users through databases, knowledge sharing 2.0 organizes around communities, driven by a common interest. Networking is as important as content management. New waves of knowledge sharing focus on users, not on their processes or activities.

Sixth, new roles and perceptions have emerged for knowledge sharing tools, whose usage is more important than the technology. The Web 2.0 tools are more user-friendly and allow for greater participation and interaction. According to Kaiser et al. (2009, p. 123), "*weblogging is fun, partly because it is not technical challenging and partly because the process invigorates people*." That is, the objective is not just to increment a database but to create social links.

Seventh, the new temporality of knowledge sharing projects means that the long process of implementation and huge investments that marked previous efforts related to knowledge sharing have been replaced by Web 2.0 tools that speed up the process and offer a cheaper technical solution.

Therefore, the arrival of Web 2.0 tools represents an important milestone in the evolution of knowledge sharing practices. It marks the shift from a logic of content management to a logic of networking management (La Tribune, 2010). However, major risks also emerge with these tools, which are more user-friendly, easier to use, and more familiar, such that they could elide the goal of knowledge sharing practices. Knowledge sharing in a Web 2.0 context thus must ensure a sufficient level of quality control with regard to knowledge accuracy and reliability. Actually, the content is often generated by the most enthusiastic users, not the most experienced. Therefore, knowledge communities require careful usage and automatic regulation, though most rules and norms are produced by the users themselves. It can be difficult to find the right balance between the technological and social perspectives of knowledge sharing, and knowledge sharing might suffer from too much trust in technical tools (McDermott, 1999).

In this scenario, social relations become increasingly important for knowledge sharing issues. Boughzala (2008) notes that knowledge communities represent key resources for modern companies, and that such communities are supported mainly by social capital through its structural, relational and cognitive dimensions. In addition, the motivation to share knowledge is a critical factor for the successful implementation of ICTs in knowledge sharing (Ardichvili et al., 2003; Kaiser et al., 2009). Such motivation could depend on the features of the people engaged in the activities (e.g., age, culture, social status), on their sense of belonging to a community, or on potential enhancement of their reputation among peers. We propose that Web 2.0 tools, no matter how useful they may seem for knowledge sharing on their own, need to be supported and reinforced by social capital.

RETHINKING KNOWLEDGE SHARING 2.0 IN TERMS OF SOCIAL CAPITAL

Social capital theory, a focus on social networks in organizations

The concept of social capital has been well developed and widely mobilized. Historically, anthropologists used it to study the nuclear family, individuals in social communities, or collective action. It also is popular among sociologists and economists (Vignette 3).

Vignette 3: Four illustrations of social capital in social sciences

a. On the wholesale diamond market of New York, strong social ties permit high levels of trust among merchants, making expensive security measures unnecessary.

b. Korean students' activism and clandestine "study circles" in the 1980s reflected their hometown or church ties, which created an extra layer of trust.

c. The increased feeling of security among parents in Jerusalem, compared with those in any U.S. city, is a consequence of the social norm that people watch out for one another's children.

d. A complex system of reciprocity and obligations among merchants in the Kahn El Khalili market in Cairo is based on proprietorship and family stability.Source: Bughin et al. (2009)

Source: Coleman (1988)

Organizational behavior and business contexts also have become significant fields of study focused on social capital. Batt (2008, p. 487) summarizes its emergence as an important theoretical framework in management: "*Bourdieu (1986) explored the concept of social capital in discussing social interactions, while Granovetter (1985) identified the role of social capital within embedded social networks. However, it was the work of Coleman (1990) and Putnam (1995) who are most responsible for the renewed interest in social capital as a means to moderate the behavior of individuals within society and exchange transactions"*.

Management literature also has started to apply this concept to achieve several different purposes. For example, social capital is associated with existing management topics, such as value delivery (Adler and Kwon 2002), firm performance (Batjargal, 2003), entrepreneurial network growth (Liao and Welsch, 2003), or intellectual capital and learning (Nahapiet and Ghoshal, 1998). Social capital can

support innovative activity at an organizational level (Kaasa, 2009), influence strategic choice at the firm level (Houghton et al., 2009), and contribute to buyer performance at the individual level (Lawson et al., 2008). Accordingly, it is regarded more and more as a requisite precondition of effective organizational behavior, such that it "acts as the fluid that enables the knowledge-intensive organization" (Kianto and Waajakoski, 2010, p. 5).

Defining social capital

Adler and Kwon (2002) review social capital literature and find no single, widely accepted definition. They consider it "*the goodwill available to individuals or groups. Its source lies in the structure and content of the actor's social relations. Its effects flow from the information, influence and solidarity it makes available to the actor*" (Adler and Kwon, 2002, p. 23). Nahapiet and Ghoshal (1998, p. 243) define social capital as "*the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit*." Therefore, social capital includes both the network and the outcomes it generates. Kianto and Waajakoski (2010, p. 6) indicate that "*social capital deals with how whom we know benefits what we do*," such that they distinguish social capital from other forms of capital because it requires maintenance (interpersonal connections can deteriorate), does not depreciate with use (but rather is often strengthened by use), is a jointly owned resource, and offers consequences that can be analyzed as either positive or negative.

Three dimensions of social capital

Nahapiet and Ghoshal (1998) provided a key step forward in the empirical study of social capital when they conceptualized it as a multidimensional construct with three distinct and complementary dimensions: structural, cognitive, and relational. They thus offer a conclusive operationalization of the concept and demonstrate its relevance in understanding knowledge sharing. The structural dimension refers to connections between actors, their links, their network, and the density and hierarchical nature of that structure, which implies that "*Structural social capital can be conceptualized as the overall pattern of relationships among social actors*" (Yang and Farn, 2009, p. 211). The relational dimension describes the types of relationships among people, which can be characterized by trust or respect—that is, expected behaviors—and implies that "*The relational dimension is associated with building trust;*

developing norms for interaction; setting expectations and obligations of its members; and creating a distinctive identity of the community with which members associate" (Sherif et al., 2006, p. 797). Finally, the cognitive dimension refers to resources such as shared representation and interpretation, and a common language among people. Interactions facilitate the development of a common sensemaking (with a shared language for example)., which prompts Yang and Farn (2009, p. 211) to define cognitive social capital as "*the common understanding among social actors through shared language and narratives. It is embodied in attributes such as shared vision or shared value that facilitates individual and collective actions and common understanding of proper actions and collective goals*." We adopt this multidimensional construct when further studying the relations between social capital and knowledge sharing.

Social capital and the challenges of knowledge sharing 2.0

Knowledge sharing and social capital have much in common, beginning with their reliance on people's ties, people's motivations, and community thinking. Several empirical investigations consider the influence of social capital on knowledge sharing (for a review, see Chow and Chan, 2008). With rare exceptions, proof of the positive relationship between social capital and knowledge sharing relies on qualitative or quantitative methods, in multiple contexts such as managerial work (Chow and Chan, 2008) or virtual communities (Chiu et al., 2006).

Cabrera and Cabrera (2005) also explain how the three dimensions of social capital help leverage knowledge sharing. They hold that the structural and cognitive dimensions of social capital "*determine whether or not individuals have the opportunity to share their knowledge with others. The opportunity to share is increased when individuals spend more time together, not only because increased interaction leads to more frequent communication, but also because communication is more effective due to the fact that these interactions also result in a shared language and codes*," whereas the relational dimension of social capital *"influences whether or not individuals have the motivation to share what they know with each others. Although the opportunity to share may exist, an individual may not be willing to share"* (Cabrera and Cabrera, 2005, p. 722).

Yet social capital also may be *"a double-edged sword, which can both facilitate and hinder knowledge sharing within a group*" (Yang and Farn, 2009, p. 216). For example, phenomena such as

inertia in highly cohesive relations or corruption and in-group favoritism can decrease creativity and innovation (Kianto and Waajakoski, 2010). Several studies highlight that social capital may risk support for organizational routines, which inhibits knowledge creation (Edelman et al., 2004; Leonard-Barton, 1995). Most research suggests, however, that the advantages outweigh the disadvantages.

Because Web 2.0 tools favor online interactive relationships and help renew knowledge practices, we explore the interplay between social capital and knowledge sharing 2.0. That is, the connections between "offline" social capital and "online" social networks appear obvious but actually require precise analysis. For example, social capital may help reduce cultural distance through its cognitive dimension, such that it can overcome a major barrier to online knowledge sharing within or outside companies. Thus, tools alone can't help, but they must be exploited in a social context that can enable online behaviors. The offline and online practices meld, as they are enacted by the same person. We propose to specifically analyze the role of social capital in knowledge sharing 2.0 through the lenses of the three dimensions of social capital: social, relational, and cognitive (Table 2).

	Social perspective	Social perspective of knowledge sharing	Social perspective of knowledge sharing 2.0
	Social capital	**Social capital and the process of knowledge sharing**	**Social capital and the process of knowledge sharing using Web 2.0 tools**
Structural dimension	Structural dimension of social capital describes the **frequency of connections** between people	Structural dimension grants **opportunities** to access knowledge	Web 2.0 tools provide **more opportunities for connection** and allow a greater influence of the structural dimension on knowledge sharing
Relational dimension	Relational dimension of social capital refers to the **kind of link** developed between people	Relational dimension creates **a favorable environment** to access knowledge	Web 2.0 tools enhance the favorable environment with **richer links** and allow a greater influence of the relational dimension on knowledge sharing
Cognitive dimension	Cognitive dimension of social capital is based on **common representations** shared by people	Cognitive dimension sustains **social proximity** to access knowledge	Web 2.0 tools support social proximity with **a quicker actualization of representations** and allow a greater influence of the cognitive dimension on knowledge sharing

Table 2: Social capital dimensions, knowledge sharing, and knowledge sharing 2.0

As Table 2 shows, social capital constitutes a lever for a more efficient knowledge sharing, even as the Web 2.0 tools foster each dimension of social capital to increase the influence in terms of knowledge access. Complementarily, the dimensions of social capital influence the renewal of knowledge sharing practices allowed by Web 2.0 tools. To study this influence, we now draw on the seven-step process used in the first part of this chapter to analyze the shift from knowledge sharing 1.0 to knowledge sharing 2.0 (see Table 1).

First, a change in the scope of knowledge sharing leads not only to bottom-up processes but also transversal communication. Such nonhierarchical knowledge sharing practices receive support from the structural dimension of social capital, which allows for multiple connections within and outside the organization and overcome its internal and external borders. Kaiser et al. (2009, p. 124) also note the issue of reciprocity, a key concern of the relational dimension of social capital, by revealing that "*webloggers who are more active, in terms of number of written posts and comments, are more likely to get significant assistance and support. To put it differently, one can assert [that] a high degree of reciprocity […] leads to the emergence of subgroups or clusters around specific knowledge topics and practices in the blogosphere.*"

Second, the evolution of the role of the knowledge manager means a shift toward the emergence of a community manager. In this context, the knowledge manager uses social capital to support the effective existence of the community and mobilize the social capital of other members to enlarge or strengthen the community. The frequency of interactions among members (structural dimension) and the content and quality of those interactions (relational dimension) are key concerns for this new function. Social capital is also relevant for building a community identity (cognitive dimension).

Third, modifications in knowledge structures suggest the more diffuse circulation of information, such that Web 2.0 tools skip traditional flows of information. The structural dimension of social capital (i.e., connections with whom) can be mobilized to create new paths of information and knowledge.

Fourth, modifications of knowledge validity and accuracy imply self-validation by knowledge owners and users, not by database managers. This validation requires easy access to the appropriate

users of the concerned knowledge. Social capital can help the community identify and reach the appropriate person much faster and with more efficacy than many formal or data computing tools.

Fifth, the nature of knowledge sharing, which has moved from formalizing knowledge to the socialization of knowledge, means that accessing people is just as important as accessing databases. Social capital, an asset held by people or the group, encourages this shift, in which case the cognitive dimension is a pertinent issue, because it helps maintain weak links between people who share the same representations and values. These weak links can be mobilized online, thanks to social networking tools for example.

Sixth, new arising perceptions of knowledge sharing tools imply that usage and interactions are more important than technology. Thus, when the technology becomes less visible and constraining for interactions, the social capital of technology users can be solicited and reused easily and naturally online.

Seventh, shorter knowledge sharing processes and faster time dimensions demand the accurate mobilization of resources at just the right moment, without delay. To avoid failures related to the non-involvement of the appropriate person or the failure to use proper knowledge, the three dimensions of social capital can dictate the correct conduct for knowledge sharing projects with Web 2.0 tools. That is, favoring connections gains time.

These elements illustrate the idea that social capital is critical for renewing knowledge sharing practices through Web 2.0. We also note that Web 2.0 tools affect people's social capital—whether related to organizational life or now—by facilitating and enlarging the opportunities for interactions (Ellison et al. 2007). Therefore, it seems that both social capital and Web 2.0 tools aid in the implementation of the effective appropriation of knowledge sharing systems by users and lead to more efficient knowledge sharing, as we illustrate with the following case.

SCHLUMBERGER: ENHANCING KNOWLEDGE SHARING 2.0 WITH SOCIAL CAPITAL … AND VICE VERSA

Schlumberger defines itself as "*the world's leading oilfield services company supplying technology, information solutions and integrated project management that optimize reservoir performance for customers working in the oil and gas industry*" (Schlumberger, 2010b). Its activity comprises two

segments: Schlumberger Oilfield Services (petroleum-related) and Western Geco (world's largest seismic company). As of March 2010, approximately 83,000 people of over 140 nationalities shared out between 80 countries worked for Schlumberger. At an operational level, the business is managed through 33 GeoMarket regions, grouped into four geographic areas (North America; Latin America; Europe, CIS & Africa; and Middle East & Asia), with activity shared between Products Centers and Research Centers. Similar to many firms, Schlumberger puts knowledge management at the heart of its strategy, such that it represents a major component of the firm's culture. For example, Schlumberger won its fourth MAKE (Most Admired Knowledge Enterprises) Award in 2009, in the twelfth iteration of the award.

The importance of knowledge sharing at Schlumberger

From its very beginning, knowledge has been a core component of Schlumberger's business: the two Schlumberger brothers who founded the firm in 1926 "*invented wireline logging as a technique for obtaining downhole data in oil and gas wells*" (Schlumberger, 2010b). This focus has remained constant and strongly influenced the firm's strategy and organization over the years. Despite sluggish economic conditions, its R&D investments in oilfield activities in 2009 reached $802 million. However, the launch of Schlumberger's KM strategy in 1998 also initiated a huge reorganization of the firm, spanning from 1996 to 2000. Back then, Schlumberger reorganized in order to develop a knowledge sharing culture among employees, wherever they worked in the world, and in the firm (i.e., geographically and/or functionally). This reorganization aimed to improve customer satisfaction and business performance through shared, integrated knowledge among employees in their daily jobs.

Prior to that period, Oilfield Services "*operated largely as a series of semiautonomous, regional organizations in over 100 locations*" (Schlumberger, 2004). Training and technological support were centralized and provided by an operational center in Houston, Texas, which used to slow communications and knowledge sharing. It also hindered the management and motivation of the firm's geographically dispersed technical professionals. As a consequence, knowledge was not always available where and when it was needed, which impeded the firm's global performance and reduced customer satisfaction. By restructuring the organization to create the GeoMarkets, the company replaced notions of separate locations (i.e. regions, countries, or even districts) and implemented a customer-focused organization, such that it replaced *"product lines"* with *"customer segments"* (Guillaume, 2001). These changes deeply altered employees' working environment by making it easier for them to share and access knowledge (Guillaume, 2001).

The restructuring also aligned Schlumberger's organization with its KM strategy, as illustrated by the company's internal definition of KM that has driven its KM strategy since 1998: "*Develop and*

deploy processes and technology to improve organizational performance and reduce costs for Schlumberger and its customers by enabling individuals to capture, share and apply their overall knowledge – in real time". In 2002, Louis-Pierre Guillaume (the KM Business Manager at Schlumberger) even represented this strong relationship between knowledge sharing and the firm's performance as: Power = Knowledge^{shared} – capturing the meaning of Schlumberger's motto relative to KM: "*Apply everywhere what you learn anywhere*".

To reach these goals, Schlumberger set up, in late 1998, two new Web 2.0 complementary knowledge sharing tools (though this timing occurred five years before the first use of the expression, according to Wikipedia). From the beginning, both tools, called Eureka and InTouch, have primarily relied on direct social interactions among employees.

Early adoption of knowledge sharing 2.0. practices at Schlumberger

Eureka: virtual, transversal and evolving technical online communities

Initially launched at the end of the 1990s, Eureka aims to link more than 5,200 technical experts in virtual, transversal technical communities for Oilfield Services (Guillaume, 2001). The communities can include people who work in any GeoMarket, Product Center or Research Center, though some feature more focused interactive subgroups. Eureka's overall philosophy, "*Networking for Technical Excellence and Business Success*" (Ferchaud, 2001), reflects its main goals and thus the resulting technical and organizational choices (Table 3).

Main Goals	Resulting Technical and Organizational Solutions
• Increase the links between technical experts to improve business performance: ✓ Create virtual and transversal technical communities ✓ Increase personal motivation (through empowerment and teamwork) ✓ Improve knowledge sharing dynamics (thanks to networking, community creation, and storage of knowledge) • Find transversal solutions across multiple segments or services • Enable a long-term reflection on technology and operations to answer clients and R&D needs	• One Webspace per community: ✓ The charter and objectives of the community ✓ A shared calendar of events ✓ A bulletin board for discussion ✓ Files to download and interesting hyperlinks ✓ Leaders' photos ✓ Recent additions: blogs, networking profile tools, and video sharing functionalities (technical and social videos) • Freedom of registration • Self-governing communities (elected leader) • Flexibility

Source: Adapted from Guillaume and Gibert (2003); Awad (2007); Andreev et al. (2010); *La Tribune* (2010)

Table 3: Main Goals and Solutions for Eureka

Table 3 highlights three noticeable features of Eureka. First, people are free to register with a community; it is not compulsory, and registration does not depend on experience, education, or title. They can access the Eureka Web site, participate in discussions, or merely observe online activities. To encourage interactions, Henry Edmundson, who was in charge of creating and directing the technical communities, allowed users to post information about themselves. Given that the employees' personnel files are locked by human resources on a secure Web site, he let them create their own online vitae. This has been an enormous success. As Edmundson explains, "*It was the first time employees had been given a chance to stand up and say 'this is who I am'*" (Wessel, 2005). It worked so well that the whole company has embraced this practice.

Second, the members of each community or subgroup democratically elect their leader (or leaders, depending on the size of the community), who manages and animates it for a year. Leaders cannot be elected more than twice and must "*be backed by at least one other community member and by his or her manager, who [consents] to let the subordinate devote a chunk of time to the endeavor*" (Wessel, 2005). According to Andrew Gould, Schlumberger's current Chief Executive, this self-governing feature is crucial to Eureka's success, because "*technical professionals often are motivated*

by peer review and peer esteem." Thus, elections by the community "*ensure the integrity of peer judgment*" and reinforce employees' motivation and pride (Vignette 4).

Vignette 4: John Afilaka and the Rock-Characterization Community

Name: John Afilaka

Function: Geological engineer, Schlumberger business development manager in Nigeria.

September 2004: John runs for the leadership of the 1000-member rock-characterization community, which aimed to determine what might be in an underground reservoir. He campaigns "*to increase technical professionals' influence on top management's R&D priorities and to forge better links among various communities*." After winning, John spent 15–20% of his time organizing and managing the community (e.g., setting up an annual conference, intermittent workshops, subgroup coordination). He proudly claims that his community "*helped shape the research agenda of a new carbonate research facility in Saudi Arabia*."

Source : Adapted from Wessel (2005)

Third, Eureka's communities are flexible: they evolve, some new emerge, some disappear, while others merge. Edmundson (2001, p. 21) describes them as "*organic*" and mentions: "*In one month, Mathematics appeared and now has 69 members. Nuclear separated from Physics, to be a community in its own right*." What's more, "*these changes occur democratically at the will of members*" (Edmundson, 2001, p. 21).

Eureka thus has been a tremendous success for Schlumberger. From October 2000 to the beginning of 2010 (Guillaume, 2001; APQC, 2010), the number of participants rose dramatically from 4,375 (68 leaders) to 25,000 (339 leaders), and the number of communities rose from 17 (no subcommunities) to 27 (127 subcommunities). Yet, its cost is relatively limited, since Schlumberger has spent about $1 million per year on it since its creation. According to Edmundson, "*Compared with other knowledge initiatives, it's a cheapie*" (Wessel, 2005). Moreover, the Human Resources (HR) department of the firm also increasingly rely on Eureka (Awad, 2007), because it helps them track employees' online activities and identify their participation in the communities (process), as well as the quantity and quality of their participation (frequency and content). The firm uses this knowledge to

encourage certain employees to develop in specific ways and restructure some services and departments

InTouch: professional, interactive social network

Parallel to Eureka, Schlumberger developed another social and complementary knowledge management tool, called InTouch, which aims to diminish the waiting time between the emergence of an operational need or problem and a response from one of the firm's technology centers (Table 4). Before InTouch, average delays ran from 2 to 16 weeks to get an answer to a technical question; 16 weeks to make engineering modifications; and 2 to 5 years to update archived material. Moreover, these processes relied on multiple data sources, which really complicated their consolidation (Guillaume, 2002). The long service gaps hindered operational performance, customer satisfaction, and knowledge sharing.

Main Goals	**Resulting Technical and Organizational Solutions**
• Improve the effectiveness, speed, and service quality improvements through operational support ✓ Activate an immediate solving-problem process ✓ Access with no delay to validated technical information about products and services ✓ Improve customer service • Capitalize immediately to share and reuse knowledge resulting from the InTouch social exchanges	• Global network facilities (standard PC) • One unique portal to enter the technical resources knowledge base • More than 75 helpdesks, available 24/7 • One validated knowledge base • Interactive and distributed training • Constantly updated online materials

Source: Adapted from Guillaume and Gibert (2003)

Table 4: Main Goals and Solutions for InTouch

Consequently, InTouch has been developed and nurtured to allow field engineers who encounter an operations problem and cannot find the answer in their local resources (e.g., manuals, CD-ROMs, local experts, the firm's knowledge database) to contact dedicated engineers in technology centers. They can be contacted 24/7 (i.e. 24 hours a day, 7 days a week), as they literally "*sleep with beepers and cell phones*" (Susan Rosenbaum, Director of Knowledge Management; Schlumberger, 2010a). These InTouch engineers "*have at least 5 years of field experience and are drawn from all the*

company's product and domain segments" (Schlumberger, 2010a), so they can provide help on diverse dimensions, such as improving a product or service or resolving technical problems. They also take charge of capturing and diffusing solutions, best practices, and conclusions from their interactions. Figure 1 depicts the whole InTouch process.

~~ Insert image from the .tif file here ~~

Figure 1: An Example of an Entire InTouch Process (Smith, 2004)

This process has proven extremely reliable, encouraging the rapid acceptance of the tool. Thus, as of January 2010, InTouch was being used daily by 14,000 engineers on average, and knowledge sharing among the different divisions appeared in a minimum of 40,000 daily transactions. These transactions (as well those with Eureka) feed a huge knowledge database. "*An example of this would be the cataloguing of industry best practices. These are divided into three categories:* "Good Idea", "Local Best Practice" and "Schlumberger Best Practice." *After a thorough screening process, each practice is assigned a category, and information is provided for each entry: who performed the screening; the specifics of best practice; the breadth of its applicability; and systematic comments on its contents*" (Edmundson, 2001, pp. 22-23). People can retrieve the information based on previous experiences very quickly and in an interactive way. Employees provide rich information about themselves, including their fields of interest and competences; InTouch engineers use that information "*to identify people according to location, technical domain, level of expertise, and job type. This enables them to push pertinent information to a selected audience. If a piece of hardware needs a modification, for example, everyone who may be concerned by the change can be made aware of it*" (Schlumberger, 2010a).

Interplays between social capital and knowledge sharing 2.0 at Schlumberger

Despite their specificities, Eureka and InTouch share the same objectives of developing technical improvements, facilitating online interactive exchanges, and sharing best practices through Web 2.0 tools. They also affect knowledge sharing at Schlumberger in ways that reflect the shift from knowledge sharing 1.0 to knowledge sharing 2.0, which we analyzed in the first part of this chapter (see Table 1):

- They have favored both a bottom-up process and transversal and interdisciplinary communication, and they have changed the information and knowledge structures (e.g., the very creation and structure of Eureka).
- They changed the role of the firm's knowledge manager to managing connections between people and training in the use of the tools (e.g. the case of John Afilaka, Vignette 5).
- Shared knowledge is now directly validated by users, who sit at the heart of the whole knowledge management processes (e.g. Figure 1 that illustrates an InTouch process).
- The ease of use and the level of interaction of these technologies has favored their use, as shown by the dramatic growth in the use of both tools;
- The tools have changed the temporality of KM projects, saving time and money (discussed at the end of this section).

However, these tools alone would not have been sufficient to provoke such a shift; the Schlumberger example illustrates rather well that social capital and knowledge sharing 2.0 influence each other (see Table 2 in the second part of this chapter). The firm has relied on social capital to leverage this evolution, even as the online interactions between users influence the transformation of the three dimensions of social capital (Table 5):

- By aligning from the very start the conception and use of Web 2.0 tools with the **structural dimension** of social capital (i.e. interacting actors, frequency of connection), Schlumberger enabled quicker and more transversal communications in a bottom-up process. This resulted in the multiplication of connections inside the organization, beyond geographical or functional boundaries, enabled and supported by the implementation of Web 2.0 tools.
- The quality of the knowledge built and shared by the users contributed to develop the **relational dimension** of social capital (mutual trust, norms for interactions, etc.) which in turn materialized as enhanced content and higher quality of the interactions within the firm.
- The implementation and further development of the Web 2.0 tools, based on shared representations and language, relied thus on the **cognitive dimension** of social capital. This common language is also reinforced by more and more frequent interactions through Web 2.0 tools.

	Development and refinement of knowledge sharing thanks to Web 2.0 tools → **Time**	
	Social capital as a lever (enables and / or explains the need for the development of Web 2.0 tools) ⟷	**Consequences for social capital** (impact of Web 2.0 tools on social capital)
Structural Dimension	• Internal reorganization (from products lines to segments, and from Regions / Countries / Districts to Geomarkets) and development of new tools due to the firm's geographic dispersion • Slow communication between the operating regions • Very few "information and knowledge professionals" • Lack of direct connections between field and expert engineers → Delay between the moment a question is asked and an answer is provided • Centralization of training and technological support	• Easier access to people • Creation of 150 new positions (InTouch engineers, experts) offset by the suppression and restructuring of 200 positions of intermediate technical managers • Integration of knowledge sharing as a key competency on the employees' performance appraisal form • Development of transversal relations within the firm • Election of communities' leaders with multiple tasks (animation of the community, intermediary between managers and the community, etc.) • Growth in the number of exchanges/connections between experts and between field engineers and experts engineers
Relational dimension	• Reinforcement of the motivation of people to share their knowledge and reuse the one of others in their daily operations • Existence of a common interest between some employees (or groups of employees) in a body of knowledge • Need to develop reciprocity in the share practices	• Identification, stimulation, and reward of desired behaviors in terms of knowledge production and sharing (e.g., delivery of a quarterly nonmonetary award to each of the geographic operating areas, chosen by the community and represented by a senior manager) • Acknowledgement of mutual competences between field and experts engineers • Increase in mutual confidence between field and experts engineers • Reinforcement of reciprocity through development of a compelling need to share problems, experiences, insights, templates, tools, and best practices
Cognitive dimension	• Common technical culture across large communities of employees • Innovation-based culture • Knowledge management at the cornerstone of Schlumberger's culture and success for 80 years	• Better and faster learning that enables to develop shared frames of reference and languages (knowledge and discourses centered on the customer and on R&D) • Group/team spirit and identity of work communities • Development of a culture based on "solutions" and knowledge sharing

Sources: de Chizelle and Guillaume (2001), Guillaume (2001, 2002), Guillaume and Gibert (2003), Smith (2004), Martellozo (2009), Schlumberger (2004, 2010a).

Table 5: Mutual influence of social capital and Web 2.0 tools, resulting in an enhanced knowledge sharing process at Schlumberger

Finally, the three dimensions of social capital limit the temporality of knowledge sharing, increasing the efficacy and efficiency of knowledge sharing processes and activities. For example, a net decrease in response delays has resulted from formal, diffuse knowledge at Schlumberger, including a 95% reduction of the time needed to answer technical requests and a 75% reduction of the time needed to update engineering changes. However, it is very important to note that, without an appropriate culture or aligned tools with the organization's processes and objectives, the results would have been rather different. Beyond the multiple functions of the tools, these results show the importance of usage and the need to align it with organizational life, that is, the business processes of the firm as well as the social norms of the employees' community, as expressed by the idea of social capital. This point is well summarized by this last quote from Susan Rosenbaum, Schlumberger's Knowledge Management Director: *"It is critical not to think that the tools are the answer. And this is the key for all knowledge management. The people are in the center and the tools surround them as aids. If we come to rely only on online tools and forget the people and their connections and interactions, then the knowledge and information will die"* (in Andreev et al., 2010, p. 11).

CONCLUSION

Knowledge management by itself cannot originate value creation without being inserted into the firm's practices. Among knowledge management processes, knowledge sharing is one of the most critical and challenging for value creation. Therefore, practitioners must be aware of the stakes related to knowledge sharing and take care of their sources of knowledge sharing, such as social interactions, especially in a Web 2.0 context that makes connections fast and easy. The Schlumberger case shows that new knowledge sharing practices oriented toward social interactions can succeed if the managerial environment is supportive and the appropriate tools are chosen and appropriated by users. This success also is based on innovative policies that prompt the firm to stress the benefits of knowledge sharing and adopt up-to-date technologies. For example, Schlumberger recently turned to wiki and video technology tools (Les Echos 2009; La Tribune 2010). Its supportive managerial environment appears institutionalized in its organizational culture, which is significant when it comes to implementing innovative knowledge sharing practices.

This chapter emphasizes the role of social capital. Managing relationships based on trust is the core process of knowledge management and of paramount importance for tacit knowledge sharing. Therefore, all three dimensions of social capital must be managed carefully to ensure effective knowledge sharing. In many cases, despite its importance, managers may not be able to take advantage of social capital to leverage 2.0 knowledge sharing practices, perhaps because of inadequate communication tools for the characteristics of knowledge they need or a lack of sufficient social networks outside the company (Anand et al., 2002). Web 2.0 might offer a viable solution.

Several recommendations derived from our analysis also can help practitioners address this issue. First, we support the recommendation of Yang and Farn (2009, p. 216): "*managers need to foster the formation of an intensive social network among employees in order to promote tacit knowledge sharing within a workgroup*." Moreover, managers should cultivate a sharing environment (i.e., develop relational social capital), such as by establishing regular group meetings. Practitioners also need to realize that knowledge management requires the assistance of people who can appropriate technological tools while also reducing knowledge complexity and managing knowledge sharing process. These employees might be named "interface integrators," and their role should be clear within the company (Deltour and Sargis Roussel, 2007). Moreover, the balance of the three dimensions of social capital within the company is of paramount importance for practitioners, who cannot just rely on interactions between actors (structural dimension). They also must assess their common meanings and trust (cognitive and relational dimensions), because all three dimensions have a joint influence (Deltour and Sargis Roussel, 2010).

Achieving effective knowledge sharing remains challenging for most companies which largely have focused on technical solutions and expert knowledge for decades. The KM perspective that has evolved in recent years suggests a more social vision of KM practices. Social capital theory defined through structural, relational, and cognitive dimensions in turn has emerged as a main theoretical framework to understand and improve KM practices. To enhance understanding of the role of social capital, future research should investigate rich empirical cases. As the Schlumberger case reveals, and as underlined by Schneckenberg (2010), conceptual improvements also might come from a bridge

between social capital and organizational culture: The goal should be to create a proper work culture to foster the use of Web 2.0 for knowledge sharing.

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Ajouter WIKIPEDIA (definition du Web 2.0)

KEY TERMS & DEFINITIONS

Social capital: "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Nahapiet and Ghoshal, 1998, p. 243).

Knowledge sharing: The transfer, diffusion, and distribution of knowledge within and between organizations, communities of practices, and departments.

Knowledge sharing 2.0: Renewed practices of knowledge sharing supported by Web 2.0 tools.