

The role of tacit and explicit knowledge in the workplace

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Introduction

People have always passed their accumulated knowledge and commercial wisdom on to future generations by telling stories about their thoughts, work and experiences. Now, as in the past, people use face-to-face and "hands-on" methods to convey their "know how" or tacit knowledge to others (Hansen *et al.*, 1999). Throughout recorded history, some form of written language has been used to document their "know-what" or explicit knowledge. Pursuits of tacit, explicit and self-knowledge, self-renewal and innovation are timeless, endless and relentless.

Historically, capital, raw materials and labor have been considered more valuable than creating and applying knowledge. The information age and the knowledge revolution have caused problems for people and organizations. Demands for imaginative, intuitive, inspirational leaders who can manage human intellect and convert it into useful products and service continue to grow (Goffee and Jones, 2000). People must do more work in less time. Workers who lack adequate education and training, or explicit knowledge, struggle to keep up. They rely on their common sense and intuition, or tacit knowledge, to get through the day. Many companies are using tacit knowledge to augment a person's academic learning and experience. Wagner and Sternberg (1987) believe that the ability to acquire and manage tacit knowledge are hallmarks of managerial success. Opportunities to use tacit knowledge are prime factors in attracting and maintaining a talented, loyal, productive workforce (Smith, 2000).

Valuable human and knowledge resources will be wasted unless management openly accepts and supports efforts to gather, sort, transform, record and share knowledge. Priceless knowledge will continue to be lost unless organizations make better use of their prime resource – relatively unchallenged, creative people who are eager to apply their knowledge. Tacit knowledge, in particular, is lost through outsourcing, downsizing, mergers and terminations. Reportedly, 90 percent of the knowledge in any organization is embedded and synthesized in peoples' heads (Wah, 1999b; Bonner, 2000a; Lee, 2000). Most tacit knowledge is an invisible line item in corporate budgets. However, it is tacit knowledge that plays a key role in

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Abstract

Knowledge plays a key role in the information revolution. Major challenges are to select the "right" information from numerous sources and transform it into useful knowledge. Tacit knowledge based on common sense, and explicit knowledge based on academic accomplishment are both underutilized. Ways knowledge-enabled organizations acquire, measure, teach, share and apply knowledge are discussed and illustrated. Methods to balance the use tacit and explicit knowledge at work and practical, proven ways to improve the understanding and use of knowledge are presented. Organizations must begin to create worker-centered environments to encourage the open sharing and use of all forms of knowledge.

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leveraging the overall quality of knowledge (Quinn *et al.*, 1996; Wah, 1999a; Goffee and Jones, 2000).

Purpose

This paper summarizes key factors in knowledge, knowledge-creating companies and knowledge management. Major contributions of tacit and explicit knowledge and ways to recognize, use, share, acquire, teach and measure tacit and explicit knowledge are discussed and illustrated. Methods to balance the use of tacit and explicit knowledge in the workplace and practical, proven ways to improve the understanding and use of knowledge are presented.

Knowledge, knowledge-creating companies and knowledge management

Employees seldom admit what they do and don't know. The book, *If Only We Knew What We Know*, aptly conveys the need to find out and record what people really know (O'Dell and Grayson, 1998). The exchange, flow and use of knowledge are increased when people capture and apply what they really know. Each step in the entire knowledge-management effort will be at risk unless organizations recognize, nourish and appropriately reward the contribution, flow and application of knowledge. Supportive work environments and user-friendly, cost-effective technology are key enablers for this entire process.

Knowledge

Knowledge belongs to the family of steadily increasing corporate assets, like management systems, brand identity, customer information and corporate reputation (Pascarella, 1997). Knowledge is a human, highly personal asset and represents the pooled expertise and efforts of networks and alliances. Reportedly, 99 percent of the work people do is knowledge based (Wah, 1999b). Knowledge seems invisible, but it clearly drives the bottom line (Pascarella, 1997). The value of knowledge is increased when it has a key purpose and focuses on mission, core values and strategic priorities. Knowledge assets, like money or equipment, exist and are worth cultivating only in the context of the strategy used to apply them (Stewart, 1997).

When organizations merge, downsize, reorganize, or organizational culture changes, priceless knowledge is lost or buried under new information. Employees who leave take their valuable knowledge, resources, skills and experiences with them. Those who stay may be assigned new jobs and never use their wealth of accumulated knowledge. Unless managers recognize the improvisations and inventive ways people get things done, tacit knowledge, in particular, will be lost.

Knowledge-creating companies

Knowledge-creating concepts begin life as data. Transforming data to information to knowledge to wisdom helps shape effective strategies to manage knowledge and create new markets to serve customers (Garvin, 1997; Stewart, 1997; Tobin, 1997; Hansen *et al.*, 1999; Wah, 1999a). Most data are numeric, basic information, or observations of work activities that can be quantified. Information is data that have relevance, purpose and context, like units of measurement. Information has little value until it is given meaning or used on the job, like raising levels of competence (Pascarella, 1997). Human intervention is usually needed to interpret and extract various types of useful information (Lee, 2000). "Data-mining" software and people skilled at seeing patterns of responses play prime roles in these intricate processes. The ultimate challenge is to move beyond knowledge to wisdom, or intuition based on experience. Wisdom closely resembles tacit knowledge (Tobin, 1997).

Organizations that dominate emerging technologies have a collective sense of identity and a shared understanding of what they stand for, where they are going, the kind of world they want to live in and how to make that world a reality (Nonaka, 1991).

Companies with interactive learning environments develop ways to find, sort, use, store, retrieve and link the growing number of data and information bases. First, they learn what local knowledge exists. Second, they put valuable knowledge into wider circulation (Brown and Dugid, 2000). Companies like IBM and Xerox Corporation transform databases and information into useable formats that are readily shared and accessed. These databases are also used to create new knowledge. To illustrate, IBM consultants who used knowledge sharing cut proposal-

writing time from an average of 200 hours to 30 hours (McCune, 1999).

Knowledge management

Knowledge management, a bottom-up, ongoing process, finds value and use for raw information which is shared across organizational boundaries (Bonner, 2000b). This holistic, organic process guides the organization's development and exploitation of tangible assets and intangible knowledge resources (McCune, 1999). "Knowledge management is a formal, directed process of determining what information a company has that could benefit others in the company and then devising ways to making it easily available" (Liss, 1999, p. 1). Steps in this process include how knowledge is captured, evaluated, cleansed, stored, provided and used (Chait, 1998).

At Xerox Corporation, knowledge management is 90 percent social process and 10 percent infrastructure, for instance. Knowledge management leverages and reuses the organization's existing resources to help people seek out best practices, not reinvent the wheel.

A poll of over 1,600 US managers revealed that knowledge management includes four areas: managing tangible intellectual capital such as copyrights, patents, licenses, royalties, etc.; gathering, organizing and sharing the company's information and knowledge assets; creating work environments to share and transfer knowledge among workers; and leveraging knowledge from all stakeholders to build innovative corporate strategies (Wah, 1999a).

Different methods are used to codify and create personalized ways to manage knowledge. Ernst & Young and Andersen Consulting (now Accenture) use codification to manage explicit knowledge. For example, many consultants use the knowledge assets listed in a manual of procedures in a variety of situations or jobs. Reusing knowledge saves time, effort and cost (Hansen *et al.*, 1999). McKinsey & Company and Bain & Company use personalization to manage tacit knowledge. For instance, people use their analytic, business problem and creative skills to examine unique business problems skills, glean knowledge and then share this person-to-person knowledge (Hansen *et al.*, 1999).

Ways to manage codified and personalized knowledge should support the organization's

competitive strategy, consider how value is created for customers, how employees deliver value and the overall financial status of the organization. All knowledge databases should be well organized, accurate, current and easy to search. Unfortunately, few organizations handle explicit and tacit knowledge effectively (Bonner, 2000b). Exceptions are learning organizations that are skilled at creating, acquiring and transferring knowledge and at modifying their behavior to reflect new knowledge and insights (Garvin, 1993). Knowledge databases add value only when employees have direct access to knowledge repositories and actually use them (Tobin, 1997). Cost, speed and availability of information technology tools play key roles in knowledge management.

Creating and managing intellectual capital (Edvinsson and Malone, 1997), "harnessing knowledge" (Pascarella, 1997), networking knowledge (Tobin, 1998) and managing professional intellect (Quinn *et al.*, 1996) are keys to organizational success. Despite globalization, cultural diversity and keeping pace with the "trend of the day", people acquire and apply tacit and explicit knowledge in their own way. Efforts to discover, use and share professional intellect are more effective when people are consistently recognized and rewarded for their understanding of the entire knowledge process and for using their creativity and intuition at work. Supportive managers and a work environment that nurtures knowledge management are essential to success.

Tacit and explicit knowledge

People possess slightly different types of tacit and explicit knowledge and apply their knowledge in unique ways. Individuals use different perspectives to think about problems and devise solutions. They share knowledge and group physical and intellectual assets in new and creative ways (Ashkenas *et al.*, 1998). Comparing tacit and explicit types of knowledge is a way to think, not point out differences. Table I summarizes basic ways tacit knowledge and explicit knowledge are used in the workplace, and groups major concepts underlying explicit and tacit knowledge into ten general categories.

Table I Use of the explicit and tacit knowledge in the workplace

Explicit knowledge – academic knowledge or “know-what” that is described in formal language, print or electronic media, often based on established work processes, use people-to-documents approach	Tacit knowledge – practical, action-oriented knowledge or ‘know-how’ based on practice, acquired by personal experience, seldom expressed openly, often resembles intuition
<i>Work process</i> – organized tasks, routine, orchestrated, assumes a predictable environment, linear, reuse codified knowledge, create knowledge objects	<i>Work practice</i> – spontaneous, improvised, web-like, responds to a changing, unpredictable environment, channels individual expertise, creates knowledge
<i>Learn</i> – on the job, trial-and-error, self-directed in areas of greatest expertise, meet work goals and objectives set by organization	<i>Learn</i> – supervisor or team leader facilitates and reinforces openness and trust to increase sharing of knowledge and business judgment
<i>Teach</i> – trainer designed using syllabus, uses formats selected by organization, based on goals and needs of the organization, may be outsourced	<i>Teach</i> – one-on-one, mentor, internships, coach, on-the-job training, apprenticeships, competency based, brainstorm, people to people
<i>Type of thinking</i> – logical, based on facts, use proven methods, primarily convergent thinking	<i>Type of thinking</i> – creative, flexible, unchartered, leads to divergent thinking, develop insights
<i>Share knowledge</i> – extract knowledge from person, code, store and reuse as needed for customers, e-mail, electronic discussions, forums	<i>Share knowledge</i> – altruistic sharing, networking, face-to-face contact, videoconferencing, chatting, storytelling, personalize knowledge
<i>Motivation</i> – often based on need to perform to meet specific goals	<i>Motivation</i> – inspire through leadership, vision and frequent personal contact with employees
<i>Reward</i> – tied to business goals, competitive within workplace, compete for scarce rewards, may not be rewarded for information sharing	<i>Reward</i> – incorporate intrinsic or non-monetary motivators and rewards for sharing information directly, recognize creativity and innovation
<i>Relationships</i> – may be top-down from supervisor to subordinate or team leader to team members	<i>Relationships</i> – open, friendly, unstructured, based on open, spontaneous sharing of knowledge
<i>Technology</i> – related to job, based on availability and cost, invest heavily in IT to develop professional library with hierarchy of databases using existing knowledge	<i>Technology</i> – tool to select personalized information, facilitate conversations, exchange tacit knowledge, invest moderately in the framework of IT, enable people to find one another
<i>Evaluation</i> – based on tangible work accomplishments, not necessarily on creativity and knowledge sharing	<i>Evaluation</i> – based on demonstrated performance, ongoing, spontaneous evaluation

Tacit knowledge

Tacit knowledge is "... being understood without being openly expressed" (*Random House Dictionary of the English Language*, 1971), or knowledge for which we do not have words. Tacit knowledge is automatic, requires little or no time or thought and helps determine how organizations make decisions and influence the collective behavior of their members (Liebowitz and Beckman, 1998). The philosopher Polanyi (1967) described tacit knowledge as knowing more than we can tell, or knowing how to do something without thinking about it, like ride a bicycle. This highly personal, subjective form of knowledge is usually informal and can be inferred from the statements of others (Sternberg, 1997). Tacit knowledge tends to be local. It is not found in manuals, books, databases or files.

Tacit knowledge is technical or cognitive and is made up of mental models, values, beliefs, perceptions, insights and assumptions. Technical tacit knowledge is demonstrated when people master a specific body of knowledge or use skills like those gradually developed by master craftsmen.

Cognitive tacit knowledge incorporates implicit mental models and perceptions that are so ingrained they are taken for granted (Sternberg, 1997). Cognitive models affect how we make sense of events in our world. People use metaphors, analogies, demonstrations and stories to convey their tacit knowledge to others (Stewart, 1997). Listeners can evaluate story content and actions and apply useful tacit knowledge to their own jobs. For instance, employees of Datafusion Inc., an information-technology products and consulting firm, take photos at business conferences and share these photos with colleagues. The stories employees write contain notes and descriptions, or explicit knowledge. Stories about why things happened and how information could be applied contain tacit knowledge. Tacit knowledge, as context, is often easier to remember and talk about than explicit knowledge or content (Wah, 1999b).

The value of tacit knowledge, like customer good will, is often underrated and underutilized in the workplace. Nearly two-thirds of work-related information that is

gradually transformed into tacit knowledge comes from face-to-face contacts, like casual conversations, stories, mentoring, internships and apprenticeships. One-of-a-kind, spontaneous, creative conversations often occur when people exchange ideas and practicalities in a free and open environment.

People who have technical tacit knowledge are considered unconsciously skilled. They know something so well that they are unaware of what they need to do to be successful. To illustrate, inexperienced managers use their tacit knowledge, common sense and diplomacy to handle a difficult employee successfully.

Tacit knowledge is grouped according to content, context and orientation. Depending on the person and the situation, one or more types of tacit knowledge may be used in different contexts and orientations. Content knowledge is used to manage oneself, others, or manage one's tasks. Context is described in terms of local and global. Local involves doing the task at hand. Global describes how the current situation fits into the larger picture. Orientations are pragmatic and ideal. A pragmatic orientation is knowing how workable an idea is without regard to its ideal quality. An ideal orientation stresses the ideal quality of an idea or goal regardless of its practicality, like giving an employee negative feedback in private, not in public (Wagner and Sternberg, 1987).

McKinsey & Company and Bain & Company use people-to-people methods to personalize tacit knowledge and encourage and reward individual ownership of knowledge and the process. Tacit knowledge is personalized when specific expertise is used to provide creative, analytically rigorous advice on high-level strategic problems. This personalized tacit knowledge fits the company culture, customer needs and standard reporting methods. Both companies built worldwide networks of people who had successfully solved similar problems by enabling them all to work together to create realistic solutions to the problems. Networks were connected so tacit knowledge could be shared face to face, over the telephone, by e-mail and through video conferences (Hansen *et al.*, 1999).

Explicit knowledge

Most explicit knowledge is technical or academic data or information that is

described in formal language, like manuals, mathematical expressions, copyright and patents. This "know-what," or systematic knowledge is readily communicated and shared through print, electronic methods and other formal means. Explicit knowledge is technical and requires a level of academic knowledge or understanding that is gained through formal education, or structured study. Explicit knowledge is carefully codified, stored in a hierarchy of databases and is accessed with high quality, reliable, fast information retrieval systems. Once codified, explicit knowledge assets can be reused to solve many similar types of problems or connect people with valuable, reusable knowledge. Sharing processes often require major monetary investments in the infrastructure needed to support and fund information technology (Hansen *et al.*, 1999). Acts of gathering and using explicit knowledge assume a predictable, relatively stable environment. Marketplace competition, changing customer needs, among other factors, reduce stability.

Examples 1 and 2 illustrate the use of explicit knowledge.

- *Example 1.* The 82,000 worldwide employees of Ernst & Young are creating a global brain of explicit knowledge to include cultural differences. Their repository of global "best practices" is founded on sharing and documenting knowledge. They approach business issues from an array of perspectives. No matter where in the world a problem occurs, there is "no one right answer" but many workable approaches. Ernst & Young view knowledge objects as templates of core insights that can be used in any cultural environment (Wah, 1999a).
- *Example 2.* Andersen Consulting (now Accenture) created elaborate ways to codify, store and reuse explicit knowledge. Its "people-to-documents" approach extracts information from the person who developed it and makes it independent of its developer. All client-sensitive information is removed and selected information is reused. Information is transformed into a proven, successful solution that can be used in the same or similar industry (Hansen *et al.*, 1999).

Creating, using and sharing tacit and explicit knowledge

Isaacs (1999) believes that explicit knowledge cannot be converted to tacit knowledge. Opposing views are that tacit knowledge, skills, unique talents and physical accomplishments can be converted to explicit knowledge and conversely through observation and verbal protocols. Despite lack of agreement, ways to codify and personalize knowledge depend on how the company serves its clients, the economics of its business and its workforce (Hansen *et al.*, 1999).

Each of the following patterns exists within a spiral of knowledge. When patterns overlap, thought processes people use to acquire and use tacit knowledge alternate between two or more patterns. There are four basic patterns for creating knowledge in organizations (Nonaka, 1991):

- (1) *From tacit to tacit* – learn by observing, imitating and practicing, or become "socialized" into a specific way of doing things, like learn from mentors and peers. Knowledge is not explicit in this stage.
- (2) *From explicit to explicit* – combines separate pieces of explicit knowledge into a new whole, like using numerous data sources to write a financial report.
- (3) *From tacit to explicit* – record discussions, descriptions and innovations in a manual and then use the content to create a new product. Converting tacit knowledge into explicit knowledge means finding a way to express the inexpressible (Stewart, 1997). To illustrate, moving from tacit to explicit involves stating one's vision of the world – what it is and what it ought to be.
- (4) *From explicit to tacit* – reframe or interpret explicit knowledge using a person's frame of reference so that knowledge can be understood and then internalized or accepted by others. A person's unique tacit knowledge can be applied in creative ways to broaden, extend or reframe a specific idea. Tacit knowledge does not become part of a person's knowledge base until it is articulated and internalized.

When tacit and explicit knowledge collide, a burst of powerful energy appears in pattern 3 or in pattern 4, or between patterns 3 and 4. This magical process blends two different and distant areas of experience into a single, inclusive symbol or image, like "two ideas in one phrase". For example Cannon applied

the technology of making disposable aluminium beer cans to the manufacturer of a low-cost, disposable aluminium mini-copier drum. Canon's revolutionary breakthrough technology jump-started miniaturization, weight reduction and automated assembly. These three processes were later applied to microfilm readers, laser printers and word processors (Nonaka, 1991). In this example, it was nearly impossible to know where and when tacit knowledge emerged or how knowledge was applied. Like creativity, tacit knowledge knows no direction or boundaries. It simply "is".

It is easier to transform explicit knowledge into tacit knowledge when people cooperate, trust each other and willingly contribute their own valuable knowledge resources.

Cooperation, trust and sharing occur when people who add to and use databases are appropriately recognized and rewarded for sharing their special form of knowledge. Unlike depletable resources, knowledge assets increase with use, provided databases are maintained. Outdated or inaccurate databases used to create and access knowledge have little value.

At Ernst & Young, incentives to stimulate knowledge sharing are used in performance reviews. Employees who spend a lot of time helping each other and adding to the corporate knowledge base are openly rewarded and recognized (Wah, 1999b). Employees are evaluated on their work contributions and on how well they use the firm's knowledge resources. Bain & Company rewards people for sharing knowledge with others based on how much direct help they give colleagues. The degree of high-quality, person-to-person dialogue a partner has with others can represent as much as one-quarter of his or her annual salary (Hansen *et al.*, 1999).

Examples 1, 2 and 3 show how tacit knowledge is used and shared.

- *Example 1.* Merrill Lynch fosters and rewards cooperation and information sharing and leverages knowledge by encouraging overlapping teams to share interests and values. All employees submit a confidential evaluation of everyone with whom they have worked closely. Compensation is attached to the network of peer relationship and is directly tied to cooperation and sharing of knowledge. Employees are also evaluated

on how well they immerse themselves in various projects, work with different groups to meet priorities and meet clients' needs. When there are enough close personal team contacts, it is possible to draw a truly multifaceted picture of an individual's performance. Each Merrill Lynch spider web of connecting networks is unique in its purpose, pattern and organizational power relationships (Quinn *et al.*, 1996).

- *Example 2.* In 1996, Xerox designed Eureka, a "social tactical system", to link 25,000 field service representatives with laptops and the Internet. Xerox used a common documentation method to facilitate lateral communication. Technicians write up "war stories" to teach each other how to diagnose and fix machines. Service reps access over 5,000 tips a month for a 5 percent saving on both parts and labor. Field service reps create and maintain the tacit knowledge base by contributing and renewing all the tips and information and maintaining the system. Each time reps contribute a tip, their name goes on the system (Wah, 1999a).
- *Example 3.* Andersen Worldwide shares its explicit knowledge through ANet. This electronic system links its 82,000 people operating in 360 offices in 76 countries. Andersen's T1 and frame-relay network connects more than 85 percent of its professionals through data, voice and video interlinks. Customers' problems from anywhere in the world are posted on Andersen's electronic bulletin board. This request is followed up on with visual and data contacts that instantly self-organize around that specific problem. Centrally collected and carefully indexed subjects, customer references and resource files are accessed directly through ANet or from CD-ROMS distributed to all offices. Sets of possible solutions are created and sent to customers (Quinn *et al.*, 1996).

At Merrill Lynch, Xerox and Andersen Worldwide, work was done in an interactive learning environment. Employees were encouraged to transfer knowledge across disciplines. Use of overlapping teams helped ensure continuity of control, joint learning and information sharing. In general, teams

that internalize information and knowledge are well equipped to solve problems.

Every organization has a slightly different knowledge base and organizational culture. Transferring useful information between organizations is costly in terms of time and effort and strains existing technology. Organizations need to develop fair and equitable reward systems to encourage employees to share tacit and explicit knowledge. Unless management clearly states expectations for sharing knowledge, employees are likely to share only explicit knowledge because it is easier to code, document and transfer. Employees must be encouraged and rewarded for sharing tacit knowledge when they write up their personal stories, document their insights and use photos, drawings or rough diagrams to show how to solve a difficult problem or improve existing work processes.

Technology plays a key role in collecting and codifying knowledge for distribution. It is important to have a strong information technology (IT) framework to design and implement the systematic storage and dissemination of information. IT is an enabler, but by itself will not get anything out of someone's head (Wah, 1999a). IT does not provide content. People do. Before selecting the management technology that is assumed to be needed, it is vital to find out what will work best for the organization. Major variables to consider in the selection of technology are functional fit, technical fit, cost and cultural fit (Ettore, 1999). Cultural fit, which influences communication flow and openness for sharing knowledge, may be the most important factor in all personal information exchanges.

Acquiring, teaching and measuring tacit knowledge

Tacit knowledge is acquired, taught and shared through knowledge fairs, learning communities, study missions, tours, advisory boards, job rotation, stories, myths and task forces. Ways to teach both tacit knowledge and formal academic knowledge or job skills are similar. Experienced people teach tacit knowledge directly to less experienced people by "showing them the ropes". Tacit knowledge is taught indirectly by writing down answers to these questions:

- (1) What do you know about your strengths, weaknesses, values and ambitions?

- (2) What are the strengths, weakness, values and ambitions of others with whom you work?
- (3) How would you approach a similar job differently in the future?

People can be trained to use this newly acquired information to improve their ability to acquire and apply tacit knowledge. It is also important to locate the most valued people in the organization and determine why they are so highly valued.

The following methods are used to acquire and teach tacit knowledge. Methods may be used individually or combined to help make sense of new situations and re-evaluate old situations (Wagner and Sternberg, 1987):

- *Selective encoding.* Select or filter relevant or needed information from the environment, like use specific information in a client's report.
- *Selective combination.* Combine specific information together in ways that are relevant. Show how facts form a pattern or how the separate parts make a complete whole.
- *Selective comparison.* See relationships between old and new facts or separate out similarities and differences between past and present. Compare previously known information with new information or apply existing knowledge in ways that create new knowledge.

Sternberg's (1991) *Tacit Knowledge Inventory for Managers* assesses the level of tacit knowledge related to managing self, tasks and other people. Nine different work-related situations or scenarios are used to assess managerial performance in decision making, supervision and general use of "street smarts". The effectiveness of the response alternatives is evaluated by comparing an individual's responses with those of expert groups of managers. Sternberg (1997) found a significant positive correlation between measures of tacit knowledge and job performance for lower, middle and upper levels of management.

"Communities of practice" capture and share knowledge and complement existing organizational structures by galvanizing knowledge sharing, learning and change. These communities originated in classical Greece as "corporations" of metalworkers, masons and other craftsmen. During the Middle Ages, these communities gradually

evolved into guilds that maintained standards to protect the interests of their members. Historically, communities of practice are made up of groups that are informally bound together by shared expertise and a passion for a joint enterprise. They are dedicated to a problem or mission. These informal groups of people from all levels and functions in the organization meet regularly, either in person or through e-mail networks (Wenger and Snyder, 2000). Membership is self-selected, as those who join know if they have something to give. Groups work outside the traditional organizational structure and are virtually immune to management. Members of various communities of practice guide and inspire ongoing work in the organization, or function in the "white spaces" of organizational charts.

Over time, members of these communities develop group knowledge and generate assets by transferring knowledge and stimulating innovation (Pascarella, 1997). For instance, in 1999 the World Bank had over 100 communities of practice around the world. These communities are in the process of connecting with each other to improve the quality of their knowledge base. The vision of the World Bank is to share knowledge about development so that all interested people can use the Internet to access information (Wah, 1999a).

Similarly, communities of interest at Xerox consist of groups of people scattered through the company. They do not meet formally, but work together on any given project. Group members either share specific knowledge or have a common interest in a process or some particular activity related to a product. Members of communities of interest build knowledge for the company and themselves through informal communication and contact (Tobin, 1997).

Balance the use of explicit and tacit knowledge

Historically, tension exists between process and practice. Process represents explicit knowledge, or how knowledge is organized. Practice represents tacit knowledge, or the way work is really done. The gradual shift from a standard linear process, like re-engineering, to non-linear, web-like applications of knowledge management has created tension that is difficult to reduce. Companies that deal successfully with this tension use the various types of tacit and explicit knowledge to their

advantage. For instance, they usually use tacit knowledge to foster creativity and innovation and use explicit knowledge to make the work environment predictable and guide the way tasks are organized (Brown and Dugid, 2000).

Xerox representatives transformed explicit knowledge into tacit knowledge by reducing the gap between what they were supposed to do, as explained in technical terms in manuals and what they really did. Actual work practices customer service representatives use to fix Xerox machines succeed because reps depart from formal processes and apply their tacit knowledge. While eating and gossiping, reps talk about work, they ask each other questions, offer solutions, laugh at mistakes and discuss changes in their work, the machines and customer relations. Reps tell stories and keep each other current on what they know, what they learned and what they are doing. During this socialization process, reps develop a collective pool of practical or tacit knowledge that any or all can draw upon. In turn, reps also contribute their unique strengths and talents that other reps can use and improve on. This collective knowledge pool transcends the knowledge of any individual member and the corporation's documentation (Brown and Dugid, 2000). Telling about successful knowledge-sharing efforts often helps people understand complicated ideas in an accessible and intelligent way (Wah, 1999b).

Each organization has its unique way to handle explicit and tacit knowledge. Many controllable and uncontrollable factors affect the time, effort and money devoted to the pursuit of tacit and explicit knowledge. Variables like where organizations are in their life cycle, type of business, core competences, leadership, culture, infrastructure and marketplace competition affect how tacit and explicit knowledge are used.

Conclusions

Organizations that recognize and use their employees' steadily growing wealth of tacit and explicit knowledge to solve problems and achieve goals have a major competitive advantage. However, many organizations need to improve how they acquire and share tacit and explicit knowledge. Supportive, interactive learning environments built on trust, openness and collective ownership

definitely encourage knowledge acquisition and sharing. New knowledge is created when people transfer and share what they know, internalize it and apply what they learned (Wah, 1999a). The value and worth of individual, group and corporate intellectual assets grow exponentially when shared and increase in value with use. Human inertia is the biggest obstacle to knowledge-management efforts (Wah, 1999b).

Major concepts underlying the entire spectrum of knowledge, like knowledge sharing and open communication, should be tied to corporate financial variables. Monetary and non-monetary (intrinsic motivators,) should be used to reward people for their abilities to recognize, store and share knowledge. Monetary motivators are bonuses and percentages of corporate profits. Intrinsic motivators are non-financial rewards, like peer recognition and opportunities to do challenging work. Ultimate judges of success are supervisors, team members, partners, shareholders and many others in the value chain.

Vital tacit knowledge vanishes when companies reorganize, merge, or downsize. The need for training in knowledge-based areas is endless. However, people welcome opportunities to teach others how to acquire and transform data and explicit information into tacit knowledge. "Learners" and "teachers" report that their most rewarding and meaningful learning experiences are one on one. These learner-centered ways to share tacit knowledge are examples of intrinsic, or self-motivators (Smith, 1995, 2000). The strong desire many people have to use and share their tacit knowledge will further increase the momentum and direction of the knowledge revolution.

Practical applications

This section describes and illustrates how tacit and explicit knowledge can be used to further professional and organizational goals and enhance the overall performance of organizations.

- Instill a corporate-wide culture that weaves knowledge into every business process. For instance, the World Bank leverages global knowledge sharing to attain its goal of becoming a clearinghouse for expertise on sustainable development (Wah, 1999a).

The World Bank spends 4 percent of its administrative budget on knowledge management and is spending over \$50 million to build a global knowledge-management system (Isaacs, 1999).

- Encourage knowledge sharing by locating people who normally work together close to each other. Knowledge sharing, an all-hands contribution, is also the pooled expertise and efforts of alliances and networks. It is very important to have onsite locations where people can connect with others through briefings and reading bulletin boards. Creating expensive hardware and software to share knowledge works only when people talk to one another regularly at work, network, serve on task forces or attend conferences and knowledge fairs. An organization is what it knows. What it knows is what it gets from its learning (Bonner, 2000a).
- Implement communities of practice that informally bind together people who share expertise, passion for joint enterprises and a common interest in knowledge sharing. These efforts will enhance learning and encourage the recognition, use and spread of tacit and explicit knowledge.
- Encourage people to visualize a self-organizing network of overlapping electronic spider's webs as intellectual webs of knowledge that exist in actual and virtual organizations. Spider's web connections bring people together and enable them to share knowledge. Once connections are made, a spider's web can be disbanded just as fast as it was formed (Quinn *et al.*, 1996). Each knowledge network shares different purposes and patterns and uses its power relations in various ways.
- Engage in a human-talent exchange that lets people rent their talents to different companies rather than work for any one company. "Click-and-go" organizational structures that link their human capital to world-wide structural capital tap into the highest level of human potential (Wah, 1999b). Quinn *et al.* (1996) consider this level self-motivated creativity, or "care why" something happened.
- Use extraordinary recruitment methods to attract, hire and retain the "best" people. Provide pleasant, supportive work environments and intrinsic motivational incentives that appeal to a person's sense of belonging and friendship (Thomas, 2000). Encourage and support training and interactive learning that occur through work experiences and give-and-take communication with fellow practitioners (Wah, 1999b). People can be trained to use tacit knowledge and develop their creative talents (Smith, 1998).
- Change performance measurement and reward systems by implementing equitable recognition and reward processes built on trust and commitment. An organizational culture that supports people's needs for self-fulfillment also increases their level of trust. Different sets of cultural norms that are supported by software and by performance measurement and reward systems can be designed to fit the organization's culture or sub-culture (Quinn *et al.*, 1996). Encourage people to collaborate as equals and share their precious knowledge assets with others. At Ernst & Young, sharing knowledge is part of an employee's performance review and has a major impact on salary. McKinsey & Company encourages the flow of knowledge and experience its consultants acquire from their clients and researchers (Pascarella, 1997). Some organizations award special titles to employees who actively transfer knowledge. Ultimately, sharing knowledge impacts efficiency and productivity in positive ways.
- Enable people to use tacit and explicit knowledge and technology as tools to leverage their own professional and personal intellect. Help them feel secure about admitting there is something they do not know. Get them to ask meaningful questions, evaluate useful answers and then make informed decisions. Use knowledge guardians to constantly probe the unknown and encourage people to bounce their concerns off project teams to generate new ideas (Wah, 1999b). Train people in methods like "knowledge navigation". Skandia uses this technique in its Future Center to help employees and visitors from other organizations experiment and develop prototypes of how tomorrow's innovative knowledge organizations will work (Wah, 1999b).

- Take ownership of knowledge to maintain expertise and speed up the application of new ideas (Wah, 1999a). Let knowledge workers take greater control over their work to enable them to get more uninterrupted private thinking time. Provide pleasant, stimulating workplaces to create, gather and share information.
- Use peer-to-peer networks to develop global mind-sets and build their own global brains (Dutton, 1999). A global brain combines local expertise from various geographical areas around the world with the insights of local managers. Tacit knowledge from peer-to-peer networks can use methods like Napster to bypass central exchanges, to enable computers to talk to one another as equals (McAfee, 2000).

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