The Wiki: a tool to support the activities of the knowledge worker

Helen Hasan
Charmaine C Pfaff

School of Economics and Information Systems
University of Wollongong
Wollongong, Australia
Email: hasan@uow.edu.au

Faculty of Business and Informatics
Central Queensland University
Sydney International Campus, CMS
Sydney, Australia
Email: pfaffc@syd.cqu.edu.au

Abstract

Since its increase in popularity in the 1990's, mainstream knowledge management research has grappled with problems of capturing, storing and disseminating knowledge in order to support growth and learning in organisations. Attempts by management to impose knowledge management initiatives often ignore the fact that, as knowledge workers, many employees possess a huge array of work-related tacit knowledge, which cannot readily be made explicit through formal enterprise knowledge management systems and processes. Informal collaborative software, known as Wikis, may provide a more appropriate knowledge management capability and environment to capture tacit knowledge. However Wikis are only now moving from the social to the corporate arena because they challenge management authority by engaging the knowledge worker in democratising organisational knowledge. Theoretical development is needed, accompanied by sound methodologies, to better understand these new processes of creation, accumulation and maintenance of knowledge in organisations. This paper has addressed the gap between theory and method by using Activity Theory to analyse the Wiki as a tool that mediates employee-based knowledge management activities.

Keywords

Wiki, knowledge management, knowledge worker, Activity Theory and organisational knowledge.

1. INTRODUCTION

Knowledge Management (KM) has became a popular research theme in many disciplines (Organisational Science, Human Resources Information Systems and others) following the work of Nonaka (1991) and others in the 1990's. Organisations essentially aim to move knowledge from the realm of the individual into the hands of the organisation. In practice, mainstream knowledge management has grappled with problems of capturing, storing and disseminating knowledge in order to support growth and learning in organisations.

Until recently, most organisations implementing KM programs adopted a well-structured and ordered approach, aligned with current organisational goals, such as the one presented in the Interim Australian KM Standard (AS5037[Int] 2003). In this paradigm, enterprise knowledge management systems require that data and documents be stored through well-established institutional processes in well-designed knowledge repositories. The process of building these knowledge repositories has been criticised as being time-consuming, laborious, and costly. Many have not been successful and have failed to be seen to improve the bottom line. Viewed by many as a superficial implement of management, they are often not kept up-to-date and are rarely accessed when real knowledge is sought. The complete Australian KM Standard (AS 5037—2005) has addressed this deficiency.

Attempts by management to impose KM initiatives often ignore the fact that, as knowledge workers, many employees possess a huge array of work-related tacit knowledge, which cannot readily be made explicit through formal enterprise knowledge management systems and processes (Butler 2003). Often, employees have no incentive to share this knowledge with other employees because they believe that what they know provides them with an advantage in bargaining and negotiation, in order to enhance their standing in the company. Other concerns include the fear that this may often result in sharing of partial, inaccurate, or ambiguous information.

The primary motivation of employees to share accurate and timely information is based on trust that comes from an information sharing culture.

The revised Australian KM Standard (AS 5037—2005), released in 2005, reflects the reality that a new KM generation is emerging that requires radical changes to traditional forms of organisations. Here, an enterprise is viewed as a knowledge eco-system where basic elements of people, processes, technology and content are dynamically interrelated and embedded in the ever-changing context and culture of the organisation (AS 5037—2005). This leads to an environment where knowledge workers are authorised, empowered and encouraged to cooperatively manage their own work practices and knowledge. This paper will assert that a Wiki is an ideal tool for KM in such an environment and that Activity Theory provides a useful framework to analyse the complex interactions involved.

The paper is structured as follows. The first section of this paper presents issues of organisational knowledge, knowledge management and knowledge work that relate to the emergent trend towards a more cooperative and democratic KM. The second section explains what a Wiki is, and how a Wiki can be used as a knowledge management system in this paradigm. The third section describes our view of Activity Theory and applies it as a framework to help understand issues to be considered with the Wiki as a knowledge management system. In the concluding section we offer suggestions regarding the future directions of creative conversational technologies such as Wikis that may support KM activities.

2. ORGANISATIONAL KNOWLEDGE, KNOWLEDGE WORKERS AND KNOWLEDGE MANAGEMENT

2.1 What is organisational knowledge?

The current corporate interest in knowledge is based on a realisation that emerging economic imperatives, coupled with social and industrial restructuring, demand a more rigorous approach to the exploitation of knowledge as an organisational resource. In the application of knowledge to business, inspired by the writings of Nonaka (1991), knowledge has been classified into two main types, namely explicit knowledge can be expressed in words or written down in the form of words, numbers, models or formulae.

Tacit knowledge, on the other hand, refers to knowledge that is embedded in a person's mind and cannot be expressed easily and explicitly. Desouza (2003) adds that tacit knowledge is deeply rooted in the human psyche of a person's actions and experiences, wrapped up in their ideals, values, and emotions. Greco (1999, p.19) maintained that the value of tacit knowledge has been overlooked because "In an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge".

In addition to the tacit-explicit dimension, many KM researchers distinguish between the view of knowledge as a commodity, and the view of knowledge as a flow. The former view is apparent when there is talk of capturing storing and disseminating knowledge; a view, which implies that knowledge, can be abstracted from one context and applied to another. It is often difficult in this view to discriminate between information and knowledge. Churchman (1971) has emphasized that: "To conceive of knowledge as a collection of information seems to rob the concept of all of its life... Knowledge resides in the user and not in the collection."

The alternate view sees knowledge as a flow. This is apparent when KM practitioners describe KM initiatives that set up a 'white-pages' of experts and create systems, such as communities of practice, to enable knowledge sharing. From this view only data and information can be stored external to the human mind. Knowledge can thus be defined as an individual's interpretation of information based on personal experiences, skills, and competencies over a course of time (Bollinger & Smith 2001). This knowledge can be shared or flow between employees, so that organisational knowledge is viewed as the collection of knowledge possessed by each employee. However, this view ignores the possibility that additional knowledge resides in the relationships between employees and in the legacy of previous employees embedded in organisational memory and culture. Organisational knowledge can be about what employees understand about historical knowledge inherent in the organisation such as the knowledge about customers, products, processes, errors, and successes. Rich and Duchessi (2000) equate organisational knowledge with the collective wisdom of the organisation when this knowledge is collected and shared.

From an Information Systems perspective, knowledge is the top of the data-information-knowledge hierarchy where information is meaningful, processed data and knowledge is information that is actionable. Complementing the need for meaningful knowledge repositories, is the need for systems to translate massive amounts of stored data and information into a form that enable people to work not only more effectively but also more creatively. The focus is sharing this knowledge more quickly and efficiently. New data and information

emerges every day and existing knowledge can become redundant very soon. Thus it is very important for organisations to allow employees to be able to share the information very quickly.

Many believe that is it is this actionable quality that distinguishes knowledge from information or data (Handzic & Hasan 2003). As echoed by Haedrich and Maier (2004) "knowledge comprises observations that have been meaningfully organised and embedded in a context through experience, communication or inference that an actor uses to interpret situations and to accomplish tasks." Malhotra (2004) argues that knowledge is better represented as active, affective, and dynamic. It is active as knowledge is best understood in action. It is affective because it takes into account the cognitive and rational dimensions, and the emotional dimensions of human decision-making. It is dynamic as it is based upon ongoing reinterpretation of data, information, and, assumptions while pro-actively sensing how decision-making process should adjust to future possibilities. This view of knowledge also reinforces the value of using Activity Theory for research on Knowledge Management.

2.2 What is knowledge management?

Davenport and Völpel (2001) claimed that the knowledge management movement began in the mid-1990s when organisations and individuals were focused on managing on how people think and act. As the term 'knowledge management' became popular in books, conferences and journals, differences in interpretation and definition have become a matter of contention. The authors believe that it has not been helpful to equate all practices that come within the province of KM as simply efforts at 'managing knowledge'. There is, indeed, a strong argument that knowledge by its very nature cannot be managed, in the traditional sense. Moreover, it may be detrimental to do so. Knowledge management can be considered as a counterbalance to a purely mechanistic view of business so that KM cannot be fostered under settings where people feel pressured, that makes them less motivated to engage in dialogue.

The Australian Standard (AS 5037—2005) defines knowledge management as follows:

> "A trans-disciplinary approach to improving organisational outcomes and learning, through maximising the use of knowledge. It involves the design, implementation and review of social and technological activities and processes to improve the creating, sharing, and applying or using of knowledge. Knowledge management is concerned with innovation and sharing behaviours, managing complexity and ambiguity through knowledge networks and connections, exploring smart processes, and deploying people-centric technologies."

We believe that knowledge management initiatives in an organisational context are reflected in people's activities. In the case of explicit organisational knowledge, this is expressed as autonomous work processes while individual tacit knowledge is expressed in terms of competencies, skills, expertise and the social construction of this capability. Underlying knowledge management is the imperative of flexible systems of production and management, underpinned by information and communications technologies (ICT), to match a rapidly changing environment.

Much of mainstream KM has failed to deliver because those implementing KM initiatives have retained a bureaucratic perspective of work as performed by individuals in a formal organisational structure where knowledge is viewed as a static resource or asset that can be treated in much the same way as any other commodity. As long as organisations retain this perspective, the real nature of knowledge work remains hidden, and thus inaccessible to those who are trying to "improve organisational outcomes" through KM practices (Linger & Warne 2001).

The concentration on formal organisational programs aimed at the individual workers ignored the real nature of work practices that reside in a space between the organisation and individual perspectives. Revealing the nature of this hidden space holds the key to understanding knowledge work and is critical to successful organisational outcomes and learning. The focus on work practices reveals how the community and its members conceptualise the work they perform. It also exposes the synergistic roles of the community and its members in the processes of knowledge production and re-production (Burstein & Linger 2003).

2.3 What is a Knowledge Worker?
The term 'knowledge worker' is attributed to Peter Drucker, who over forty years ago used it to describe someone who adds value by processing existing information to create new information which could be used to define and solve problems (Drucker 1959). For a long time the band of knowledge workers (doctors, lawyers, researchers) was rather small and elite, but this has a boundless potential to change with the spread of information and communication technology and the advancement of the information age. Against this, Zuboff (1989) argued, almost 20 years ago, that the information age carried with it, not liberation, but the threat that management, and perhaps the state, will use technology to invade more and more of the space previously claimed by workers and citizens for unsupervised, discretionary activity. While there is plenty of evidence of this seen in the trends to globalisation and standardisation of IT in the workplace, there is now evidence that the initial promise of the information age is being realised. New conversational technologies are now connecting and supporting liberated knowledge exchanges much as transportation systems and cities on the ground have

always done (Mitchell 1997). Interconnected networked structures of social interaction and creative activity are emerging as a part of the civil digital culture and, less rapidly, in the knowledge work of organisations.

In this context, Burstein and Linger (2003) have taken up Drucker's term "knowledge work" to refer to self-directed work practices of individuals and teams in almost every industry who continuously engage in processes that create and exploit knowledge. They go on to describe knowledge work as an activity system "located within the space defined by the *doing, thinking and communicating* dimensions. In order for actors to move seamlessly anywhere in this three-dimensional space, they need to have authority and responsibility that allows them to determine task outcomes." Likewise, Rogoski (1999) says of knowledge workers: "Their main value to an organisation is their ability to gather and analyse information and make decisions that will benefit the company. They are able to work collaboratively with and learn from each other; they are willing to take risks, expecting to learn from their mistakes rather than be criticised for them." Haedrich and Maier (2004) also note that knowledge work is typically characterised by attributes such as mobility, flexibility, teamwork, computer-support and the use of intellectual abilities as well as specialised knowledge rather than physical abilities. It is creative work solving unstructured problems that require exploration or creation of knowledge.

Drucker's more recent views are demonstrated in his observations that "... fewer and fewer people are subordinates - even in fairly low-level jobs. Increasingly they are knowledge workers. Knowledge workers cannot be managed as subordinates; they are associates… This difference is more than cosmetic. Once beyond the apprentice stage, knowledge workers must know more about their job than their boss does - or what good are they? The very definition of a knowledge worker is one who knows more about his or her job than anyone else in the organisation" (Drucker 1998). However he goes on to say that, "The productivity of the knowledge worker is still abysmally low. It has probably not improved in the past 100 or even 200 years-for the simple reason that nobody has worked at improving the productivity. All our work on productivity has been on the productivity of the manual worker…The way one maximizes their performance is by capitalising on their strengths and their knowledge rather than trying to force them into moulds." It is our contention that new ICT tools such as the Wiki can be the enabler to effect changes for the better in organisations. For example, organisations that adopt a rigorous 'best practices' approach find it extremely challenging to ensure that such practices remain open to critique, adaptation, and, replacement so that the organisation is not caught in the death spiral (Nadler and Shaw 1995) of doing *more of the same better and better* with diminishing marginal returns (Drucker, 1994).

3. WHAT IS A WIKI?

Together with Personal Digital Assistants (PDA) s and mobile telephones, conversational technologies such as email, discussion forums, chatrooms, Weblogs and Wikis have been readily adopted in civil society and are transforming the way many of us access information. We now conduct transactions and interconnect with others anywhere and any time in our everyday lives. Conversational technologies can be seen as tools to support work units and the individual knowledge worker. For this new breed of employee, it is as much part of their job to seek out, share and create knowledge as it is to perform work tasks. They need the skills, capabilities and authority, as well as ICT support, to do this thereby providing the firm with innovation and creativity. While all these new technologies can have a transforming influence when adopted within an organisational setting, it is the Wiki that is of most interest to the field of KM.

A Wiki is a web-based application that allows many participants to write collaboratively, where they can continue to add to or edit the content of documents and dynamically determine the relationships between sets of documents. Such documents can be anything supported by the web with hyperlinks to anywhere on the World Wide Web including text, image and video. It is named after the Hawaiian term 'Wiki' meaning 'quick', 'fast', or 'to hasten' which is symbolic of the quick changes in the editing processes (Leuf & Cunningham 2005). A Wiki is therefore a collection of interlinked HTML web pages and has crosslinks between internal pages where each page can be edited keeping a complete record of such changes. In addition, any change can be easily reverted to any of its previous states. A Wiki can be accessed from any web browser and no other special tools are needed to create and edit existing pages. A Wiki can be said to be an evolving knowledge repository where users are encouraged to make additions to this repository by adding new documents or working on existing ones (Pfaff & Hasan 2006).

The most well known example of a Wiki is the popular English language version of Wikipedia[1], which was started in 2001 and now has nearly 900,000 articles. Wikipedias have been published in 200 languages with a total of more than three million articles. Contributions come from all over the world. It is estimated that 100,000 people have made contributions, which includes four million editing work done on the articles. More people

---

[1] http://en.Wikipedia.org

have visited Wikipedia than popular sites such as the online the New York Times and CNN. Countless numbers of Wikis have been created since then, some in organisations as the knowledge management advantages have become more apparent. These organisations have already adopted the Wiki as a growing and living resource.

A Wiki is an ideal collaboration environment offering users the capability to co-create and co-evolve a knowledge repository. Central to the concept of a Wiki is that a user does not need to have any technical (computing or web-related) expertise to add, edit or delete a page. This means that even a novice user can contribute to the knowledge acquisition process in an organisation. A Wiki allows sufficient flexibility for users to lend their own interpretation about a particular topic. It avoids individual bias because the content of the data is determined by all the users.

3.1 Limitations of the Wiki

There are however social issues mitigating against the adoption of Wikis in corporations. If the Wiki can be described as a 'social software' (Swisher 2004), then there are social factors that must undergo some changes before the Wiki will be accepted as an open device to improve the organisation's knowledge management. The informal network approach that is currently favoured in a Wiki, may make some companies believe that their data quality will be affected and that system errors will occur. Their centralised and highly structured environment will make it difficult to adopt a 'community approach' towards knowledge acquisition. There is no recognition of authorship in a Wiki because pages can be freely written or edited by anybody. This goes against the innate need by workers for recognition, as well as a belief that the source of contributions should be accurately reflected. The Wiki software uses the 'contributors tag' for general name recognition of 'good' authors or editors. However, this might lead to disputes among the contributors that they have not contributed 'enough' to the article to be considered as one of the authors or editors.

Perhaps the most valid criticism is that the information is very variable in quality. As stated in Wikipedia, it is the official policy of Wikipedia to adopt a 'neutral point of view' or NPOV, to prevent the biased views of some authors. This is to appeal to the largesse of the majority to be fair and conciliatory if there are conflicts in opinions. So in an organisation there needs to be assurance that the information on a Wiki is credible. There is a need to determine matters of responsibility and decide who is held accountable if the data is fraudulent. The principal dilemma of a Wiki is that, while its anarchic nature is desirable for fostering open debate without censorship, it also raises questions about the quality of information available, which could inhibit its usefulness. Issues of quality control need to be thought through and evaluation of knowledge quality are extremely difficult to measure. Donabedian (1980) suggested that measures of process and structure can be used as indirect indicators of quality, for example, reliability of information, provision of context, qualification of authors, as well as the use or acceptance of this information by other employees.

4. THE WIKI AS THE NEXT GENERATION KMS

In trying to address the limitations of prior KMS, the next generation KMS must understand that competitive survival in rapidly changing environment would depend on the ability to continuously redefine and adapt organizational goals, purposes, and "the organisation's way of doing things." There is an emphasis in conforming to the status quo so that the organisation can "play it safe" and avoid errors. Many KMS fail because there is an assumption that all relevant knowledge, including tacit knowledge can be stored in computerized databases, software programs, and, institutionalized rules and practices. Human sense making processes represent a complete contrast, as human decision-making is influenced by attention, motivation, commitment, creativity, and innovation of individuals and groups.

It is a difficult challenge to scan the human mind and its sense making capabilities because most individuals may know more than they think they know. The sense meaning making capacity of the human mind may evoke tacit knowledge as a response to new and unfamiliar stimuli or situations that may not fit previously recognized scenarios. Malhotra (2004) states that the same data may evoke different responses from different people, at different times or in different contexts. Consequently, storing explicit static representations of individuals' tacit knowledge in databases may not be a viable solution for their dynamic sense making capabilities.

An overemphasis on consistency would constrain the design of the next generation KMS Although this may go against the traditional business logic that is based on organisational control where controls ensure conformity so that tasks can be defined and measured, however they stifle creativity and initiative. In practice, the new business environment requires a business model that will perform better based on a few rules, some specific information and greater freedom. Knowledge workers need to take autonomous roles of self-leadership and self-regulation and managerial functions as sense makers as they are in the best position to sense the dynamic changes in their immediate business environment. Using the Wiki, they would be able to define problems and generate their own solutions, evaluate and revise their solution-generating processes. Managers can promote the use of the Wiki to instil confidence in knowledge workers to act on incomplete information, trusting their own

judgments, and taking decisive actions. Such a democratisation of experimentation and rethinking will innovate the creation of new knowledge. Hence, in the emerging business model, Wiki communities should be rightfully treated as external extensions of the company's service and support infrastructure.

5. THE ACTIVITY THEORY ANALYSIS

5.1 Theoretical Basis: the Cultural-Historical Activity Theory

In many areas of research there is a need for a holistic theoretical framework to provide a basis for studies of complex socio-technical phenomena. Although the (cultural-historical) Activity Theory was proposed long before the advent of computers and the Internet, its holistic and insightful nature has the potential to provide a suitable vehicle for understanding and analysis in many areas of research and practice in information systems and knowledge management. A growing band of researchers recognise that the theory provides a rich holistic understanding of how people do things together with the assistance of sophisticated tools in the complex dynamic environments of modern organisations (Thomas and Torsten 2005); (Waycott, Jones and Scanlon 2005); (Hasan 1999).

The focus of this paper suggests that activity theory can be used as a theoretical framework to evaluate technology use and the emergent democratisation of knowledge through the use of a Wiki. Cultural-Historical Activity Theory has been adopted to underpin this analysis as it provides a multifaceted, holistic and dynamic framework for both the analysis of the problem area and presentation of the findings. Here *activity* is a suitable unit of analysis where the project team is a *collective subject* composed of individuals who bring different skills and understandings to bear on a *common object*, the Wiki.

The notion of *activity* is interpreted from the theory of Leontiev (1981) which is, in turn, based on the psychology of Vygotsky (1978). Vygotsky (1978) proposed an 'instrumented' structure of activity within a 'system of interrelationships' between people (Verenikina & Gould 1998). In other words, all human activity is purposeful, is carried out through the use of 'tools' and is essentially social. Essentially, Vygotsky (1978) defined human activity as a dialectic relationship between subject and object, i.e. a person working at something. In this dynamic, purposeful relationship the 'always active' subject learns and grows while the object is interpreted and reinterpreted by the subject in the ongoing conduct of the activity. The dialectic relationship between subject (human) and object (purpose) that forms the core of an activity is mediated by tools and community. This is a two-way concept of mediation where the capability and availability of tools mediates what is able to be done and tools, in turn, evolve to hold the historical knowledge of how the communities behaves and is organised. Vygotsky believed that tools play a mediating role in all human activities and mental processes which can only be understood in terms of the tools and signs that mediate them. Tools expand our possibility to manipulate and transform objects but also restrict what can be done within the limitation of the tool, which, in turn, often stimulates improvements to the tool (Verenikina & Gould 1998). This is particularly powerful when the tools are computer-based (Kaptelinen 1996). The formal, or informal, rules and division of labour of the community, in which the activity occurs, also dynamically mediate the subject-object relationship.

5.2 The Method of Analysis

Kuutti and Virkkunen's research (1995) has used activity systems as a representation of the common object of organisational work which cannot be studied by reducing the scope to one or another element, but where a minimum meaningful system as a whole should be taken as the unit of analysis and intervention. There may be legitimate alternative sets of actions that can enable the successful performance of an activity, for example: it is common practice in IS development to assess the feasibility of different design solutions to an organisational problem and then choose one solution to implement based on a cost benefit analysis. However there may be instances where it is feasible to allow concurrent different solutions (i.e. different sets of actions) for an activity under different circumstances (e.g. in different countries where cultures vary or in different divisions of a company). It is important however to have a common understanding of the object (purpose) of the activity at the top of the hierarchy.

This paper exploits the explanatory, analytical and interpretive power of Activity Theory for the study of Wikis viewed as socio-technical systems which mediate complex, collective knowledge-related activities in the modern workplace. The advantage of Activity Theory is that it supports the analysis of the dialectic interactions between people and technologies, and how they are shaped by human activity. The approach is strongly influenced by the expanding spiral of learning in the Developmental Work Research (DWR) approach (Engeström 1987), where the work unit is viewed as an activity system bringing together both practice and learning (Virkkunen & Kuutti 2000). As described in Hasan (2003b), following the work of Engeström (1987), Kuutti and Virkunnen (1995), an activity system normally has one central activity, which is the focal point of holistic investigation, surrounded by other activities with some link to the central activity.

Activity Theory is therefore well placed to describe the activities that occur in a socio-technical system such as those that use a Wiki for democratic cooperative knowledge management. The analysis begins with the identification and explication of the central activity and then looks at those activities that are link to it (Hasan 2003a). DWR provides a dynamic framework that can accommodate a multifaceted analysis of the interrelated activities of knowledge workers, their motives and purpose, their relationships and the tools that mediate their knowledge management activities. In this research the tools include, the Wiki technology together with social and learning processes within the organisation. Each activity is identified through the dialectic relationship between subject and object where the object encompasses focus and purpose while the subject, a person or group engaged in the activity, incorporates the various motives involved. The mediating elements are then revealed and include the tools, artefacts and concepts used by subjects to accomplish tasks, and the community which defines the social context for the activity. Engeström (1987) suggests the following are particular factors which mediate the relationship between the community and the activity:

• Division of Labour - the balance of tasks among different people in the system

• Rules - the code and guidelines for actions and behaviour in the system

In order to explicate both the core KM activity and other related activities associated with a corporate Wiki, we followed the example of the activity theory analysis of an earlier KM technology, Executive Information Systems (EIS), which at that time were quite new (Hasan 2001). As this extensive research unfolded, the analysis of the literature and a series of case studies led to the development of the activity system depicted in Figures 1 and 2. This work on EIS began with the premise that the core activity of senior managers was 'decision-making'. However, the most significant revelation of the research was that what managers do more often is to use a variety of means to gather information in order to make sense of the area for which they are responsible. The core activity of the EIS system was then changed to be 'sense–making' as shown in Figure 1. This activity is defined by the dynamic dialectic relationship between executives, as subject, and sense-making, as object, implying that the way executives collect process and use information is both subjective and objective. The subject-object relationship that defines the activity is mediated by the community, in this case the organisation and the government agency which funded the organisation based on the performance indicators stored in the EIS, and the EIS itself as a technical artefact or tool.
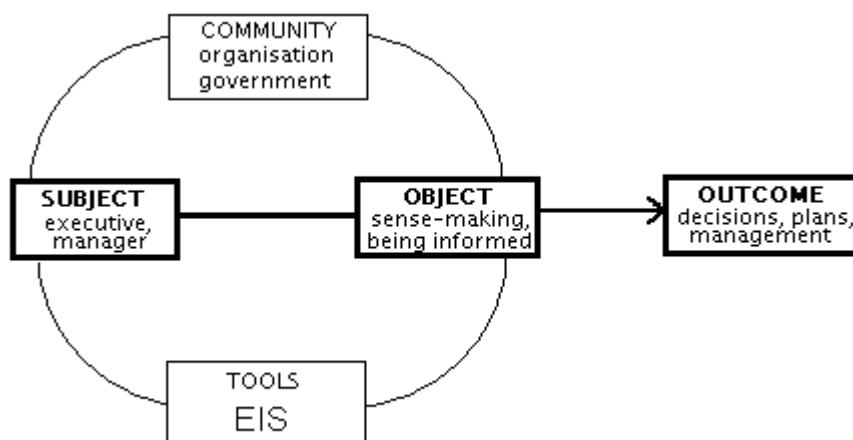

Figure 1: The central activity of executive senior managers using an EIS has sense-making as the object and decisions as one of the outcomes (Hasan 2001).

Although the sense-making activity of executive is no doubt mediated by many other activities internal and external to the organisation, this particular study focussed on those concerning the EIS. The most significant auxiliary activities to the core sense-making activity in this activity system were identified as 1) the technical development of the EIS', and 2) the data collection that formed its contents. In the organisation of the case study the subjects of these two activities were two quite separate work units with very different work cultures: one technical and the other bureaucratic. Figure 2 represents the way these link to the core sense-making activity to form an activity system.
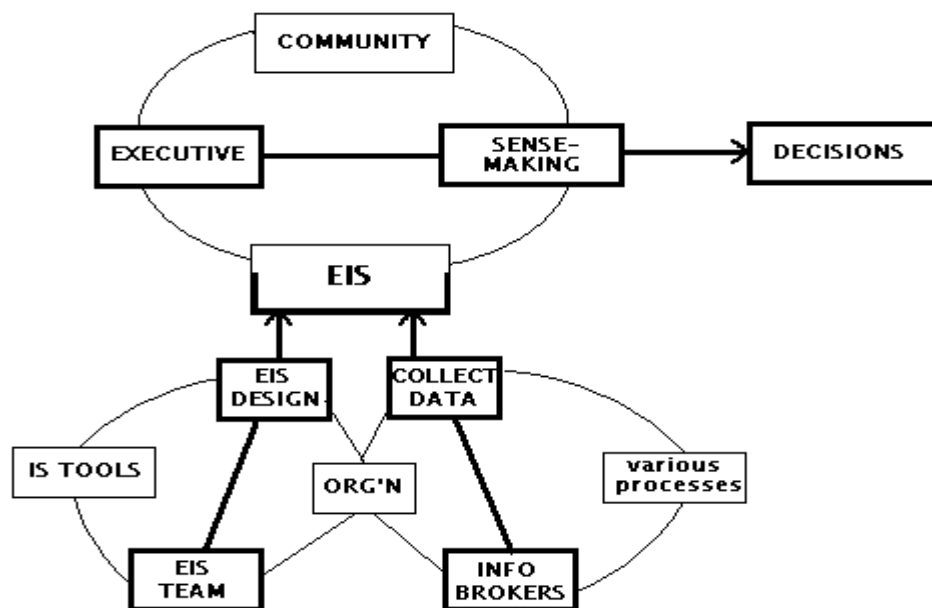
Figure 2: The activity system where the core activity, from Figure 1, has two linked tool-making activities: one to design the technological aspects of the EIS and the other to collect the data to populate the EIS data store (Hasan 2001).

5.3 What is the activity system of a corporate Wiki?

Following the previous example of the application of the activity theory framework to EIS, a general activity theory analysis of corporate Wiki used for KM will now be presented. We begin with the premise that knowledge management is not an end in itself but is undertaken in order to improve the performance of an organisation and enable it to learn and even transform itself to meet the changing demands of its environment. Thus the core activity, for which a Wiki is used, is not knowledge management per se but rather what we refer to as knowledge work. In the activities of the knowledge worker there is an obvious dialectic relationship between knowledge and work, i.e. thinking and doing or what employees do and what they know. This dialectic is expressed by a synthesis of the concept of experiential learning with that of informed actions, i.e. experience in a continuous cycle of doing through which learning occurs resulting in more knowledgeable doing and so on.

The Wiki is a tool by which workers can co-create knowledge about their work in a form that is meaningful for them to access as needed. Thus the activities of the knowledge worker as just described are mediated not only by the functions of the Wiki itself but also by the attitudes and customs of the organisations in giving workers the resources and authority to do so. This activity is shown in Figure 3.

The purpose of the Wiki activity is to create, share and manage knowledge in the form of an encyclopaedia, which will persist over time while the participants may change. Each participant subject will bring different personal characteristics that may change over time, including individual motivations, goals, and perceptions of self. The transformation of goals is affected by the users' self-perceived identities and the role of participation. The goal of participating in a Wiki is information gathering i.e. gathering specific knowledge that work related or maintaining the overall quality of the Wiki. Contributions can come from users' personal knowledge, which is related to fields that they feel comfortable and competent such as work projects or knowledge specializations. Bryant, Forte and Bruckman (2005) indicated that the potential audience for Wiki articles is important to the participants and the way they feel about their contributions.

The distinctive attributes of Wikis described above then give us an indication of the auxiliary activities that link to the core knowledge work activity shown in Figure 4. One of the main problems with previous knowledge repositories has been to motivate employees to contribute to it and then to use its contents (Hasan 2003a). As demonstrated by the popularity of Wikipedia, the Wiki can overcome this participatory problem although whether it will routinely do so in an organisational setting is yet to be verified. This may depend on the organisation having a knowledge sharing culture and appropriate job descriptions and incentives in place.
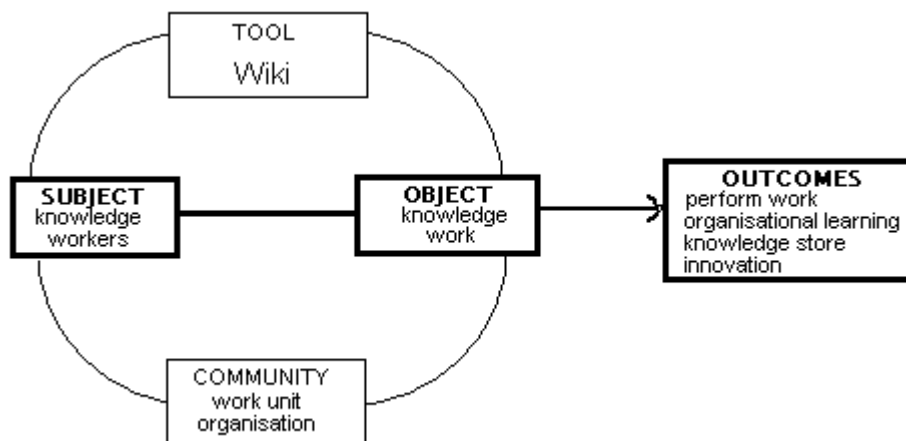
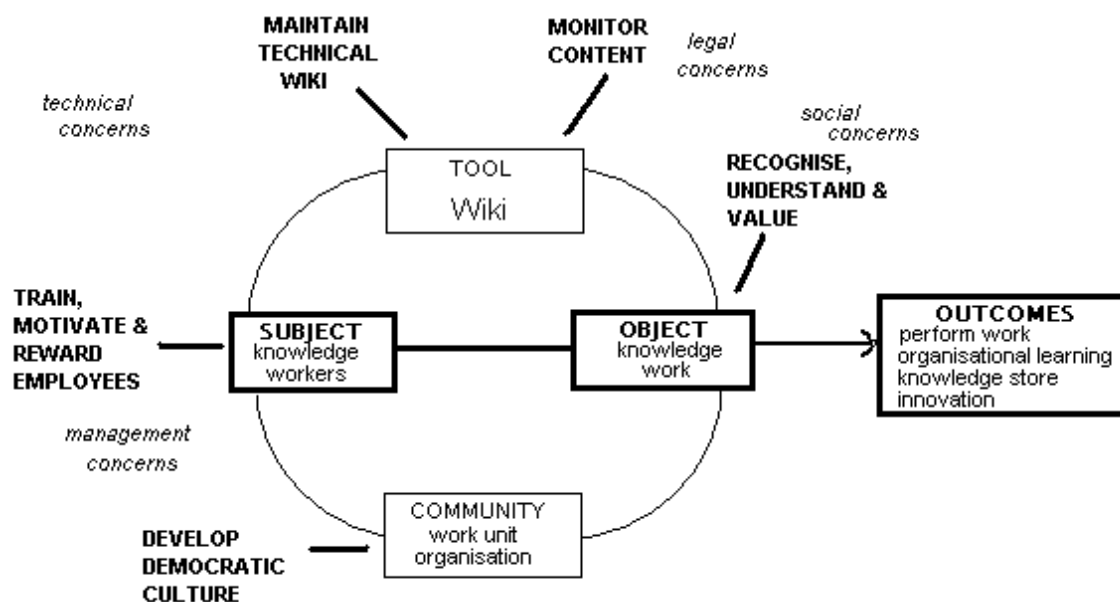Figure 3: The core activity of knowledge work mediated by a Wiki

Figure 4: elements of secondary activities related to knowledge work using a Wiki

6. IMPLICATIONS FROM THE ACTIVITY THEORY VIEW OF WIKIS

In summary the analysis using a Wiki for KM in an organisation brings out the following observations:

1.   The core activity of interest is knowledge work defined as a dialectic relationship including a synthesis of thinking and doing

2.   Not only is the activity of knowledge work mediated by the Wiki itself but also by organisational factors such as the existence or not of a knowledge sharing culture.

3.   The Activity Systems of which knowledge work is the core activity consists of other related activities as suggested in Figure 4, such as the establishment of suitable incentives.

Creative approaches may be needed for the introduction of a Wiki into a traditional organisational culture. A way to motivate and gradually ease employees into using the Wiki may be to start with a task that is part of the workload e.g. produce the annual report or submitting ideas for a group project. As employees grow more confident, the wiki can accept contributions about know-what ('best practices', rules, procedures, etc.) to harvesting know-how (stories, conversations and other context-rich knowledge).If this is made easier using the Wiki than in previous years without it, employees may take on board the benefits and readily move to other tasks.

Traditionally, the channels of information have been controlled by those who have wealth or influence. The creation of the Internet has had a democratising effect on the availability and use of information. Many users who are active on the Internet are there because they are attracted to the equal access it allows and its break from traditional media. Democracy raises public awareness of issues such as openness, freedom of information and public accountability (Benkler 2006). Sunstein (2006) argues that the on-line effort of joining together people with diverse talents and interests to achieve common goals might well provide the best path to infotopia. However in order for that to happen, people must feel they have more to gain from coming together than from working independently.

Scardamalia (2003) states that symmetric knowledge advancement occurs when the participants in a network are able to advance their own knowledge-building agendas by helping other participants advance theirs. The same democratising effect will be true of conversational technologies. As it is not easy to transfer the cumulative experience and skills of employees to the organisation, a Wiki can address this problem and be a type of 'information commons' (Benkler, 2006). An "information commons" are common spaces where people can share experiences and have unanticipated, un-chosen exposures to the ideas of other people. An organisational Wiki represents the power of many and this power is distributed collectively to improve content quality. Each author is able to change the contributions of other authors, refining the quality of the knowledge assets.

7. REFERENCES

AS5037[Int] (2003) Interim Australian Standard Knowledge Management, Standards Australia

AS 5037 (2005) Australian Standard Knowledge Management, Standards Australia

Benkler, Y (2006) The Wealth of Networks. URL http://www.benkler.org/wealth_of_networks/, Accessed 1 July 2006.

Bollinger, A.S. and Smith, R.D. (2001) Managing organizational knowledge as a strategic asset, Journal of Knowledge Management, 5(1), 8-18.

Bryant, S.L., Forte, A., & Bruckman, A. (2005) Becoming Wikipedian: Transformation of Participation in a Collaborative Online Encyclopedia, Conference on Supporting Group Work, Proceedings of the 2005 international ACM SIGGROUP conference on supporting group work, Sanibel Island, Florida, USA

Burstein, F. and Linger, H. (2003) Supporting post-Fordist Work Practices: A Knowledge Management Framework for Dynamic Intelligent Decision Support, Journal of IT&P special issue on KM, 16(3), 289-305.

Butler, T. (2003) From Data to Knowledge and Back Again: Understanding the Limitations of KMS, Knowledge and Process Management, 10(3), 144-155.

Churchman, C.W. (1971) The Design of Inquiring Systems. New York, NY: Basic Books.

Davenport, T. H. & Völpel, S.C. (2001) The rise of knowledge towards attention management, Journal of Knowledge Management, 5(3), 212-222.

Desouza, K.C. 2003 Facilitating tacit knowledge exchange, Communications of the ACM, 46(6), 85-88.

Drucker, P. (1959). Landmarks of Tomorrow, Harper, New York, USA.

Drucker, P.(1994). The Theory of Business. Harvard Business Review, September-October, 95-104.

Drucker, P. (1998) Management's New Paradigms. Forbes, 1998, 5 October.

Engeström Y. (1987). Learning by expanding: An activity-theoretical approach to developmental research. Helsinki: Orienta-Konsultit.

Greco, J. (1999). Knowledge is power, Journal of Business Strategy, March, 18-22.

Hädrich, T.; Maier, R.: Modeling Knowledge Work. In: Chamoni et al. (Eds.): Multikonferenz Wirtschaftsinformatik (MKWI) 2004, University Duisburg-Essen, 9th-11th March, Volume 2, Akademische Verlagsgesellschaft GmbH (Berlin), 189-203.

Handzic, M and Hasan, H. (2003) The Search for an Integrated KM Framework, In H. Hasan & M. Handzic (Eds) Australian Studies in Knowledge Management, UOW Press, 3-34

Hasan H. (2003a) An Activity-based Model of Collective Knowledge, Proceedings of 36th Hawaii International Conference on System Sciences , Big Island, Hawaii, USA.

Hasan H. (2003b) Communities as Activity Systems and other such Frameworks, in H. Hasan I. Verenikina and E Gould. (Eds) Information Systems and Activity Theory Volume 3 Expanding the Horizon, UOW Press, 74-95

Hasan H. (2001) An Historical Study of a Sequence of EIS Projects in an Organisation in Hasan, H., Gould, E. and Larkin, P. (Eds) Information Systems and Activity Theory: Volume 2 Theory and Practice, Wollongong University Press, 125-142.

Hasan H. (1999) Integrating IS and HCI using Activity Theory as a Philosophical and Theoretical Basis, Australian Journal of Information Systems, 6/2, 44-55. (1998) E-journal Foundations of IS at http://www.cba.uh.edu/~parks/fis/fisart.htm

Kaptelinin V. (1996) Activity Theory: Implications for Human-Computer Interaction in B.Nardi (Ed). Context and Consciousness: MIT Press, 103-116.

Leontiev A.N. (1981) Problems of the Development of Mind, Moscow, Progress.

Leuf, B. & Cunningham, W. (2001) The Wiki Way, Quick Collaboration of the Web, Addison-Wesley.

Linger, H. & Warne, L. (2001) Making the Invisible Visible: Modelling Social Learning in a Knowledge Management Context, Special Issue on Knowledge Management of the Australian Journal of Information Systems, 56-66.

Mitchell W. J. (1997), City of Bits, MIT Press.

Malhotra, Y. (2004) Why Knowledge Management Systems Fail? Enablers and Constraints of Knowledge Management in Human Enterprises, in Michael E.D. Koenig & T. Kanti Srikantaiah (Eds.), Knowledge Management Lessons Learned: What Works and What Doesn't, Information Today Inc. American Society for Information Science and Technology Monograph Series, 87-112.

Nadler, D.A. & Shaw, R.B. (1995). Change Leadership: Core Competency for the Twenty-First Century, in Nadler, D.A., Shaw, R.B. and Walton, A.E. (Eds.), Discontinuous Change: Leading Organizational Transformation. San Franscisco, CA: Jossey-Bass.

Nonaka, I. (1991). The knowledge-creating company, Harvard Business Review, November/December,.96-104.

Pfaff, C.C. and Hasan, H., (2006) Overcoming Organisational Resistance to using Wiki Technology for Knowledge Management, Proceedings of 10th Pacific Asia Conference on Information Systems, Kuala Lumpur, Malaysia.

Rich, E. & Duchessi, P. (2000) Models for Understanding the Dynamics of Organizational Knowledge in Consulting Firms, Proceedings of the Hawaii International Conference on System Sciences.

Rogoski, R.R. (1999) Knowledge workers top company assets. Triangle Business Journal, January 8, 14 (19), 21.

Scardamalia, M. (2003). Knowledge Society Network (KSN): Toward an expert society for democratizing knowledge, Journal of Distance Education, Learning Technology Innovation in Canada, 17(3), 63-66.

Suntein, C.R. (2006) Infotopia: How Many Minds Produce Knowledge, Oxford University Press, USA

Thomas, H. & Torsten, P. (2005) Supporting Knowledge Work with Knowledge Stance-Oriented Integrative Portals, Proceedings of European Conference on Information Systems, Regensburg, Germany.

Waycott, J., Jones, A., & Scanlon, E. (2005) PDAs as lifelong learning tools: An Activity Theory based Analysis. Learning, Media and Technology, 30(2), 107-130.