Chapter 2.31
IS Design for Community of Practice's Knowledge Challenge

Kam Hou Vat
University of Macau, Macau

INTRODUCTION

The last decade of the 20th century saw explosive growth in discussions about knowledge—knowledge work, knowledge management, knowledge-based organizations, and the knowledge economy (Cortada & Woods, 2000). Against this backdrop, enterprises including educational institutes are challenged to do things faster, better, and more cost-effectively in order to remain competitive in an increasingly global environment (Stalk, Evans & Shulman, 1992). There is a strong need to share knowledge in a way that makes it easier for individuals, teams, and enterprises to work together to effectively contribute to an organization's success.

This idea of knowledge sharing has well been exemplified in the notion of a learning organization (LO) (Senge, 1990; Garvin, 1993; King, 1996; Levine, 2001). Essentially, a learning organization could be considered as an organization that focuses on developing and using its information and knowledge capabilities in order to create higher-value information and knowledge, to

modify behaviors to reflect new knowledge and insights, and to improve bottom-line results. Consequently, there are many possible instances of information system (IS) design and realization that could be incorporated into a learning organization. The acronym "LOIS" (Learning Organization Information System) (Williamson & Lliopoulos, 2001) as applied to an organization is often used as a collective term representing the conglomeration of various information systems, each of which, being a functionally defined subsystem of the enterprise LOIS, is distinguished through the services it renders. For example, if a LOIS could support structured and unstructured dialogue and negotiation among the organizational members, then the LOIS subsystems might need to support reflection and creative synthesis of information and knowledge, and thus integrate working and learning. Also, if each member of an organization is believed to possess his or her own knowledge space, which is subject to some level of description, and thus may be integrated into an organization's communal knowledge space (Wiig, 1993; Davenport & Prusak, 1998; Levine,

2001), the LOIS subsystems should help document information and knowledge as it builds up, say, by electronic journals. Or, they have to make recorded information and knowledge retrievable, and individuals with information and knowledge accessible. Collectively, a LOIS can be considered as a scheme to improve the organization's chances for success and survival by continuously adapting to the external environment. That way, we stand a better chance of increasing social participation and shared understanding within the enterprise, and thus foster better learning. More importantly, the philosophy underlying the LOIS design should recognize that our knowledge is the amassed thought and experience of innumerable minds, and LOIS helps capture and reuse those experiences and insights in the enterprise. Indeed, the cultivation of an organization's communal knowledge space—one that develops new forms of knowledge from that which exists among its members, based on seeing knowledge as a social phenomenon, and not merely as a 'thing'—is fundamental to enterprises that intend to establish, grow, and nurture a learning organization, be it physical or digital (Hackbarth & Groven, 1999), where individuals grow intellectually and expand their knowledge by unlearning inaccurate information and relearning new information.

The theme of this article is to examine the knowledge processes required of the learning organization viewed from the community of practice viewpoint, to develop and sustain the communal knowledge space through the elaboration of suitable LOIS support so as to expand an organization's capacity to adapt to future challenges.

THE BACKGROUND OF COMMUNITIES OF PRACTICE

According to Wenger, McDermott, and Snyder (2002, p. 4), communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise by interacting on an ongoing basis. As they spend time together, they typically share information, insight, and advice. They help one another solve problems; they ponder common issues, explore ideas, and accumulate knowledge. Oftentimes, they become informally bound by the value that they find in learning together. This value is not merely instrumental for their work. It also accrues in the personal satisfaction of knowing colleagues who understand each other's perspectives and of belonging to an interesting group of people. Over time, they develop a unique perspective on their topic, as well as a body of common knowledge, practices, and approaches. They also develop personal relationships, a common sense of identity, and established ways of interacting.

Indeed, communities of practice are not a new idea (Wenger, 1998). They were our first knowledge-based social structures, back when we lived in caves and gathered around the fire to discuss strategies for cornering prey, the shape of arrowheads, or which roots were edible. They have captured our focus today because organizations have come to realize that knowledge has become the key to success (OECD, 1996), and their competitive edge is mostly the intellectual capital of their employees (Stewart, 1997), and they need to be more intentional and systematic about managing knowledge through harnessing their human resources in order to stay ahead of the pack. Undeniably, in today's knowledge-intensive economy, organizations are increasingly expecting their employees to continually improvise and invent new methods to deal with unexpected difficulties and to solve immediate problems, and to share these innovations with other employees through some effective channels.

In this regard, the idea of the community of practice has inspired many an organization to initiate their collective learning based not so much on delineated learning paths, but rather on experience sharing, the identification of best practices, and

reciprocal support for tackling day-to-day problems in the workplace. Cultivating communities of practice in strategic areas is considered as a practical way to manage knowledge in terms of critical knowledge domains; organizations need to identify the people and the specific knowledge needed for their work, and explore how they connect them into suitable communities of practice so that together they could steward the necessary knowledge. From this viewpoint, the cultivation of an organization's communal knowledge space is literally the cultivation of the various communities of practice throughout the organization.

UNDERSTANDING THE KNOWLEDGE CHALLENGE FOR LEARNING ORGANIZATIONS

Nowadays, enterprises need to understand precisely what knowledge will give them a competitive advantage. They then need to keep this knowledge on the cutting edge, deploy it, leverage it in operations, and spread it across the organization. However, many an organization still has no explicit, consolidated knowledge strategy to steward the required knowledge. Instead, many attempts at knowledge management have simply counted on new information technologies to capture all the possible knowledge of an organization into databases that would make it easily accessible to all employees (King, 1999; Levine, 2001). This philosophy of regarding knowledge as a "thing" that can be managed like other physical assets has not been quite successful for several obvious reasons. One is the apparent difficulty concerned with knowledge capture and the issue of tacit-to-explicit transformation. Another is the question of intellectual asset management. Third is the myopic interpretation of knowledge management in terms of information management, which involves breaking information into smaller chunks that can be detected throughout the organization, stored for later use, manipu-

lated by being combined with other chunks, and transferred where they are needed. The ultimate goal of such knowledge management efforts is to get the right information to the right people at the right place with the right information technologies. It is believed that a knowledge strategy must be based on understanding what the knowledge challenge is. The essence of this challenge comes down to a few key points about the nature of knowing (Nonaka & Takeuchi, 1995; O'Leary, 1998; Wenger, 1998, 2002).

- Knowledge lives in the human act of knowing: In many instances of our daily living, our knowledge can hardly be reduced to an object that can be packaged for storage and retrieval. Our knowledge is often an accumulation of experience—a kind of residue of our actions, thinking, and conversations—that remains a dynamic part of our ongoing experience. This type of knowledge is much more a living process than a static body of information.
- Knowledge is tacit as well as explicit: Not everything we know can be codified as documents or tools. Sharing tacit knowledge requires interaction and informal learning processes such as storytelling, conversation, coaching, and apprenticeship. The tacit aspects of knowledge often consist of embodied expertise—a deep understanding of complex, interdependent elements that enables dynamic responses to context-specific problems. This type of knowledge is very difficult to replicate. This is not to say that it is not useful to document such knowledge in whatever manner serves the needs of practitioners. But even explicit knowledge is dependent on tacit knowledge to be applied.
- Knowledge is dynamic, social, as well as individual: It is important to accept that though our experience of knowing is individual, knowledge is not. Much of what we

know derives from centuries of understanding and practice developed by long-standing communities. Appreciating the collective nature of knowledge is especially important in an age when almost every field changes too much, too fast for individuals to master. Today's complex problem solving requires multiple perspectives. We need others to complement and develop our own expertise. In fact, our collective knowledge of any field is changing at an accelerating rate. What was true yesterday must be adapted to accommodate new factors, new data, new inventions, and new problems.

In short, what makes managing knowledge a challenge is that it is not an object that can be stored, owned, and moved around like a piece of equipment or a document. It resides in the skills, understanding, and relationships of its members, as well as in the tools, documents, and processes that embody aspects of this knowledge. In response to such knowledge challenge in a learning organization, it is interesting to observe some of the interpretations from the standpoint of the communities of practice (CoPs).

Firstly, it is not a CoP's practice to reduce knowledge to an object. They often make it an integral part of their activities and interactions, and they serve as a living repository for that knowledge. Secondly, a CoP is in the best position to codify knowledge since their members can combine its tacit and explicit aspects. They also can produce useful documentation, tools, and procedures because they understand the needs of practitioners. Such CoP products are often not considered as just objects by themselves, but are part of the life of the community. Thirdly, what counts as collective knowledge is often produced through a process of communal involvement, including all the possible controversies, so as to develop the specific body of knowledge. This collective character of knowledge creation does not mean that individuals do not count. In fact, the best

communities welcome strong personalities and encourage disagreements and debates. Besides, that knowledge is not static does not mean that a domain of knowledge lacks a stable core. One of the primary tasks of a community of practice is to establish a common baseline of knowledge and standardize what is well understood so that people can focus their creative energies on the more advanced issues.

CONCEIVING KNOWLEDGE PROCESSES FOR COMMUNITIES OF PRACTICE

In order to create the communal knowledge space through cultivating various communities of practice for the entire organization, it is important to have a vision that orients the entire organization to the kind of knowledge it must acquire, and wins spontaneous commitment by the individuals and groups involved in knowledge creation (Dierkes, Marz & Teele, 2001; Kim, 1993; Stopford, 2001). It is top management's role to articulate this knowledge vision and communicate it throughout the organization. A knowledge vision should define what kind of knowledge the organization should create in what domains. It helps determine how an organization and its knowledge base will evolve in the long run (Leonard-Barton, 1995; Nonaka & Takeuchi, 1995). On the other hand, the central requirement for organizational knowledge synthesis is to provide the organization with a strategic ability to acquire, create, exploit, and accumulate new knowledge continuously and repeatedly. To meet this requirement, we need an actionable framework, which could facilitate the development of this strategic ability through the communities of practice. It is likely that there are at least three major processes constituting this synthesis framework of a learning organization, including the personal process, the social process, and the organizational process. What follows is our appreciation of these three important knowl-

edge processes considered as indispensable in the daily operations of the learning organization. Of particular interest here is the idea of appreciative settings, which according to Vickers (1972, p. 98) refer to the body of linked connotations of personal interest, discrimination, and valuation which we bring to the exercise of judgment and which tacitly determine what we shall notice, how we shall discriminate situations from the general confusion of ongoing events, and how we shall regard them. The word "settings" is used because such categories and criteria are usually mutually related; a change in one is likely to affect others.

- The Personal Process: Consider a human being as an individual conscious of the world outside his or her physical boundary. This consciousness means that we can think about the world in different ways, relate these concepts to our experience of the world, and so form judgments that can affect our intentions and, ultimately, our actions. This line of thought suggests a basic model for the active human agent in the world. In this model we are able to perceive parts of the world, attribute meanings to what we perceive, make judgments about our perceptions, form intentions to take particular actions, and carry out those actions. These change the perceived world, however slightly, so that the process begins again, becoming a cycle. In fact, this simple model requires some elaborations. First, we always selectively perceive parts of the world, as a result of our interests and previous history. Secondly, the act of attributing meaning and making judgments implies the existence of standards against which comparisons can be made. Thirdly, the source of standards, for which there is normally no ultimate authority, can only be the previous history of the very process we are describing, and the standards will themselves often change over time as new

experience accumulates. This is the process model for the active human agents in the world of individual learning, through their individual appreciative settings. This model has to allow for the visions and actions, which ultimately belong to an autonomous individual, even though there may be great pressure to conform to the perceptions, meaning attributions, and judgments which belong to the social environment, which, in our discussion, is the community of practice.

- The Social Process: Although each human being retains at least the potential selectively to perceive and interpret the world in his or her own unique way, the norm for a social being is that our perceptions of the world, our meaning attributions, and our judgments of it will all be strongly conditioned by our exchanges with others. The most obvious characteristic of group life is the never-ending dialogue, discussion, debate, and discourse in which we all try to affect one another's perceptions, judgments, intentions, and actions. This means that we can assume that while the personal process model continues to apply to the individual, the social situation will be that much of the process will be carried out inter-subjectively in discourse among individuals, the purpose of which is to affect the thinking and actions of at least one other party. As a result of the ensuing discourse, accommodations may be reached which lead to action being taken. Consequently, this model of the social process which leads to purposeful or intentional action, then, is one in which appreciative settings lead to particular features of situations, as well as the situations themselves, being observed and interpreted in specific ways by standards built up from previous experience. Meanwhile, the standards by which judgments are made may well be changed through time as our personal and

social history unfolds. There is no permanent social reality except at the broadest possible level, immune from the events and ideas, which, in the normal social process, continually change it.

- The Organizational Process: Our personal appreciative settings may well be unique since we all have a unique experience of the world, but oftentimes these settings will overlap with those of people with whom we are closely associated or who have had similar experiences. Tellingly, appreciative settings may be attributed to a group of people, including members of a community, or the larger organization as a whole, even though we must remember that there will hardly be complete congruence between the individual and the group settings. It would also be naïve to assume that all members of an organization share the same settings, those that lead them unambiguously to collaborate together in pursuit of collective goals. The reality is that though the idea of the attributed appreciative settings of an organization as a whole is a usable concept, the content of those settings, whatever attributions are made, will never be completely static. Changes both internal and external to the organization will change individual and group perceptions and judgments, leading to new accommodations related to evolving intentions and purposes. Subsequently, the organizational process will be one in which the data-rich world outside is perceived selectively by individuals and by groups of individuals. The selectivity will be the result of our predispositions to "select, amplify, reject, attenuate, or distort" (Land, 1985, p. 212) because of previous experience, and individuals will interact with the world not only as individuals but also through their simultaneous membership of multiple groups, some being formally organized and others informally. Perceptions will be exchanged, shared, challenged, and argued over, in a discourse that will consist of the inter-subjective creation of selected data and meanings. Those meanings will create information and knowledge which will lead to accommodations being made, intentions being formed, and purposeful action undertaken. Both the thinking and the action will change the perceived world, and may change the appreciative settings that filter our perceptions. This organizational process is a cyclic one and a process of continuous learning; it should be richer if more people take part in it. And it should fit into the context of a learning organization.

AN ORGANIZATION SCENARIO OF KNOWLEDGE SYNTHESIS FOR COMMUNITIES OF PRACTICE

From the discussion built up so far, we can understand that knowledge synthesis is a social as well as an individual process. Sharing tacit knowledge requires individuals to share their personal beliefs about a situation with others (Nonaka, 2002). At that point of sharing, justification becomes public. Each individual is faced with the tremendous challenge of justifying his or her beliefs in front of others—and it is this need for justification, explanation, persuasion, and human connection that makes knowledge synthesis a highly dynamic process (Markova & Foppa, 1990; Vat, 2003).

To bring personal knowledge into a social context, within which it can be amplified or further synthesized, it is necessary to have a field that provides a place in which individual perspectives are articulated, and conflicts are resolved in the formation of higher-level concepts. In the organizational context of our investigation, this field for interaction is provided in the form of a community of practice, made of members perhaps from different functional units.

It is a critical matter for an organization to decide when and how to establish such a community of interaction in which individuals can meet and interact. This community triggers organization knowledge synthesis mainly through several stages. First, it facilitates the building of mutual trust among members, and accelerates creation of an implicit perspective shared by members as tacit knowledge. Second, the shared implicit perspective is conceptualized through continuous dialogue among members. Tacit field-specific perspectives are converted into explicit concepts that can be shared beyond the boundary of the community. It is a process in which one builds concepts in cooperation with others. It provides the opportunity for one's hypothesis or assumption to be tested. As Markova and Foppa (1990) argue, social intercourse is one of the most powerful media for verifying one's own ideas. Next comes the step of justification, which determines the extent to which the knowledge created within the community is truly worthwhile for the organization. Typically, an individual justifies the truthfulness of his or her beliefs based on observations of the situation; these observations, in turn, depend on a unique viewpoint, personal sensibility, and individual experience. Accordingly, when someone creates knowledge, he or she makes sense out of a new situation by holding justified beliefs and committing to them. Indeed, the creation of knowledge, from this angle, is not simply a compilation of facts, but a uniquely human process that cannot be reduced or easily replicated. It can involve feelings and belief systems of which we may not even be conscious. Nevertheless, justification must involve the evaluation standards for judging truthfulness. There might also be value premises that transcend factual or pragmatic considerations. Finally, we arrive at the stage of cross-leveling knowledge (Nonaka, 2002). During this stage, the concept that has been created and justified is integrated into the knowledge base of the organization, which comprises a whole network of organizational knowledge.

CRITICAL CHALLENGES OF ARCHITECTING IS SUPPORT FOR COMMUNITIES OF PRACTICE

Undeniably, setting up an organizational IS support for various communities of practice is a social act in itself, requiring some kind of concerted action by many different people (Vat, 2004a); and the operation of any LOIS subsystem entails such human phenomena as attributing meaning to manipulated data and making judgments about what constitutes a relevant category (Vat, 2004b). Subsequently, an organization is often seen at core as a conversational process in which the world is interpreted in a particular way which legitimates shared actions and establishes shared norms and standards. There is no single body of work which underlies this soft approach to IS, but the works of Sir Geoffrey Vickers (1965) provide quite an interesting reference. For Vickers, organizational members set standards or norms rather than goals, and the traditional focus on goals is replaced by one on managing relationships according to standards generated by previous history of the organization. Furthermore, the discussion/debate, which leads to action, is one in which social action is based upon personal and collective sense making (Weick, 1995). Thereby, organizations are also regarded as networks of conversation or communicative exchanges in which commitments are generated (Ciborra, 1987; Winograd & Flores, 1986). And LOIS support should be thought of as making such exchanges easier—the exchange support systems.

Consequently, a strategy for IS support needs to be thought of, through which desirable change and organizational learning are often considered as the aims. Its stages of development could be characterized as follows with plausible iterations in stages 3, 4, and 5 (Wilson, 2002, pp. 6-10):

1. define the situation that has provoked concerns;

2. express the situation with different sets of concerns;
3. select concepts that may be relevant;
4. assemble concepts into an intellectual structure;
5. use this structure to explore the situation;
6. define changes to the situation as the challenges to be explored; and
7. implement the change processes.

Given the great variety of organizational design problems for CoP-based LOIS support, considerable flexibility must exist in the concepts and structures available to the analysts. It is believed that unless the particular methodology is assembled as a conscious part of the analysis, it is very unlikely that the changes and solutions identified will represent an effective output of the analysis. More importantly, the specific methodology needs to be explicit in order to provide a defensible audit trail from recommendations back to initial assumptions and judgments.

Thereby, thinking about how to think in designing LOIS support is about planning the intellectual process to follow up with the design itself. And there are numerous challenges (Carroll, 1995, 2000) in the underlying process. First, there is often an incomplete description of the problem to be addressed, but it is always necessary to identify the relevant description of the current situation that is to be altered by the design work. Secondly, the problem space of allowable and possible moves is often not determined beforehand. In fact, there is often no guidance on possible design moves in reasoning from a description of the current situation toward an improved version of the situation. Thirdly, design problems themselves characteristically involve many trade-offs; any move creates side effects, such as impacts on human activities. Accordingly, it is by no means a routine process in the IS design for organizational communities of practice.

FUTURE TRENDS OF IS DESIGN FOR COP-BASED KNOWLEDGE SYNTHESIS

According to Checkland and Holwell (1995), the main role of an information system is that of a support function helping people in their purposeful actions. Many of today's information systems are difficult to learn and awkward to use; they often change our activities in ways that we do not need or want. The problem lies in the IS development process. Oftentimes, IS designers have to face convoluted networks of trade-off and inter-dependence, the need to coordinate and integrate the contributions of many kinds of experts, and the potential of unintended impacts on people and their social institutions. It has been observed that traditional textbook approaches to IS development (Checkland & Holwell, 1998) seek to control the complexity and fluidity of design using techniques which filter the information considered, and weakly decompose the problems to be solved. In contrast, the scenario-based design approach (Vat, 2004a, 2004b; Carroll, 1995, 2000) belongs to a complementary tradition that seeks to exploit the complexity and fluidity of design by trying to learn more about the concrete elements of the problem situation. Thereby, John Carroll characterizes scenarios as concrete stories about use through which IS architects could envision and facilitate new ways of doing things and new things to do. Specifically, scenarios provide a vocabulary for coordinating the central tasks of systems development—understanding people's needs, envisioning new activities and technologies, designing effective systems and software, and drawing general lessons from systems as they are developed and used. Namely, scenarios help IS designers analyze the various possibilities by focusing first on the human activities that need to be supported and allowing descriptions of those activities to drive the quest for correct problem requirements. It is expected that through

maintaining a continuous focus on situations of and consequences for human work and activities, IS designers could become more informed of the problem domains, seeing usage situations from different perspectives, and managing trade-offs to reach usable and effective design outcomes (Carroll, 1994, 1995).

Consequently, through the appropriate use of design scenarios, the problems of designing CoP-based LOIS support for knowledge work should never be thought of as something to be defined once and for all, and then implemented. Instead, it must be based on the observation that all real-world organizational problem situations contain people interested in trying to take purposeful action (Checkland, 1999). Pragmatically, the idea of a set of activities linked together so that the whole, as an entity called the human activity system (HAS) from the viewpoint of soft systems methodology (SSM) (Checkland & Holwell, 1998; Checkland & Scholes, 1999) could pursue a purpose, could indeed be considered as a representative organizational scenario for architecting LOIS support, which is never fixed once and for all. In practice, given a handful of the HAS models, namely, models of concepts of purposeful activity built from a declared point of view, we could create a coherent structure to debate about the problem situation and what might improve it (Checkland, Forbes & Martin, 1990; Checkland, 1981, 1983).

Subsequently, from the IS architect's point of view, while conceiving the necessary IS support to serve the specific organizational knowledge requirements, the fundamental ideas could be integrated as follows: Always start from a careful account of the purposeful activity to be served by the system. From that, work out what informational support is required (by people) to carry out the activity. Treat the creation of that support as a collaborative effort between technical experts and those who truly understand the purposeful action served. Meanwhile, ensure that both system creation and system development and use are treated

as opportunities for continuous learning. In this way, models of purposeful human activities can be used as scenarios to initiate and structure sensible discussion about LOIS support for the people undertaking the real-world problem situations. Thereby, the process of IS development needs to start not with attention quickly focused on data and technology, but with a focus on the actions served by the intended organizational system. Once the actions to be supported have been decided and described, which can usefully be done using activity models, we can proceed to decide what kind of support should be provided. The key point is that in order to create the necessary IS support which serves the intended organizational scenario, it is first necessary to conceptualize the organizational system (different communities of practices) that is to be served, since this order of thinking should inform what relevant services would indeed be needed in the IS support.

CONCLUSION

This article describes an initiative to develop an actionable framework of knowledge processes, which are aimed to facilitate the creation and sustenance of communities of practice in the context of a learning organization. Our discussion has paid particular attention to the design issues in support of participatory knowledge construction, which is essential for the growth of any CoP in the organizational workplace. In particular, we have elaborated the design issues of three important knowledge processes (the individual, the social, and the organizational), which have tremendous implications for the design of suitable IS support (Vat, 2004b) to help structure and facilitate knowledge creation in the specific organizational setting, where a community of people can conceptualize their world and hence the purposeful action they wish to undertake. This renders a perspective of a knowledge context in a learning organization in which social reality is continually defined and

re-defined in both the talk and action of the various communities within the organization. The article concludes by reiterating the challenge of designing LOIS support so that the purposeful actions of the CoPs can be accommodated. It is important that the examination of meanings and purposes should be broadly based, and its richness will be greater the larger the number of people who take part in it. This consequently provides the basis for ascertaining the development of an organization's communal knowledge space: namely, what IS support is needed by those undertaking their actions, and how modern information technologies can help to provide that support to the various communities of practice.

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