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DEMOCRATISING ORGANISATIONAL KNOWLEDGE: THE POTENTIAL OF THE CORPORATE WIKI

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Abstract

Attempts to impose knowledge management often ignore the vast organisational resource of work-related tacit knowledge possessed by knowledge workers. Our research reveals that activities supported by social technologies such as Wikis may provide a more appropriate capability for tacit knowledge management where a network-centric focus is adopted. A corporate Wiki has the potential to engage the collective responsibilities of knowledge workers to transfer their collective experience and skills into a dynamic shared knowledge repository. However, the traditional organisational culture can be reluctant to allow this power shift that surrenders the monopolistic control of the few over the creation and management of organisational knowledge. In order to frame the theoretical perspectives of these new processes of creation, accumulation, and maintenance of tacit knowledge in organisations, this paper uses Activity Theory to analyse the Wiki as a tool that mediates employee-based knowledge management activities leading to the democratisation of organisational knowledge.

Keywords: Wiki, knowledge worker, Activity Theory, democratisation of knowledge

Introduction

Knowledge Management (KM) has become a popular research theme in many disciplines (Organisational Science, Human Resources, Information Systems [IS] etc.) following the work of Nonaka (1991) and others in the 1990s (Davenport & Völpe 2001). As organisations aimed at moving knowledge from the realm of the individual into the hands of the organisation, they often resorted to expensive Knowledge Management Systems (KMS) with search engines, text mining, and automatic indexing tools to organise and access large volumes of documents (Bygstad 2003). Following the production of several standards (e.g., AS 5037 [2005]) and industry and academic conferences and journals, the result of the work of KM pioneers, KM has now become mainstream and is looking for new directions. Traditional business logic has dictated that there must be organisational controls to ensure conformity so that tasks can be defined and measured, but these controls stifle creativity and initiative. Faced with rapidly changing and unpredictable local and global environments, organisations are endeavouring to learn how to be agile, adaptable, and innovative as never before, seeking a balance between emergent new agile patterns of network-centric organisational activity and the well-established hierarchical institutional platforms and legal regulation frameworks that have served developed countries for centuries. In the current business climate an overemphasis on consistency would constrain the design of the collaborative, next generation KMS which are now being realised in Web 2.0 and associated Enterprise 2.0 developments (McAfee 2006). In practice, the new business environment requires a business model that will perform better based on fewer rules, some specific information, and greater freedom. 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 KMS and processes (Butler 2003).

The authors have already published findings of research on corporate Wiki projects (Hasan & Pfaff 2006a, b; Pfaff & Hasan 2006), and it is on this work that the subsequent analysis in this paper is based. The broad questions addressed in this research, to which we intend to provide answers in this paper, are as follows:

1. How can organisations understand and meet the challenges posed by the emergent and collaborative nature of the next generation Web 2.0 KMS?
2. As one Web 2.0 application, can the corporate Wiki realise its potential in supporting knowledge work by democratising organisational knowledge?

The goal of this paper is to analyse the essential elements of organisational knowledge, KM, and knowledge workers that relate to the challenges of a more cooperative and democratic KM paradigm. We begin with an examination of these concepts in order to raise IS researchers' awareness of the potential of using a corporate Wiki as a new generation KMS redefining the concept of 'knowledge workers' for whom managing collective knowledge about their work is an integral part of the work itself and integral to the performance of the organisation. We describe two cases, and use them to draw out the implications of the use of a corporate Wiki through the application of Activity Theory, which we demonstrate is suitable to analyse the complex interactions involved. We conclude by proposing the future directions that corporate Wikis, together with other social technologies (Swisher 2004) currently popular in the civil digital culture, may take to support KM activities and future research undertakings.

Organisational Knowledge, Knowledge Workers, and Knowledge Management

Organisational knowledge

The differences in interpretation and definition of knowledge among various streams of KM research have become a matter of contention. Nonaka (1991) made a clear distinction between explicit knowledge (knowledge that can be expressed in words or written down in the form of words, numbers, models, or formulae) and tacit knowledge (knowledge that is embedded in a person's mind and cannot be expressed easily and explicitly). Desouza (2003) adds that tacit knowledge of people's actions and experiences is deeply rooted in the human psyche, wrapped up in their ideals, values, and emotions. 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-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 recognised scenarios.

Many KM researchers distinguish between the view of knowledge as a commodity, and the view of knowledge as a flow (Snowden 2003; Storey & Barnett 2000). The former view is apparent when there is talk of capturing, storing, and disseminating knowledge; this view 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) emphasised 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 treats knowledge as a flow when KM initiatives set up a 'white-pages' of experts and create systems, such as communities of practice, to enable knowledge sharing (Okafor & Osuagwu 2006). From this view, knowledge can be shared or flowed 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 knowledge about customers, products, processes, errors, and successes. KM priorities are linked to organisational structure and, as Santoro and Gopalakrishnan (2000) argue, KM priorities are affected by environmental structures.

From an IS perspective, knowledge is the top of the data-information-knowledge hierarchy in which information is meaningful, processed data, and knowledge is information that is actionable (Pan & Leidner 2003; Nunamaker, Romano & Briggs 2001). 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. Actionable quality is the distinguishing feature that separates knowledge from information or data (Handzic & Hasan 2003). According to Malhotra (2004), 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 as well as 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 processes adjust to future possibilities. This view of knowledge also reinforces the value of using Activity Theory for research on KM.

Knowledge Management Issues

In modern ICT-enabled organisations many KMS do not meet their original business objectives because there are assumptions that all relevant knowledge, including that which is tacit, can be stored in computerised databases, software programs, and institutionalised rules and practices (Maholtra 2004; McDermott 2004; Schwen & Hara 2003). The following issues are contributory factors for KMS failures.

First, organisations often implement KM programs by adopting a well-structured and ordered approach that must be aligned with current organisational goals. Such an approach was presented in the Interim Australian KM Standard (AS5037[Int] 2003). In this paradigm, enterprise KMS require data and documents to undergo rigorous well-established institutional processes so as to be stored in well-designed knowledge repositories. The process of building these knowledge repositories has been criticised as being time-consuming, laborious, and costly. Viewed as a superficial implement of management, knowledge repositories are often not kept up-to-date and are rarely accessed when real knowledge is sought (Lam & Chua 2005; Klint & Verhoef 2002).

Second, organisations try to 'manage knowledge' by organising and categorising large volumes of information so that it can be easily retrieved. Research indicates that this may be detrimental because knowledge by its very nature cannot be 'managed', in the traditional sense (Hart & Warne 2005).

Third, KM can be considered as a counterbalance to a purely mechanistic view of business so KM cannot be fostered under settings where people feel pressured, as it makes them less motivated to engage in dialogue. Often, employees hoard their knowledge because sharing it will not contribute anything to their careers and they see it as an additional burden to their already heavy workloads (Hasan & Pfaff 2006b). In addition, employees are afraid they would become less valuable to their organisations if their peers become more knowledgeable than them. Other concerns include the fear of sharing partial, inaccurate, or ambiguous information (Pan & Leidner 2003).

Continuous Expansion of Knowledge Workers' Roles

The term 'knowledge worker' is used to describe someone who adds value by processing existing information to create new information which can be used to define and solve problems (Drucker 1959). Drucker (1998) observed

that "... fewer and fewer people are subordinates - even in fairly low-level jobs. Knowledge workers cannot be managed as subordinates; they are associates. ... Once beyond the apprentice stage, knowledge workers must know more about their job than their boss does - or what good are they?" He adds, "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. ... The way one maximises their performance is by capitalising on their strengths and their knowledge rather than trying to force them into moulds."

Thus, knowledge work is not restricted to self-directed work practices of individuals and teams in almost every industry who continuously engage in processes that create and exploit knowledge, but also includes an activity system "located within the space defined by the *doing, thinking and communicating* dimensions" (Burstein & Linger 2003). Some organisations that are implementing KM initiatives retain a bureaucratic perspective of work where knowledge is viewed as a static resource or asset that can be treated in much the same way as any other commodity (Storey & Barnett 2000). Consequently, 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).

Hence, the authors support the revised Australian Standard (AS 5037—2005) definition of KM:

"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. KM is concerned with innovation and sharing behaviours, managing complexity and ambiguity through knowledge networks and connections, exploring smart processes, and deploying people-centric technologies."

The Australian KM Standard has addressed the deficiencies in current KMS. Here, an enterprise is viewed as a knowledge ecosystem where basic elements of people, processes, technology, and content are dynamically interrelated and embedded in the ever-changing context and culture of the organisation. It also recognises that an emergent KM generation requires radical changes to traditional forms of organisations (AS 5037—2005). Von Hippel (2005) agrees that the shift towards democratising user development is attractive because users get what they want when they design it for themselves. Such activities can flourish in a network-centric organisation, the defining characteristics of which are flatter hierarchies, decentralised decision-making, greater capacity for tolerance of ambiguity, permeable internal and external boundaries, empowerment of employees, capacity for renewal, self-organising units, and self-integrating coordination mechanisms (Daft & Lewin 1993). In such organisations, knowledge is the most strategically important resource, and organisational capabilities are the product of distinctive competencies in integrating and applying this knowledge.

It is our contention that new ICT tools such as the corporate 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 not to be caught in the death spiral (Nadler & Shaw 1995) of doing *more of the same better and better* with diminishing marginal returns (Drucker 1994). The corporate Wiki provides an environment where knowledge workers are authorised, empowered, and encouraged to cooperatively manage their own work practices and knowledge so that such practices remain open to critique, adaptation, and replacement.

Wiki as a Social Technology

Social Technologies

Social technologies such as email, discussion forums, chatrooms, Weblogs, and Wikis are tools to support work units and the individual knowledge worker. At the current time, a new civil digital culture has taken hold, in which so-called 'social' and/or 'conversational' technologies are providing unprecedented opportunities for everyday civil user activities. The term 'Web 2.0' has entered the vocabulary to reflect the ongoing transition of the World Wide Web from a collection of websites to a full-fledged computing platform serving these social web applications to end users. Moving into the corporate setting, the terms Enterprise 2.0, and even KM 2.0, are emerging to reflect the use of freeform social software within companies (McAfee 2006).

The attraction of these social technologies is their low cost, intuitive functionality, and connectivity. Social technologies provide computer-mediated environments that use applications such as Wikis and various web-based

groupware systems. They support new forms of informal, network-centric interaction and activity between people, allowing and enhancing informal access to create and distribute information. These technologies empower ordinary people to have a global presence for business, political, and social purposes. The new social technologies at the focus of this project are tools of a rising digital democracy. They give users a new flexibility and independence to support collective actions, knowledge sharing, and decision-making by self-directed groups.

While all these new technologies can have a transforming influence when adopted within an organisational setting, it is the corporate Wiki that is of most interest to the field of KM because it can be developed by knowledge workers through collaboration (Hasan & Pfaff 2006a; Wagner 2006; Brown 2004; Hof 2004). Knowledge workers who become members of the corporate Wiki community can take advantage of the interconnected networked structures of social interaction and creative activity that have become common in civil digital culture, to play a larger role in the knowledge work of organisations.

A Wiki is an open author system for a conjoined construction and maintenance of Websites (Fuchs-Kittowski & Köhler 2002). A Wiki can be accessed from any web browser. Its open nature allows many participants to write collaboratively: anyone can start a new page or edit an existing one, including text, images, and videos. 'Wiki Wiki' means 'quick' or 'fast' in Hawaiian, referring to the quick changes in the editing processes (Leuf & Cunningham 2005). Changes are logged and viewed online instantly, or reverted to any previous states. The editing process is simple and does not require any knowledge of coding, systems, or how to upload pages onto a server. 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 2006b).

The most well known example of a Wiki is the popular English-language version of *Wikipedia*.¹ *Wikipedia* is an online encyclopaedia which is run on open source software. As of May 2007, *Wikipedia* consists of nearly 1.74 million articles in English. *Wikipedias* have been published in more than 100 languages with a total of more than 5.3 million articles contributed by more than 75 000 active participants.

What Makes Wikipedia So Popular?

A Wiki is an ideal collaboration environment because there is a strong motivation for people to work together for the good of the world, to share their knowledge so as to teach the world. The openness of a publicly editable website has been the motivating factor to its phenomenal growth. Emigh and Herring (2005) compared traditional printed sources with *Wikipedia* articles and found that they are stylistically indistinguishable. Bryant, Forte and Bruckman (2005) observe that a number of people consider *Wikipedia* articles to be well-written, and citing *Wikipedia* articles in news and other media has become common. The constant editing improves the rigor and diversity of a *Wikipedia* article in the popular media (Lih 2004).

Wiki users feel a sense of ownership when they see their work online and spurs users to "collaborate radically" to create a knowledge repository. Radical collaboration is one of the best features of the open source software movement in which anyone can edit another person's work. Sanger (2005) adds that collaboration avoids bottleneck complications if there is an individual author, and the constant editing refines the article. The point to note is that a Wiki is an encyclopaedia of knowledge and not a discussion forum. The neutral policy of a Wiki allows everyone to air his or her views while at the same time respecting divergent views.

Criticisms of Wikipedia

The structure of allowing anonymous group authorship is often criticised. This goes against a professional and social culture in which workers want to get credit for the work they have done. Although the Wiki software uses the 'contributors tag' for general name recognition of 'good' authors or editors, this might lead to disputes among the contributors that they have not contributed 'enough' to the article to be considered one of the authors or editors. A change of thinking is required: the Wiki should be seen as an open community process that encourages multiple iterations in the creation of a knowledge repository (Wei et al. 2005). Other criticisms include a lack of concern for editorial standards, defamation, and intellectual property concerns.

¹ <http://en.Wikipedia.org>

The main allegation about Wikipedia is that the information varies in quality. However, Rosenzweig's (2006) research found that Wikipedia articles were accurate when he compared 25 *Wikipedia* biographies against comparable entries in Microsoft's *Encarta* and *American National Biography Online*, written by professional historians. *Wikipedia* was also accurate in reporting names, dates, and events in U.S. history. Other studies that have compared *Wikipedia* to other major encyclopaedias support this conclusion. A German computing magazine engaged experts to compare *Wikipedia* articles in 22 different fields in the three leading German-language digital encyclopaedias. It rated *Wikipedia* first, with a 3.6 on a 5-point scale, above *Brockhaus Premium* (3.3) and *Encarta* (3.1) (Kurzdin 2004). A British scientific magazine, *Nature*, asked academic scientists to do a blind review of 42 science entries in *Wikipedia* and *Encyclopaedia Britannica*. The reviewers found the difference in accuracy was not significant. *Wikipedia* contained around four inaccuracies and *Britannica* had three (Giles 2005). Nevertheless, the Wiki community has tried to address the shortcomings of *Wikipedia* by introducing a new project, *Citizendium*, to increase editorial control and limit anonymous authoring (Waters 2006).

We contend that there needs to be a critical comparison of the traditional process of legitimising publication of new knowledge through peer-review and authorised editorial bodies with the open source approach favoured by *Wikipedia*. In short, the Wiki is a democratisation of knowledge (Hasan & Pfaff 2006b) where anyone can challenge, change, or expand the body of recorded history. In the latter, 'official' knowledge is no longer owned by those in power and authority but by the masses. *Wikipedia* has made a huge impact on our culture and seems to have won over the younger 'wired' generations who prefer to be active participants in the unofficial online version of events and spurn the traditional role of the 'official' news media as knowledge creators and gatekeepers.

The Corporate Wiki

One of the limitations of prior KMS was focusing on technology rather than creating a conducive atmosphere for knowledge acquisition and sharing. The authors try to address this by proposing the corporate Wiki be used as the next generation KMS. A corporate Wiki overcomes the barrier of KMS created from the static accumulation of dynamic knowledge. Recognising that knowledge is constantly evolving, a corporate Wiki takes advantage of the human sense-making processes that is influenced by attention, motivation, commitment, creativity, and innovation of individuals and groups.

Nevertheless, researchers indicate that some of the problems faced by *Wikipedia* are reflected in the corporate Wiki (Hasan & Pfaff 2006b; Wei et al. 2005; Gonzalez-Reinhart 2005). The principal dilemma of a Wiki is that, while its anarchic nature is desirable for fostering open debate without censorship, it raises questions of whether the information is authoritative and credible, thus inhibiting its usefulness. Yet a critical factor to bear in mind is that *Wikipedia* is a public online Wiki. Within an organisation, the corporate Wiki will be used by knowledge workers who are specialists in their fields. The very definition of a knowledge worker is "one who knows more about his or her job than anyone else in the organisation" (Ducker 1998). Workers who make contributions to the corporate Wiki are employed by the organisation as specialists whose opinions will be highly regarded by their organisations as trusted and authoritative. Management can use the corporate Wiki to address this participatory problem among the community of practice. Yahoo!, Disney, SAP, and Motorola are successfully using corporate Wikis to reap the benefits of economic savings, increased efficiency in understanding the elements of knowledge work, and easy dissemination of knowledge to disconnected teams (Pfaff & Hasan 2006b; Gonzalez-Reinhart 2005).

The Research Design and Method

This research has been designed as a series of interpretive case studies with the objective of revealing a rich understanding of current practice. Cases have been taken up as they become known to the researchers. Some have involved non-participant observation, while others have been participatory action research. Case One was planned as an action research project in which the researchers would guide the organisation in setting up a Wiki and observe the emergent organisational response. In Case Two, the corporate Wiki already existed and the research plan was to hold focus groups with users and potential users to collect data comprised of a set of statements on their attitude to the Wiki. This was done in the manner of a Q study, which involves having the participants provide their subjective thoughts and views on a broad topic, in this case what they thought about the Wiki. Group discussion was used to stimulate this process. According to McKeown and Thomas (1988), a Q sample of 30 to 50 individuals has the ability to produce meaningful results (i.e., provide an accurate picture of the range of views on a topic). Although the statements will later be used for a Q-Sort and factor analysis, the results reported here are the results of a

categorisation of these statements by the research team together with the Wiki manager. A frequency analysis of statements in each category was then made. The research findings for each case are now presented as a rich description. In order to integrate the findings from these and other cases of our research, we explain and use Activity Theory to provide a holistic unit of analysis of knowledge work within the framework of an activity system.

The Empirical and Theoretical Basis for the Analysis

The Activity Theory analysis to be presented in this paper is informed by the authors' field research, typified by the two case studies presented here. Preliminary results of Case One have already been published (Pfaff & Hasan 2006). The report for Case Two is in the final stages of preparation. We contend that these results should be made public as quickly as possible, as this is an area that is growing rapidly and of current interest to both researchers and practitioners in the field of IS. This section of the paper contains an overview of each case, together with relevant findings, followed by a description of how Activity Theory will be used for the analysis.

Case One: Lessons from the Rejection of a Wiki

In this study the authors examined the case of an organisation where management had opposed the use of Wiki technology as a KMS. This research project was planned as a piece of action research in which the researchers would participate in setting up a Wiki and observe its contribution to KM in the organisation. There was an obvious bottleneck in the organisation in the acquisition of knowledge. Wagner (2006) identified several factors that cause the knowledge acquisition bottleneck effect. The first factor is the narrow bandwidth. Conversion of organisational knowledge from its source is limited. The second factor refers to the acquisition latency. There is a lag in time between when the knowledge was created and when it can be shared. The third factor involves knowledge inaccuracy. Incorrect data can be entered into the knowledge base or incorrect maintenance procedures can change correct data into incorrect data. Lastly, the maintenance trap suggests that maintenance needs will grow correspondingly with the growth of the knowledge base.

Although the KM issues just mentioned were widely recognised in the organisation, management was not prepared to go ahead and trial a solution based on a Wiki. When it became apparent that management support would not be forthcoming, the research plan was altered to one which would use the limited literature on Wikis to identify and examine the reasons for the organisation's reluctance to proceed with the Wiki project. The reasons given by the organisation for not proceeding with the Wiki project will now be discussed.

Management Concerns

Limit to power sharing: The merits of promoting an open democratic approach to knowledge sharing has been ignored by the case organisation, which favours a traditional organisational structure. Management were concerned that the use of a Wiki could flatten the organisational hierarchy, changing traditional and hierarchical communication channels. This has also been observed by Stenmark (2003). Under the assumption that knowledge is power, the senior executives were reluctant to share this power with their subordinates.

Centralised IS control: The case organisation insisted that it offers better quality control in its existing centralised approach to documentation management with formal editing opportunities and review and verification stages. Their centralised and highly structured environment, however, makes it difficult to adopt a 'community approach' towards knowledge acquisition.

The informal network approach that is currently favoured in a Wiki may make some companies believe that their data quality will be affected and system errors will occur. Their centralised and highly structured environment will make it difficult to adopt a 'community approach' towards knowledge acquisition. The demands for accountability and control are met because employees using a corporate Wiki will not be using 'handles' but their real names to log in to edit the Wiki. All edits are logged and attributed to an individual employee. A footnote can be included to remind employees that usage could be traced back to them to deter intentional misuse. Wikis have a rollback feature, which could be used by administrators to repair deletions or misuse. Daily backups can preserve the Wiki database against loss of data in case of system failures (Augar et al 2004).

Technical Concerns

Given its simplicity, there are minimal technical concerns with a Wiki. The main challenge comes during the installation stage, which requires some experience with databases and server configuration. Alternatively, an organisation can host the Wiki on a Wiki farm for a small fee (Raman 2006). The primary motivation to share accurate and timely information is based on trust; this can only come from an information-sharing culture, with appropriate job descriptions and incentives in place. Prevailing legal concerns include copyright, publicity, defamation, and trademark issues.

Social Concerns

Some social factors were identified that would have to change before the Wiki would be accepted as an improvement to the organisation's KM.

Open to vandalism: Wiki vandalism is another reason cited by the case organisation for its reluctance to implement a Wiki. Since the Wiki would have no organisational or social boundaries, the case for vandalism might be overwhelming. Wiki vandalism involves editing a Wiki in a wilfully destructive manner to deface the website or deliberately change the content to include irrelevant or incorrect information.

No rewards for work: It is not easy to recognise authorship in a Wiki because pages can be freely written or edited by anybody; this counters the innate need by workers for recognition. 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.

Fact or fiction: 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. This was a concern in this case.

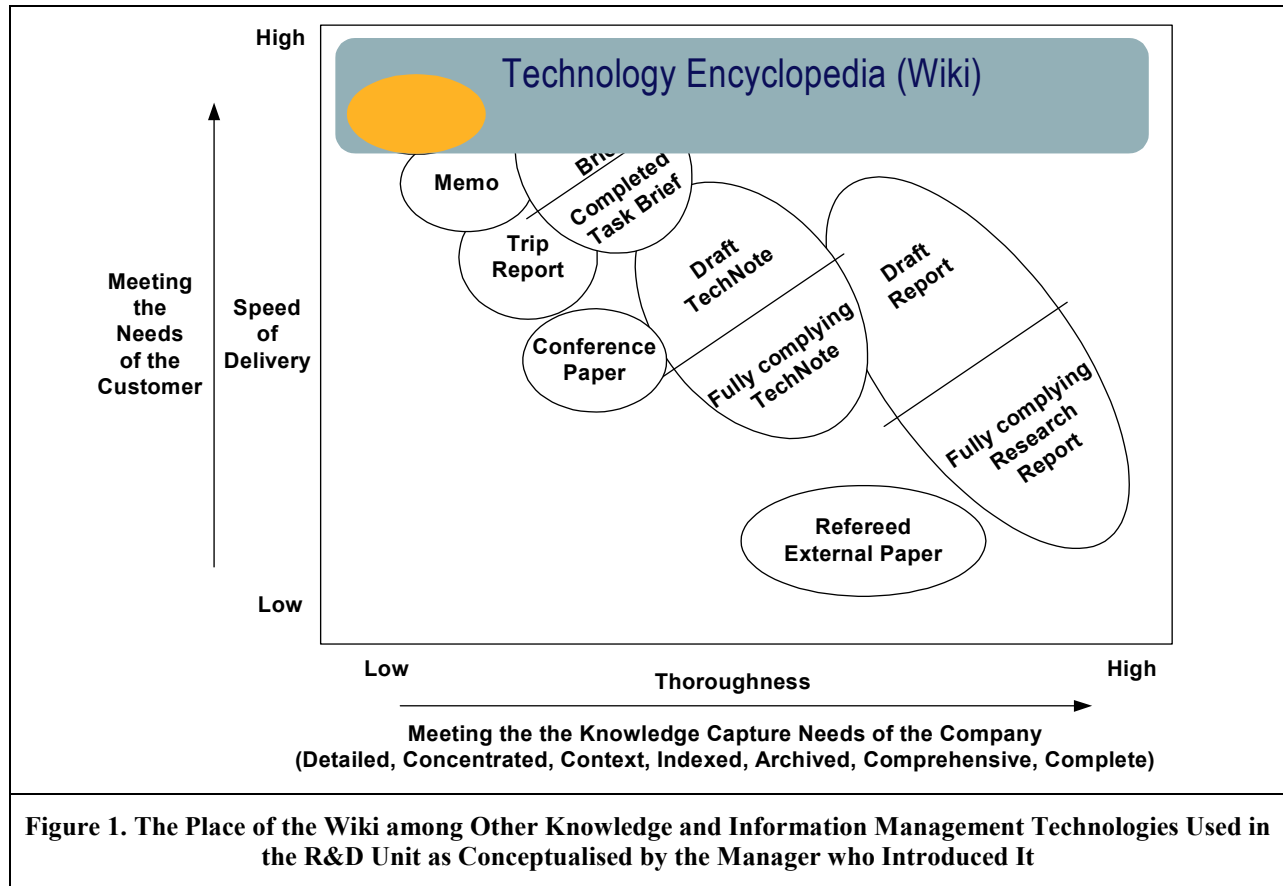
Legal Concerns

Intellectual property: It would be difficult to attribute the true source of authorship because there are many contributors to the site.

Libel Liability: A *Wikipedia* example of this is well known and is often used to deter the use of Wikis. A false *Wikipedia* entry listed John Seigenthaler, a former assistant U.S. attorney general, as having been briefly suspected of involvement in the assassinations of both John Kennedy and Robert Kennedy (Seigenthaler 2005). Legal experts assert that Section 230 of the *Federal Communications Act* (CDA) 1996 made *Wikipedia* safe from legal liability for libel, regardless of how long an inaccurate article stays on the site. Although it was determined that *Wikipedia* is a service provider and not a publisher, which makes them immune from liability for libel (Terdiman 2005), this issue is still one that is used against *Wikipedia* and Wikis in general.

Case Two: Challenges of Establishing a Wiki in the R&D Division of a Large Firm

In this Research and Development (R&D) section of a large industrial corporation, close to 100 employees work on projects that help sustain the company's competitive advantage through highly technical product-related research. The manager of this section has recognised the changing nature of work created by the knowledge economy and is particularly interested in the convergence of KM technology and social interaction amongst his staff. He has recently introduced a Wiki as an on-line repository of organisational knowledge under continuous development through collaborative editing by knowledge workers. He wanted to allow participants to continue to submit, add to, or edit the content of documents and be able to dynamically determine the relationships between sets of documents that were hitherto only kept in static libraries. According to the manager, the Wiki will allow employees to access the organisation's current stock of knowledge and provide a forum for creating and sharing new knowledge. He saw the Wiki complementing other KM processes, such as emails and formal reports, as shown in Figure 1. This shows that on the horizontal axis he saw the Wiki as providing flexibility in the corporate knowledge stored, ranging from the quick note of an email to the completeness of a formal report. On the vertical axis he saw the potential of the Wiki to keep knowledge current and varied to meet all the needs of his clients.



Although the Wiki had been operational for some time the manager was not happy with the level of user participation by his employees. He recently approached the authors' research team to investigate the attitudes of users to the Wiki. A pilot study had just been completed which included a series of focus groups with the R&D employees. The focus groups opened up discussions among employees regarding the rationale behind the Wiki project and the benefits that the manager hopes to achieve. Conducted as a Q-methodology concourse, the focus groups produced a set of 50 statements of employee concerns with and attitudes towards the Wiki. These statements were subsequently grouped by the research team into the categories shown in Table 1, ordered by the number of statements in each category.

Table 1. Summarised Statements from the R&D Focus Groups, in Descending Order of Frequency

Management approval: rewards or incentives mandated as part of the job description
Guarantee of permanence: a place in the organisational culture and processes
Value to users, contributors and customers, plus clarity of purpose
More usable, more structure, better organised, more functionality
Time and effort involved, duplication of effort
User support, training guidance on what to contribute
Integrated to other systems, single source of information
More users (critical mass)
Information and content quality
Security concerns
Fear of losing job through knowledge sharing (knowledge is power)

The core knowledge work activity of interest here concerns the dynamic storage, manipulation, and generation of collective knowledge through the day-to-day participation of all employees in the R&D group as work proceeded. The manager had appropriated the Wiki technology, well known through the popularity of *Wikipedia* in the civil digital society. While the literature and our work to date have raised legal, control, and quality concerns of corporate Wikis from the management perspective, the users of the Wiki place other issues at the top of the list as shown in Table 1. The employees' most pressing issue was that their use of the Wiki would be seen as integral to their work as employees, which is the basis of the authors' perspective of what constitutes knowledge work. Users had misgivings that the Wiki would not last long enough to be useful, and that the organisational culture did not appreciate this 'knowledge' aspect of their work. They also indicated ways that the Wiki could be improved to better suit their activity. They suggested making it "usable, more structure, better organised, with more functionality" and "integrated to other systems" (from Table 1). These illustrate the mediating relationship between activity and tool: the tool raises issues of recognition of knowledge work and the activity demands changes to the tool.

The introduction of the Wiki is part of a broader strategy to improve KM in the organisation as a whole. Therefore, the Wiki is seen as a first step in this overall strategy to improve its capacity as a learning organisation which, in turn, will improve innovation in the company. It will organise (i.e., warehouse) much of the company's extensive structural capital but it will also provide an on-line forum for knowledge creation, transfer, and collaboration. It is planned that, if the Wiki is successful in this location, it will be extended to other suitable areas of the firm.

Theoretical Basis: Cultural-Historical Activity Theory (CHAT)

Although Activity Theory, which will now be referred to as CHAT, was proposed long before the advent of computers and the Internet, it has the potential to provide a suitable vehicle for understanding and analysis in many areas of research and practice in IS and KM. A growing band of researchers recognise that CHAT provides a rich holistic understanding of how people collaborate with the assistance of sophisticated tools in the complex dynamic environments of modern organisations (Thomas & Torstein 2005; Waycott, Jones & Scanlon 2005; Hasan 1999).

Leontiev (1981) introduced the notion of *activity* based on the psychology of Vygotsky (1978), who proposed an 'instrumented' structure of activity within a 'system of interrelationships' between people (Verenikina & Gould 1998). In short, all human activity is purposeful, carried out through the use of 'tools' and socially mediated. The dialectic relationship between subject (human) and object (purpose) that forms the core of an activity is mediated by tools and community. The 'always active' subject learns and grows while the object is interpreted and reinterpreted by the subject in the ongoing conduct of the activity. This is a two-way concept of mediation where the capability and availability of tools mediates what can be done and tools, in turn, evolve to hold the historical knowledge of how the community behaves and is organised. Tools expand our potential 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), especially used in the context of analysing the dialectic interactions between people and technologies, and how they are shaped by human activity. Division of labour (the balance of tasks among different people in the system) and rules (the code and guidelines for actions and behaviour in the system) are two characteristics that mediate the relationship between the community and the activity (Engeström 1987).

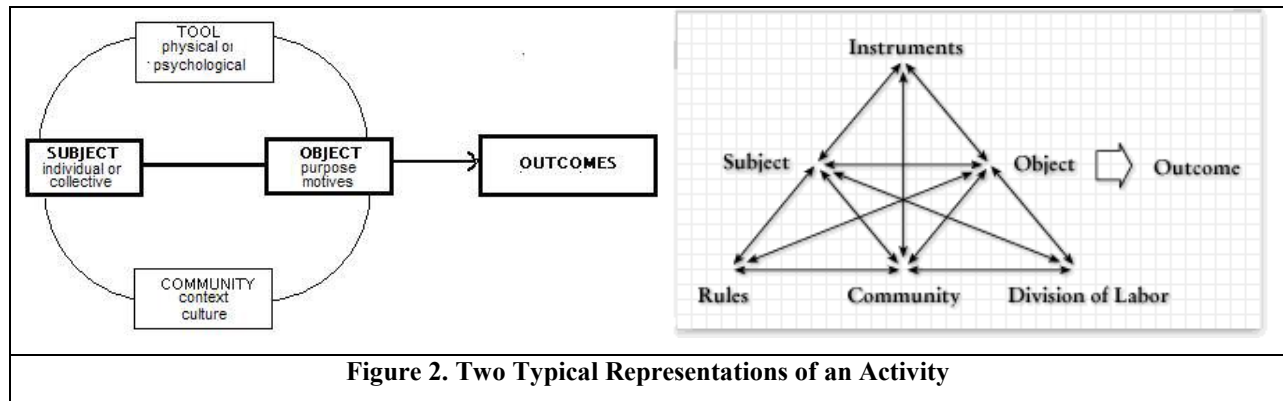


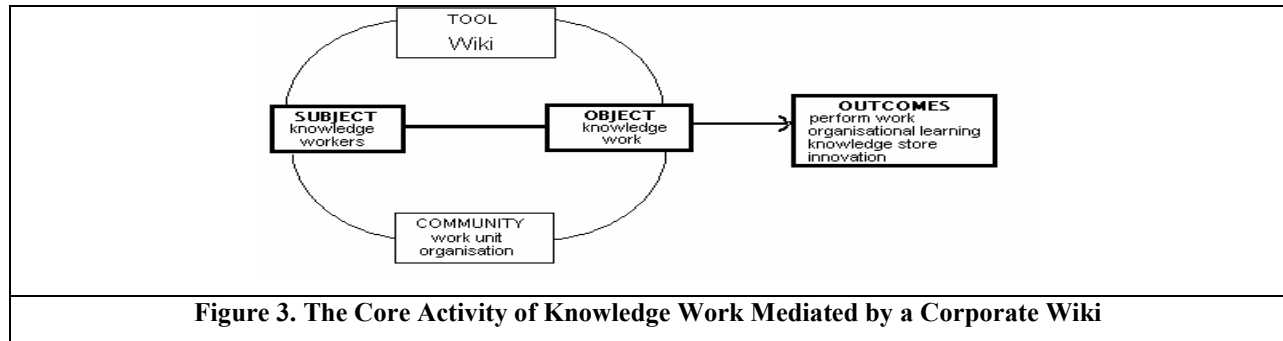
Figure 2 shows two typical representations of an activity. On the left is the representation proposed by the authors; on the right is a representation drawn from Engeström (CATDWR 2002). Both show the central dialectic relationship of subject and object (a person or group doing something for a purpose) mediated by tools (both physical and psychological) and community, which includes the context, environment, and culture. Activities can have intended or unintended outcomes.

Using CHAT to underpin research takes *activity*, as shown in Figure 2, as the unit of analysis. The analysis begins with the identification and explication of the central activity and then looks at those activities that are linked to it (Hasan 2003a). As described in Hasan (2003b), following the work of Engeström (1987) and Kuutti and Virkkunen (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. 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. An *activity* is the engagement of a subject toward a certain goal or objective. A project team would be a *collective subject* composed of a group of individuals who bring different skills and understandings to bear on a *common object*.

In complementary studies work units are viewed as elements of an activity system bringing together both practice and learning (Virkkunen & Kuutti 2000). CHAT 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 KM activities. Kuutti and Virkkunen’s (1995) research has used activity systems to represent the object of organisational work where a 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. 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.

The Activity System of a Corporate Wiki

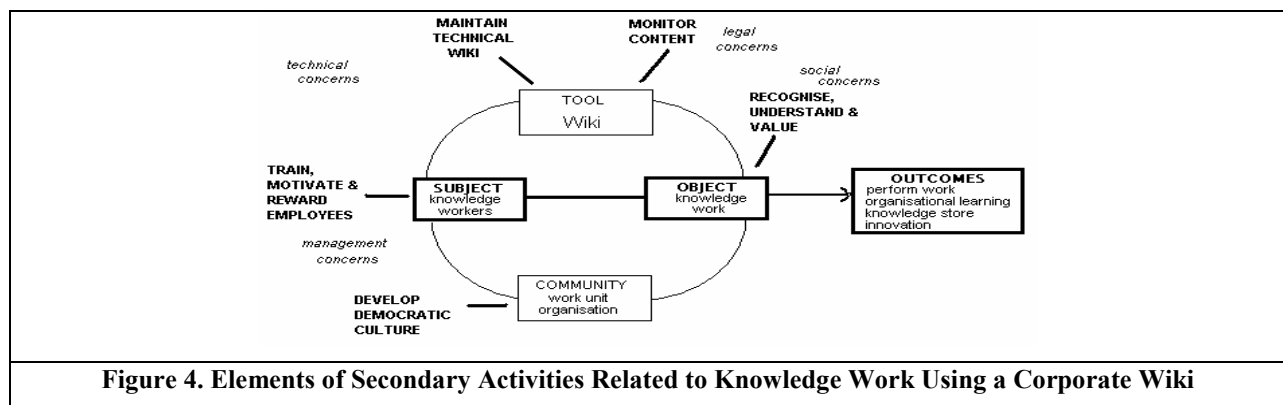
In order to explicate both the core KM activity and other related activities associated with a corporate Wiki, a general CHAT analysis of corporate Wiki used for KM will now be presented. We hold the premise that KM is not an end in itself, but is undertaken in order to improve the performance of an organisation and enable it to learn and even transform itself to meet the changing demands of its environment. However, a CHAT analysis is essentially interpretive and iterative so we begin with the core activity for which the Wiki is used and come back to the broader issue of organisational performance at the end of the analysis.



Our research experience suggests that the core *activity* for which a corporate Wiki is used is not KM per se but knowledge work, as shown in Figure 3. In the spirit of the subject-object dialectic that defines the knowledge work activity, there is an obvious parallel dialectic relationship between knowledge and work (i.e., thinking and doing or what employees do and what they know). This dialectic is expressed by the experience in a continuous cycle of co-creating work-related knowledge in a form that is meaningful for them to access as needed, through which learning occurs, resulting in more knowledgeable doing and so on. The *tools* are the Wiki technology together with social and learning processes within the organisation. The mediating elements include the tools, artefacts, and concepts used by subjects to accomplish tasks, and the community which defines the social context for the activity.

The *outcomes* of the Wiki activity are to create, share, and manage knowledge in the form of an encyclopaedia, which acts as a knowledge store. Organisational learning takes place as the corporate Wiki evolves over time, and new knowledge accumulates as the participants change or learn in the process of performing work. Each participant subject will bring different personal characteristics, including innovative methods, individual motivations, goals, and perceptions of self. These characteristics may change over time. The transformation of goals is affected by the users' self-perceived identities and the role of participation. The goal of participating in the corporate Wiki of Case Two focussed on information gathering (i.e., gathering specific knowledge that is work-related or maintaining the overall quality of the corporate Wiki). Contributions can come from users' personal knowledge, which is related to fields in which they feel comfortable and competent, such as work projects or knowledge specialisations. The outcomes of a corporate Wiki offer knowledge workers 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. Knowledge workers can participate as writers and peer reviewers, giving them opportunities to define problems and generate their own solutions, and to evaluate and revise their solution-generating processes.

The distinctive attributes of a corporate Wiki identified in the two case studies are now used to give us an indication of the auxiliary activities that link to the core knowledge work activity. An initial representation of these, drawn mainly from Case One, is shown in Figure 4. Here, there are a set of five activities that relate to the core activity as will now be explained.



Maintain the Technical Wiki: As mentioned previously, this is not an onerous task thanks to currently available options. However, it should be noted that the activities of the knowledge workers are mediated not only by the

functions of the corporate Wiki itself but also by the attitudes and customs of the organisations in giving workers the resources and authority to do so.

Monitor Content: While legal concerns were particularly noted in Case One, they were not so prominent in Case Two, where experience has shown that, in the closed corporate Wiki, employees have a disincentive to vandalise the contents. This does not mean, however, that suitable content is readily forthcoming.

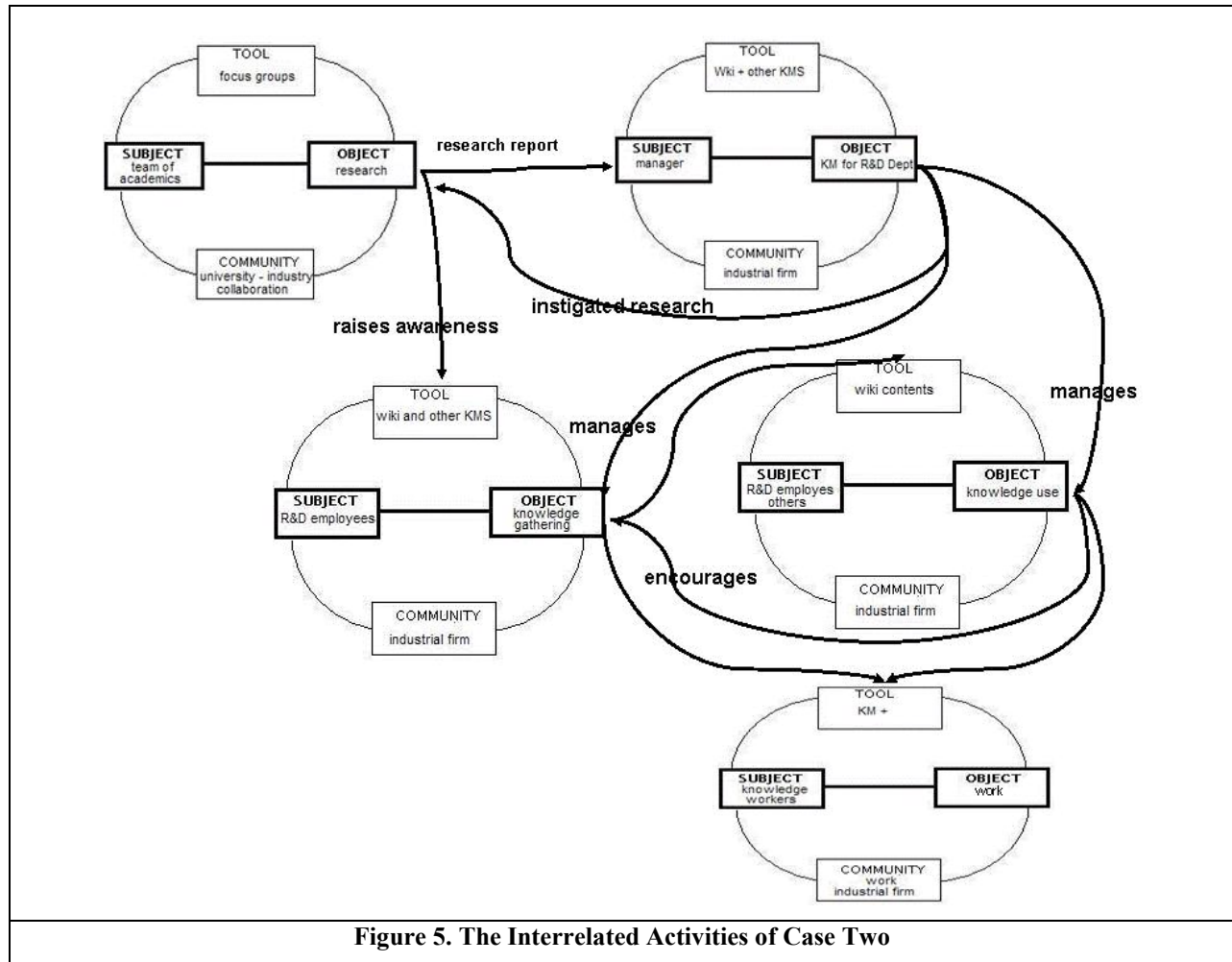
Develop a Democratic Culture: Managers can be the catalysts to promote knowledge sharing by encouraging mutual trust and mutual influence within the organisation. Trust and influence can only be derived through communication where individuals can seek to influence others and vice versa. Influence indicates mutual understanding and this leads to a sharing of knowledge (Nelson & Coopriider 1996). The communicative aspect of knowledge sharing is demonstrated in the use of the corporate Wiki. Managers can instil confidence in knowledge workers to act on incomplete information, trust their own judgments, and take decisive actions.

Recognise, Understand, and Value Participation: A corporate Wiki is a social phenomenon because it encourages democratisation and innovation of experimentation and rethinking to create new knowledge. Hence, in the emerging business model, corporate Wiki communities should be rightfully treated as external extensions of the company's service and support infrastructure. The challenge is to convince employees that their organisations recognise their worth as knowledge workers. Their contributions to the corporate Wiki provide them with a user-friendly and useful resource of work-related content that will be checked and verified by their peers.

Train, Motivate, and Reward Employees: One of the main problems with knowledge repositories has been to motivate employees to contribute to it and then to use its contents (Hasan 2003a). Research was undertaken in Case Two to understand the attitudes of employees. It was found that the intervention of the research itself helped to improve attitudes towards knowledge contribution, as this provided time for discussion among the employees during the focus groups sessions. It also revealed negative feedback about the usability of the Wiki, including that the interface could be more intuitive. It is, however, assumed that, as employees can make use of increased content in the Wiki, they will also be better motivated to contribute. This is shown in the link labelled 'encourages' in Figure 5.

Although Figure 4 was created using the results of Case One, the statements from the focus groups of Case Two support this identification of activities that surround the core knowledge work activity. The report from this study to the manager who commissioned the research is being used to plan practical interventions along these lines. Follow-up to Case Two is the CHAT analysis of that case, which is shown in Figure 5. The purpose of this diagram was to serve as a clarification of the 'big picture'. This shows five inter-related activities identified by the subject-object dialectic, namely:

- the research activity conducted by a team of academics;
- the KM activity for the R&D department carried out by the manager who also instigated the research activity;
- the knowledge-gathering activity of the R&D employees whose attitudes to the Wiki were the focus of the research;
- the knowledge use activity of the R&D employees that was the main purpose of the Wiki knowledge repository; and
- the day-to-day work activity of the knowledge worker employees enabled by the Wiki and leading to the performance of the organisation. This would be the core activity from the broad perspective of the organisation.



Conclusion

The research questions posed in the Introduction to this paper were quite broad. However, the holistic Activity Theory analysis provides significant progress in providing answers. We propose the following answers:

1. How can organisations understand and meet the challenges posed by the emergent and collaborative nature of the next generation Web 2.0 KMS?

By focussing on knowledge work as the core activity where individuals and teams create, process, share, and apply knowledge as an integral and important part of their job. The knowledge manager must be aware of how this core activity is impacted and supported by other organisational activities as depicted in Figure 4.

2. As one Web 2.0 application, can the corporate Wiki realise its potential in supporting knowledge work by democratising organisational knowledge?

As depicted in Figure 5, our Activity Theory analysis of one successful case provides a way of understanding how various activities must be seen to relate to each other in a particular context. Such activity systems involving Wikis will be unique to each organisational context, but will consist of similar activities to those shown in Figure 5, particularly those of knowledge-gathering and knowledge use.

By its very nature, a Wiki demands an open democratic organisational attitude to the management of collective tacit knowledge of employees. The application of CHAT to analyse the corporate Wiki activity reveals several

implications for the associated activities related to knowledge work. These arise from our work and should be topics for future research.

The two organisational case studies reported in this paper concern attempts to implement corporate Wikis for knowledge creation and distribution. The corporate Wiki that delivered the greatest value, Case Two, supported a clear business challenge identified by management, while the unsuccessful Wiki project in Case One faced organisational resistance to change.

The Case One organisation can be described as a hierarchical workplace with a pyramidal structure of power, prestige, and access to information. The use of any technology that threatens this structure will encounter resistance at the adoption and implementation stages, which explains why the organisation is unhappy with its current traditional KMS, let alone with a new Wiki application. The experience from the Case One organisation suggests that management on its own is insufficient to provide leadership and vision to sustain and stimulate KM. For knowledge sharing to exist, there must be a climate of trust between employees and management. The study leads to the conclusion that incorporating a corporate Wiki as a new KMS necessitates more than technology, business processes, and structures. Facilitating organisational cultural changes to enhance KM requires proactive management support. The impetus for this change may be internal, as management decide that its self-interest in serving new purposes is greater than its interest in perpetuating the existing scheme of things.

In order to democratise organisational knowledge and maximise the potential of the corporate Wiki, management needs to be responsible to complete several requirements.

First, creative approaches may be needed for the introduction of a corporate Wiki into a traditional organisational culture, as the success of a corporate Wiki is dependent on people who are focused on, and devoted to, co-creating an encyclopaedic knowledge repository.

Second, knowledge creation projects bring to light what new roles and responsibilities knowledge workers may need to adopt. From the outset, the organisation needs to appoint a core group of knowledge workers who are good writers and experts in their specialised fields to take the lead on what the encyclopaedia should look like and 'seed' the corporate Wiki. The adoption of an incremental principle highlights the non-existence of pages, which tempts users to create new pages of content. Another way to motivate and gradually ease employees into using the corporate Wiki may be to start with a task that is part of the workload (e.g., producing the annual report or submitting ideas for a group project). As employees gain confidence, the corporate Wiki can harvest contributions about declarative (know-what) knowledge (e.g., 'best practices', business procedures, and rules), procedural (know how) knowledge (e.g., stories, conversations, and other context-rich knowledge), and conceptual (know why) knowledge (e.g., principles and laws) (Agarwal et al. 1997). If this is made easier using the corporate Wiki than in previous years without it, employees may accept the benefits and readily move to other tasks.

Third, the organisation needs to cultivate a democratic culture of knowledge-sharing by reinforcing the notion that their reputations and their attractiveness as knowledge workers are enhanced by participation in such projects (Hahn et al. 2002). Such reasons hold promise of marketing job skills and knowledge to employers, and increasing social recognition and prestige, just as people are rewarded for voluntary services on a professional association board. KM practitioners recommend the need to create a reward system to share knowledge, instead of focusing on individualistic goals and self-promotion (Paul 2003; Davenport & Prusak 1998).

Finally, if organisations are compelled to share their power with knowledge workers, this would result in a democratisation of knowledge. A corporate Wiki can be a 'peer production information commons' (Benkler 2006) functioning as a common space where people can share experiences and have unanticipated, un-chosen exposures to the ideas of other people. Traditionally, very few and very powerful people dominate the channels of information and hold the reins of power. Just as the Internet has a democratising effect on the availability and use of information, the corporate Wiki will introduce a power shift, seeing KM passing from the hands of management to workers.

While CHAT provides a lens to reveal the several challenges faced by corporate Wikis, future research priorities should focus on how to maintain strict standards for information quality to overcome trust issues to allay management concerns. It is our contention that radical ideas and new technologies need to be continually refined and adapted in order to succeed. *Wikipedia* succeeded because of its open, free, and collaborative nature. If corporate Wikis were to borrow elements that contributed to *Wikipedia*'s success, while at the same time addressing its limitations, it would be a feasible model for a new generation KMS.

References

- Agarwal, R., Krudys, G. Tanniru, M. "Infusing learning into the IS organisation", *European Journal of Information Systems*, (6:1), 1997, pp. 25-40.
- AS5037 [Int] *Interim Australian Standard of Knowledge Management*, Standards Australia, 2003.
- AS 5037 *Australian Standard of Knowledge Management*, Standards Australia, 2005.
- Augar, N., Raitman, R. Zhou, Z. "Teaching and learning online with Wikis", in *Proceedings of the 21st ASCILITE Conference*, Perth 2004, pp. 95-104.
- Benkler, Y. *The Wealth of Networks*. [Available: http://www.benkler.org/wealth_of_networks/] 2006.
- Brown, E. "Veni, vidi ...Wiki?" *Forbes*, (173:13), 2004 p 062a.
- Bryant, S.L., Forte, A. Bruckman, A. "Becoming Wikipedian: transformation of participation in a collaborative online encyclopedia" in *Proceedings of the 2005 international ACM SIGGROUP conference on supporting group work*, Sanibel Island, Florida, USA. (2005).
- Burstein, F. Linger, H. "Supporting post-Fordist work practices: A KM framework for dynamic intelligent decision support". *Journal of IT&P special issue on KM*, (16:3), 2003 pp. 289-305.
- Butler, T. "From data to knowledge and back again: understanding the limitations of KMS" *Knowledge and Process Management*, (10:3), 2003 pp. 144-155.
- Bygstad, B. "The implementation puzzle of CRM systems in knowledge-based organizations" *Information Resources Management Journal*, (16:4), 2003 pp. 33-45.
- CATDWR, *Centre for Activity Theory and Developmental Work Research*, Website Text, University of Helsinki. [Available: <http://www.edu.helsinki.fi/activity/6b0.htm>. Downloaded 6 November 2002.]
- Churchman, C.W. *The Design of Inquiring Systems*, New York, NY: Basic Books, 1971.
- Daft, R. L. and Lewin, A. Y. "Where are the theories for the "new" organizational forms: An editorial essay." *Organization Science* (4) 1993 pp. i-vi.
- Davenport, T. H., Prusak, L. *Working Knowledge*, Harvard Business School Press, Boston 1998.
- Davenport, T. H. Völpel, S.C. "The rise of knowledge towards attention management" *Journal of Knowledge Management*, (5:3), 2001 pp. 212-222.
- Desouza, K.C. "Facilitating tacit knowledge exchange". *Communications of the ACM*, (46:6), 2003 pp. 85-88.
- Drucker, P. *Landmarks of Tomorrow* Harper, New York, USA 1959.
- Drucker, P. "The Theory of Business" *Harvard Business Review*, September-October, 1994 pp. 95-104.
- Drucker, P. "Management's New Paradigms". *Forbes*, 5 October 1998.
- Emigh, W. Herring, S. "Collaborative authoring on the web: A genre analysis of online encyclopedias". *Proceedings of the 38th Hawaii International Conference on System Sciences 2005*.
- Engeström Y. *Learning by expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Konsultit 1987.
- Fuchs-Kittowski, E, Köhler.A. "Knowledge creating communities in the context of work processes" *ACM SIGCSE Bulletin*, (23:3), 2002 pp. 8-13.
- Giles, J. "Internet encyclopaedias go head to head" *Nature*, December 15 2005. [Available: <http://www.nature.com/nature/journal/v438/n7070/full/438900a.html>.]
- Gonzalez-Reinhart, J. "Wikis and the Wiki Way. *Information Systems Research*, 2005 pp. 1-22.
- Hahn, H., Roberts, J., Slaughter, S., Fielding, R. "Economic incentives for participating in open source software projects," in *Proceedings of the Twenty-Third International Conference on Information Systems*, 2002 pp. 365-372.
- Handzic, M Hasan, H. "The search for an integrated KM framework" in Hasan, H. Handzic, M. (Eds). *Australian Studies in Knowledge Management*, UOW Press, 2003 pp. 3-34.
- Hart D. Warne L. "Comparing cultural and political perspectives of data, information and knowledge sharing in organizations" *Journal of Knowledge Management* (9) 2005.
- Hasan H. "Integrating IS and HCI using AT as a Philosophical and Theoretical Basis" *Australian Journal of Information Systems*, (6:2) 1999 pp. 44-55.
- Hasan H. "An Activity-based Model of Collective Knowledge" in *Proceedings of the 36th Hawaii International Conference on System Sciences* , Big Island, Hawaii, USA 2003a.
- Hasan H. "Communities as Activity Systems and other such Frameworks" in Hasan, H., Verenikina, I. and Gould, E.(Eds) *Information Systems and AT, Expanding the Horizon*, UOW Press, 2003b pp. 74-95.
- Hasan, H. Pfaff C.C. (2006a). "The Wiki: a tool to support the activities of the knowledge worker" in *Proceedings of the Transformational Tools for 21st Century Conference*, Central Queensland University, Rockhampton, Queensland, 2006 CD.

- Hasan, H. Pfaff C.C. "Emergent Conversational Technologies that are Democratising Information Systems in Organisations: the case of the corporate Wiki" *Proceedings of the ISF: Theory, Representation and Reality conference*, Australian National University, Canberra 2006a.
- Hof, R. D. "Something wiki this way comes: They're Web sites anyone can edit — And they could transform corporate America" *Business Week*, 128 2004.
- Kaptelinin, V. "AT: Implications for Human-Computer Interaction" in B.Nardi (Ed). *Context and Consciousness*: MIT Press, 1996 pp. 103-116.
- Klint, P. Verhoef, C. "Enabling the creation of knowledge about software assets" *Data and Knowledge Engineering*, (41:2-3), 2002 pp. 141-158.
- Kurzidim, M. "Wissenswettbewerb. Die kostenlose Wikipedia tritt gegen die Marktführer" *Encarta und Brockhaus*. (Knowledge competition: Free *Wikipedia* goes head to head with market leaders *Encarta* and *Brockhaus*). Oct. 4, 2004 pp. 132-39.
- Kuutti K and Vikkunen J "Organisational Memory and Learning Network Organisation: the Case of Finnish Labour protection Inspectors" *Proceedings of HICSS28* 1995.
- Lam, W. Chua, A. "Knowledge management project abandonment: an exploratory examination of root causes", *Communications of the Association of Information Systems*, (16), 2005 pp. 723-743.
- Leontiev, A.N. *Problems of the Development of Mind*. Progress, Moscow 1981.
- Leuf, B. Cunningham, W. *The Wiki Way, Quick Collaboration of the Web*. Addison-Wesley 2001.
- Lih, A. "Wikipedia as Participatory journalism: reliable sources? Metrics for evaluating collaborative media as a news resource" in *Proceedings of the Fifth International Symposium on Online Journalism*, Austin, Texas April 2004 pp. 16-17.
- Linger, H. Warne, L. "Making the invisible visible: modelling social learning in a KM context" *Special Issue on KM of the Australian Journal of Information Systems*, 2001 pp. 56-66.
- Malhotra, Y. (2004). "Why KMS fail? Enablers and constraints of KM in human enterprises" in Michael E.D. Koenig T. Kanti Srikantaiah (Eds.), *KM lessons learned: what works and what doesn't*. Information Today Inc. American Society for Information Science and Technology Monograph Series 2004 pp. 87-112.
- McAfee A. "Enterprise 2.0: The Dawn of Emergent Collaboration", *Sloan Management Review*, (47:3) 21:28
- McDermott, R. (2004). "How to Avoid a Mid-Life Crisis in your CoPs", *KM Review*, (7:2), 2004 pp.10 – 13.
- McKeown, B.F. Thomas, D.B. *Q Methodology Quantitative Applications in the Social Sciences*, (66) Newbury Park, CA: Sage 1988
- Nadler, D.A. Shaw, R.B. "Change leadership: core competency for the 21st Century" in Nadler, D.A., Shaw, R.B. Walton, A.E. (Eds.), *Discontinuous Change: Leading Organizational Transformation*. San Francisco, CA: Jossey-Bass 1995.
- Nelson, K.M., Coopridge, J.G. "The contribution of shared knowledge to IS group performance" *MIS Quarterly*, December, (20:4) 1996 pp. 409-432.
- Nonaka, I. "The knowledge-creating company" *Harvard Business Review*, November/December, 1991 pp. 96-104.
- Nunamaker, J.F., Jr., Romano, N.C., Jr. Briggs, R.O. "A framework for collaboration and KM" In *Proceedings of the 34th Annual Hawaii International Conference on System Sciences* 2001.
- Okafor, E.C. Osuagwu, C. C. "The underlying issues in knowledge elicitation" *Interdisciplinary Journal of Information, Knowledge, and Management*, (1), 2006, pp. 95-108.
- Paul, L.G. (2003). *Why three heads are better than one: how to create a know-it-all-company*. [Available: <http://www.cio.com/archive/120103/km.html>.]
- Pfaff, C.C. Hasan, H. "Overcoming organisational resistance to using Wiki technology for Knowledge Management" in *Proceedings of the 10th Pacific Asia Conference on Information Systems*, Kuala Lumpur, Malaysia 2006 CD.
- Raman, M. "Wiki technology as a free collaborative tool in an organizational setting" *IS Management*, (23:4) pp. 2006 pp. 59-66.
- Rosenzweig, R. "Can history be Open Source? Wikipedia and the future of the past" *The Journal of American History*, (93:1) 2006 pp.117-46.
- Sanger, L. "The early history of Nupedia and Wikipedia: a memoir" in DiBona, C., Stone, M. and Cooper, D., eds, *Open Sources 2.0*, O'Reilly Press: Sebastopol, CA. 2005.
- Santoro, M.D., Gopalakrishnan, S., "The Institutionalization of knowledge transfer activities within industry–university collaborative ventures", *Journal of Engineering and Technology Management*, (17:3–4) 2000, pp. 299–319.
- Schwen, T.M., Hara, N. "Community of Practice: A metaphor for online design?" *The Information Society*, (19:3) 2003 pp. 257-270.

- Seigenthaler, J, "A false Wikipedia 'biography'", *USA Today*, 29 November 2005.
- Shan L. P. Leidner, D.E. "Bridging communities of practice with information technology in pursuit of global knowledge sharing", *Journal of Strategic Information Systems*, (12) 2003 71–88.
- Snowden, D. "Complex Acts of Knowing: Paradox and Descriptive Self-Awareness", *Bulletin of the American Society for Information Science and Technology*, April/May 2003.
- Stenmark, D., "Knowledge Creation and the Web: Factors Indicating Why Some Intranets Succeed Where Others Fail", *Knowledge and Process Management*, (10:3), 2003, pp. 207–216.
- Storey, J. Barnett, E. "Knowledge Management initiatives: learning from failure" *Journal of Knowledge Management*, (4:2), 2000 pp. 145-156.
- Swisher, K. Boomtown: "Wiki may alter how employees work together", *Wall Street Journal*, Jul 29, (2004) p. B1.
- Terdiman, D., "Is Wikipedia safe from libel liability?" *CNET News.com*, Dec 7, 2005, viewed 21 Feb 2006. http://news.com.com/Is+Wikipedia+safe+from+libel+liability/2100-1025_3-5984880.html?tag=st.rc.targ_mb
- Thomas, H. Torstein, P. "Supporting knowledge work with Knowledge Stance-Oriented Integrative Portals", in *Proceedings of the European Conference on Information Systems*, Regensburg, Germany, 2005 CD
- Verenikina I. Gould E. "Cultural-Historical Psychology and Activity Theory" in Hasan H, Gould E. and Hyland P. (eds) *Information Systems and Activity Theory: Tools in Context*, Wollongong University Press, 1998 pp. 1-18.
- Virkkunen J. Kuutti K. "Understanding organisational learning by focusing on 'activity systems'", *Accounting, Management and Information Technology* (10) 2000 pp. 291-319.
- Von Hippel, E. *Democratizing Innovation*, MIT Press Ltd 2005.
- Vygotsky, L.S. *Mind and Society*, Harvard University Press, Cambridge, MA 1978.
- Wagner, C. "Breaking the knowledge acquisition bottleneck through conversational knowledge management" *Information Resources Management Journal*, (19:1), 2006 pp. 70-83.
- Waters, R. "Wikipedia founder plans rival Citizendium aims to introduce order to chaos of web encyclopaedias". *Financial Times*, Oct. 17 2006, p.19.
- Waycott, J., Jones, A. Scanlon, E. "PDAs as lifelong learning tools: An AT based Analysis" *Learning, Media and Technology*, (30:2) 2005, pp. 107-130.
- Wei, C., Maust, B., Barrick, J., Cuddihy, E. Spyridakis, J. H. "Wikis for supporting Distributed Collaborative Writing" in *Proceedings of the Society for Technical Communication*, Seattle USA 2005 pp. 204-209.