The role of technology in Knowledge Management: trends in the Australian corporate environment Suzanne Zyngier School of Information Management & Systems, Monash University Melbourne, Australia sz@knowledgeservices.com.au

ABSTRACT

Previous research in the UK, in Europe and in the USA has shown different understandings of the concept of knowledge management and of the role of technology in implementation strategies. This paper will present discussion of field research by survey of the current business understanding of the concept of knowledge management and of its uptake trends in the Australian corporate environment.

This will be done by providing background to the current study, by reference to preliminary results and to further research possibilities.

1 INTRODUCTION

The discipline of knowledge management has gained prominence within British, European, American and Asian Pacific companies over the last five years. Knowledge management is a business-focused approach to the collection of processes that govern the creation, dissemination, and utilisation of knowledge to fulfil organisational objectives thereby adding value to and increasing the productivity of the organisation. Knowledge management is a tool to facilitate the transfer of knowledge in its explicit and in its tacit forms. Knowledge requires facilitation in order for it to be transformed or used by organisations to create new meanings and innovation. The management of knowledge has therefore become a new business imperative.

In the business context a key element that creates an organisation's market edge is the ability to differentiate itself from its market competitors. One way it achieves this is through the leveraging of corporate knowledge to better meet the needs of its market base. This the leveraging of corporate knowledge can better meet the need of an organisations market base by reducing the unit cost of the production of an item, by better service levels, by increase in staff satisfaction and enhancing staff quality. Leveraging of corporate knowledge can also plug the leak of knowledge loss in an organisation due to staff turnover.

Knowledge management theorists Nonaka and Takeuchi (1995), Owens, Wilson and Abel (1996), Prusak and Davenport (1997), Probst, Raub and Romhardt (1999) and Dixon (2000) maintain that effective practice of the management of explicit and tacit knowledge acts to increase the effectiveness and profitability of an organisation.

The understanding of the flow of knowledge, the capacity to manage the flow and leverage the capacity of the organisation to create and innovate and the place of technology in this schema is an essential focus in the exploding information age. Knowledge management issues include the development, implementation and maintenance of appropriate organisational and technical infrastructures to enable knowledge sharing.

How then is knowledge different to information? Synonyms for knowledge include understanding, awareness, intelligence, comprehension and wisdom. Synonyms for information include facts, news, and definition. Knowledge unlike information cannot always be transmitted in its entirety in codified form. Knowledge can grow from the interaction of individuals or groups in the sharing of prior knowledge.

Knowledge management processes capture, utilise and re-utilise information using the experience of staff. This allows innovation and creativity to be enhanced within and through the value chain of organisational activity. The processes and tools that are employed in the development of a knowledge management strategy require careful evaluation and must be developed not in a prescriptive way but rather after careful evaluation of each organisation's specific context.

2 PREVIOUS FIELD STUDIES

An examination of knowledge management research in the last ten years shows that seven surveys by self administered questionnaire have been distributed to the corporate sector in regions focussing on Europe, the United Kingdom and the United States. These surveys sought to establish the level of activity related to knowledge management in those regions.

The Information Systems Research Centre at the Cranfield School of Management conducted a survey into the state of knowledge management in European businesses (Murray 1998). Their aim was to find out what the current views, awareness, and plans were to deal with knowledge and its management as a means to gaining business benefit. The survey was sent to 3000 companies across Europe and a response was received from 260 chief executive officers or their designated substitute officers.

In the report of this study, the discussion of respondents' views on the uses of technology firmly dismisses the notion of knowledge management as wholly an extension of the corporate Information Technology (IT) strategy. IT is described as a facilitator and as a tool of knowledge management. Technologies are identified as tools for transfer of explicit knowledge across cross-functional boundaries or silos of knowledge in an organisation. Technologies are identified as a means of national and of global knowledge integration. This 1998 report identified document management, GroupWare and online information systems as being used extensively while CD Roms, the Internet and Intranets were far less used. The report concluded that in the corporate sector medium to large sized companies in the United Kingdom and in Europe was spending money on knowledge management. This survey clearly demonstrated from their data that the efforts on knowledge management were focussed on maintaining or developing a competitive advantage and enhancing profitability.

Studies done by David Parlby of KMPG (1998) (2000), Next Generation Research Group (1998), and Davis et al (1998), demonstrate that companies' experience of the benefits of knowledge management included better decision making, more rapid response times to key business issues and improved customer service delivery. In each case technology is described as an enabler that is often under-utilised. This is a theme that I will examine in this paper.

The range of conclusions that are drawn from these surveys include the lack of co-ordinated strategy, the lack of training and the lack of management support for a corporate knowledge management strategy. A study by Hackett (2000) indicates that where knowledge management is applied there are measurable business benefits to customer service, research and development, sales and marketing. A McKinsey survey of 40 companies in Europe, Japan, and the United States by Hauschild *et al*, (2001) demonstrated that many in executive management continue to regard knowledge management as primarily a technology based management tool. There is a perceptible business shift reflected in these survey reports to management coming to understand the notion of creating a holistic strategy for sharing explicit and tacit knowledge to enable an increase in profitability by improving processes, products, and customer relations. Other research into the understanding and application of knowledge management strategies has been described in knowledge management strategies of individual companies outside Australia.

An empirical study is an important tool in measuring the current business understanding of the concept of knowledge management and of its application in the Australian corporate environment. This study seeks to provide a snapshot of the situation in Australia over three months from March to May 2001 and to interpret that data.

3 RELEVANCE OF TECHNOLOGY TO KNOWLEDGE MANAGEMENT IN THE ORGANISATION

A survey of the literature relating to this topic illustrates volume of work that has been done into research in knowledge management. Most of this research has been over the last ten years. The issue of technology as a tool of a knowledge management strategy is a constant theme as research deals with the concept of knowledge, with where knowledge is located in an organisation and if it can be

embedded in best practices, of how people learn and how knowledge is transferred. The research also deals extensively with the problems organisation face inhibiting knowledge transfer. Some of these inhibitors are social, other relate to issues relating to the technological tools referred to here in data collected from the Australian field study (Zyngier 2001).

3.1 Knowledge

In 1999 Bill Gates defined knowledge management as "not even start[ing] with technology. It starts with business objectives and processes and with recognition of the need to share information (Gates 1999 p.238). Three and a half decades earlier Peter Drucker (1964) discussed the contribution that knowledge makes to an organisation. He commented that what makes "a business distinct and what is its peculiar resource, is its ability to use knowledge of all kinds - from scientific and technical knowledge to social, economic and managerial knowledge"(Drucker 1964 p.5)

Knowledge is understanding derived from experiential learning. Knowledge is 'know-how' that can be acted upon and includes accrued information that can be employed and interpreted in one context specific way and then reused in a different context drawing on other relational material. Knowledge is not facts but can be factual information as applied to a given context - the key here being the interaction and its application.

Tacit knowledge is transferred between people directly. Explicit knowledge is often but not always transferred using the medium of technology. An outcome of this process of transfer is the development of possible new interpretations by individuals of their own understandings and the possibility to act accordingly. This process forms part of the knowledge development process. This knowledge development process is not linear but grows incrementally as experiences and learning build horizontally, tangentially and vertically according to organisational need and the thought processes of the individual.

3.2 Location of knowledge resources

Allee (1997) looks to the collective intelligence of an organisation. In a "knowledge based management [the challenge] is trying to understand how a company, business unit, or work team function as a collaborative intelligence or collective field of knowledge"(Allee 1997 p. 19) Knowledge here includes emergent knowledge together with the skills and talents that lead to generative learning - where learning generates new knowledge and creates direction for additional learning. An organisation often works within the confines of an area that it has functioned for some time. The processes are familiar, new product development is finely focussed on meeting that needs of a stable client base. The focus of the company can be introspective to the point that external developments in their competitor market will be unobserved. Allee's (1997) organisational comfort zone and Leonard-Barton's (1995) core rigidities refer to this introspective attitude in individual and organisational areas where personnel already excel and to the human preference for doing what they already do well. Introspection is not deliberate for no company would intentionally limit their capacity to service a market.

Allee (1997) describes the transformation of data to wisdom as "not a linear process but is best described as a series of concentric circles or the layers of an onion with data on the outermost layer and wisdom in the centre - data to information to knowledge to meaning to wisdom."(ibid p.62) This approach can utilise technology but does not rely on technology as its only tool.

Fahey and Prusak (1998) assert that the implementation of a knowledge management program in any organisation is reliant on the development of each organisation developing its own specific working definition of knowledge management. The definition must focus on information flow rather than on the knowledge itself. The feature of an organisation specific knowledge management program is that the knowledge is enmeshed in its context. Problems arise when the organisation pays too little attention to tacit knowledge and innovation, or to resources that are outside the heads of individuals. The focus of such programmes should create a future direction rather than a focus on coping with the present.

Similarly when we are developing a technology infrastructure for an organisation we would not look only at the current need but look at and try to further predict the development of the industry that we are serving and the development of the technology that we are working with.

In the *Emerging Practices in knowledge management Consortium Benchmarking Study* (APCQ 1996) knowledge management is addressed as a tool of best practice by O'Dell, Grayson & Essaides (1998) They comment the "study results corroborate the anecdotal evidence: Systematic Best Practice transfer is the one strategy pursued by 100 percent of the organisations pursuing value-through-knowledge". The transfer of knowledge is seen in the context of the transfer of best practice. Best practice is usually transferred in codified form as procedures rather than the transfer of tacit knowledge. They comment that each company has a different set of factors that drive or impede its performance. The codified form of knowledge has until recently been produced as best practice manuals. As PC technology, networks, GroupWare and corporate Intranets have become standard business tools, so to have manuals been more and more readily accessed in digital form. This change has enabled the rapid dissemination of corporate information, the ready updating of that information and the consequent diminished reliance on paper manuals of standard or best practice.

To set up an appropriate knowledge management practice O'Dell *et al* (1998) propose that it must be based in the value proposition of the firm rather than one externally imposed. That is it must be grounded in the aims and objectives of an organisation, rather than superimposed on practice. By looking at the current practices of an organisation, locating the knowledge resources of that organisation then a strategy for harnessing that knowledge can be developed. This focus ensures that valuable resources are applied to high pay-off areas. By establishing these priorities companies have a better chance to achieve positive results, thus enhancing the credibility of the knowledge transfer effort.

Dixon (2000) has further developed knowledge management theory and documented five different ways that knowledge can be shared in an organisation. Every organisation has its own individual structure and needs. The lack of systematic and consistent framework for understanding the mechanisms of knowledge transfer has slowed the analysis of methodology to be used in each instance. Dixon offers a framework for understanding knowledge transfer that may illuminate this issue and be applied to the different and individual needs being encountered by practitioners. The theoretical problem has impeded the development of knowledge sharing practice, as the application of methodologies has not necessarily proved a good 'fit' for every situation.

3.3 Knowledge transfer

Research into knowledge management by Nonaka and Takeuchi (1995) is premised on the differentiation of two types of knowledge: explicit knowledge, contained in manuals and procedures, and tacit knowledge, learned only by experience, and communicated only indirectly, through demonstration metaphor and analogy. They maintain that until 1995 U.S. managers had focused on the management of explicit knowledge contrasting this with traditional Japanese business practices where the workforce is organised into teams where much attention is paid to the focus on tacit knowledge transformed into explicit knowledge through practice. Nonaka and Takeuchi examine the Western positivist cultural approach to the individual and the focus on explicit knowledge as an inhibitor to the transfer of knowledge.

Leonard-Barton (1995) also looks at the inhibitors and facilitators of knowledge transfer in an organisation. She enhances the existing notion of core capability and develops the concept of core rigidity. Frequently an organisation's expertise derives from the accumulated wisdom or knowledge becomes embedded in software, in specific configurations of hardware and in standard procedures. As such compilations of knowledge derive from multiple individual sources that cannot be easily identified or even separated, the whole technical system can be greater than the sum of its parts. In this context the term 'technical' refers to the whole system of an organisation, not to the technical infrastructure of an organisation.

Core capability is a facilitator of knowledge transfer and refers to the whole schema of activities in a workplace. The physical systems together with skills and knowledge bases that set an organisation apart from its competitors giving it a competitive advantage. The dimensions of a core capability

comprise both skills and knowledge bases that are divided into the following categories: public or scientific, industry specific and firm specific. The more closely that skills and knowledge bases are integrated into the firm's own skills and knowledge bases then transfer of these skills is less easy to separate from the total processing of the organisation. That is they are less easily able to be codified and are less transferable. They are embedded into the functioning of the firm. Core rigidity is an inhibitor of knowledge transfer that functions from the same bases as core capabilities in the activities, physical systems, skills and knowledge bases of an organisation.

Dixon (2000) has identification of five different ways that knowledge can be shared detailing those types of knowledge transfer that are explicit and those that are tacit or a combination of the two. This framework can assist the knowledge management practitioner develop a strategy in the context of the examination of where knowledge is in the organisation and of how best to facilitate its transfer using technological tools most appropriately according to the need and according to the technological tools available.

3.4 Inhibitors to knowledge transfer

In a work on the interaction between humans and computers Preece (1995) discusses the design criterion required to make computers more user friendly. It could be argued that the launch of the Windows 95 interface at this time has greatly enhanced the usability of computers. This is not only through the basic design of the product but through the saturation of the marketplace by the Microsoft Corporation giving the average PC user a common platform to view software in home and work environments. This plus the later addition of Internet Explorer as an almost standard web browser must make easier access to the basic use of computers. How then is the transfer of knowledge inhibited in the organisation?

It is the organisation's cultural structures and learning disabilities that are repeatedly mentioned as inhibitors in knowledge management strategies. Leonard-Barton (1995) sees core rigidities as acting to inhibit knowledge transfer when the very existence of these structures prevent or limit innovation and movement beyond the established wisdom. Where all the solutions to a workplace problem are already defined then an external solution to a new problem or an innovative solution to an old problem may be ignored or never even exposed. By limiting of the application of new ideas the knowledge creation process is torpified and this stagnates work practices. This practice will lead to the diminution of product development and of service to clients. The stagnation of the knowledge creation process will diminish the intellectual development of staff, lowering morale and innovation.

Prusak and Davenport (1997) raise the issue of cultural inhibitors to knowledge sharing giving the examples of "Mobil where disapproval of bragging is embedded in the culture." Similarly, "a Hewlett Packard Vice president who transferred from the United States to Australia [was inhibited] in a democratic culture of mateship that discourages calling attention to individual performance." (Prusak and Davenport p.27) Facilitation of knowledge sharing and transfer is to be approached in a programmatic way rather than relying on good will on an ad hoc basis. Building trust throughout a company is the key to creating a knowledge-oriented corporate culture. It is the corporate culture that nourishes a knowledge management programme producing a positive environment in which employees are encouraged to take risks to make decisions that are efficient, productive, and innovative.

Differing cultures within one organisation also act as inhibitors to the efficient sharing of knowledge. Differing languages reflect differing workplaces, different trades and technical backgrounds, and different divisions or departments and ranks in a single organisation. These language differences can limit the ability to communicate in verbal and in written form.

Senge saw the lack of ability to share knowledge and learn in an organisational context as a learning disability. He applied systems thinking to the organisational learning framework resulting in a contemplation of the whole rather than an individual component of a system. Organisational learning is grounded in an organisation's or individual's mental models which are deeply ingrained assumptions, generalisations or even pictures or images that influence how they understand the world and take action. A learning organisation is one that is continually expanding its knowledge base and thus its capacity to create its own future. "Information as a commodity has a very short shelf life ...

[B]efore information is of value, it requires the imput of time, prior experience and mental effort to transform / assimilate information into knowledge."(Senge 1990) In the current fast paced business environment an organisation must evaluate the time and cost-loss imperative of the risk of duplicating work already done and knowledge already acquired in the organisation against the cost of developing a framework for the capture and re-utilisation of internal expertise and knowledge.

3.5 The role of technology

In a knowledge management strategy technology is an instrument in a collection of processes that govern the creation, dissemination and utilisation of knowledge to fulfil organisational objectives (see 5 Preliminary Findings below). In this context Nonaka and Takeuchi (1995), O'Dell, Grayson & Essaides (1998), Prusak and Davenport (1997) and Dixon (2000) discuss technology is a means of transfer of explicit knowledge that will allow internalisation of that knowledge and thereby its incorporation into the understanding and experience of the individual. Dixon (2000) particularly identifies technological tools as facilitators and as a practical means of national and global knowledge integration

The use of technology as a tool to assist the management of explicit knowledge is unarguable. The Australian Bureau of Statistics (2000a) informs that of businesses with 100 or more persons 100% of staff have computers, 95% have internet access, 68% of these companies have permanent IT staff. These statistics would indicate an almost global use of PC and Internet at this level. The purposes of business use of the Internet include buying, selling of goods and services and related activities, banking, email and information searches.

The Australian Bureau of Statistics (2000b) informs that "By November 2000 well over half (56%) of the households in Australia, or over 4.0 million adults had access to a computer at home. The number of households with access to the Internet at home rose to 2.7 million, or 37% of all Australian households" (Australian Bureau of Statistics 2000b p.3). Familiarity is indicated as being widespread in the business and general community where users have many basic skills required utilising an Intranet effectively as a knowledge management tool

4 METHODOLOGY

The research presented in this paper casts new light on a measurement of the current business understanding of the concept of knowledge management and of its uptake trends in the Australian corporate environment between March and July 2001. It is therefore a snapshot of knowledge management understanding in Australia at this time.

Conceptualisation was required of the issues:

- 1. the understanding of the concept of knowledge management at the executive level of management in the top 1000 Australian private and public organisations
- 2. the extent of uptake and implementation of knowledge management strategies in the top 1000 Australian private and public organisations

4.1 Study assumptions and scope

This Australian study assumes that there has been a level of acknowledgement of knowledge management as a management tool in Australia. This is reflected in the Australian business press and in the business sections of the local press over the last five years.

The aim of this exploratory research project is to examine and measure the current views, awareness, and knowledge management strategies of the top 1000 Australian organisations as measured by turnover. This list includes blue-chip companies, medium enterprises, government bodies and tertiary educational institutions. The research project overviews the present conditions in this sector in Australia.

The study uses a population of 1000 organisations. In each organisation survey questionnaires have been sent to the Chief Executive Officer, the Chief Information Officer and the Director of Human Resources. The survey is accompanied by an explanatory cover letter and reply paid envelope. Therefore a total of 3000 surveys were sent.

The survey base includes respondent demographics in their age, educational level attained, position, length of time in the company and in their present position, a company profile defining the industry sector in which the company operates.

Knowledge Management concepts and knowledge issues including management and the exploitation of knowledge assets are canvassed. The cultural aspects, perceived obstacles and future plans of a knowledge management strategy are discussed.

Information already available in the public sphere on each organisation includes:

- company size
- the state in or from which it operates
- current company ranking by turnover
- number of employees
- company turnover

Information on the knowledge management strategies employed by each organisation has been crosstabulated against data by industry, by age, position, educational level and length of service of the respondent. It has also been possible to cross tabulate data by state, by size of the organisation, an by turnover of the organisation. Conclusions will be drawn on the nature of the current state of knowledge management practice in Australia.

4.2 The Australian survey instrument

In considering the research hypotheses and having located and evaluated the survey instruments used by other researchers, the survey instrument being used in this project has been adapted from the instrument that was developed in 1998 by the School of Management, University of Cranfield, U.K.

The survey instruments were numbered so that the researcher is able to identify the organisation that has completed the questionnaire. The personal identity of the respondent is unknown as the materials were addressed to named positions. A survey question requests that the respondent indicate their position title.

The questionnaire is divided into seven parts and was timed to take approximately 20 minutes to complete. In answering the questions and statements respondents were required to tick appropriate responses showing a ranking of preference to queries or to multiple choice questions phrased usually with a single option or single option with an "other - please specify" possibility. The respondent was also asked to add text where required to questions in the last section.

5 PRELIMINARY FINDINGS

A survey return rate of 15.3% has been achieved. These survey documents have been collated. Preliminary analysis follows.

5.1 Defining Knowledge Management

The respondents were asked to select from four definitions of knowledge management that represent a spectrum of the understandings of the concept of knowledge management. These were:

- A technological concept "the use of information technology to capture data and information in order to manage knowledge"
- A business focused approach "the collection of processes that govern the creation, dissemination, and utilisation of knowledge to fulfil organisational objectives"
- A situation where no visible processes are used but it is "simply the ability to manage 'knowledge'"
- About intellectual assets "taking the form of documents and information bases"

The majority of 85% of respondents defined knowledge management as being a business focussed approach comprising the collection of processes that govern the creation, dissemination and utilisation of knowledge to fulfil organisatonal objectives.

Of the remaining 15% of respondents, 7% relate knowledge management to intellectual assets taking the form of documents and databases, 6% see it as a technological concept and 2% see no visible process. Organisations therefore interpret knowledge management as a tool for productivity gain. This tool recognises the imperative to capture the knowledge that organisations have, to share it and to use it for the benefit of the whole organisation.



[Figure 1 Definition of knowledge management]

5.2 Knowledge management initiatives

In Figure 2 It is evident that over 89% of respondents plan to acquire and exploit knowledge that is required. Over 77% of respondents believe that value can be attached to knowledge and that their organisation displays awareness of knowledge that already exists within the organisation. Some 58% of organisations believe that they possess a unique body of knowledge. Over 42% of respondents believe that in many areas they are replicating what others have done before. Conversely over 39% of respondents indicate that they neither have any means of tracking the re-use of organisational knowhow, e.g. Re-use of designs or processes or of tracking the re-use of organisational knowhow across departments or units. There is 57% recognition of sharing best practice based on past experiences and while only 50% have methods of acquiring or developing skills in knowledge management.



[Figure 2 Knowledge management initiatives]

There is supporting thematic and statistical evidence in the survey return data to show a pattern over 50% of organisation tracking people who are knowledgeable about key processes, markets and technologies using internal yellow page directories. The greatest negative response was to the question on tracking organisation know-how across departments. This indicates the tendency for organisations to operate in functional silos where knowledge is not transmitted between functions.

5.3 Uses of technology

The survey seeks to establish the uses of technology to support a knowledge management strategy. In Figure 3 below almost 90% of the organisations surveyed used an Intranet extensively or to a certain extent as a means of sharing knowledge.



[Figure 3 Technologies in use]

GroupWare is also reported as being used to share information at a lesser rate of just under 70%. Online information sources and the Internet generally, are also widely used. Other forms of technology currently in use or planned to be used include CD Rom utilisation and Video-conferencing, Electronic bulletin boards, Expert systems, Search and retrieval agents, Data warehousing/mining and document repositories or document management systems. It can be argued that the purpose and design of an Intranet is to disseminate knowledge in its explicit form across an organisation. An organisation with or without an clear knowledge management strategy must invest considerable resources into the development and maintenance of an Intranet. Data from the Australian Bureau of Statistics indicating an increase of access to and use of the Internet across all age groups in both the work and domestic environment implies a familiarity with the functionality of web browsers as a tool for gathering information. The use of an Intranet crosses the boundaries of ease of use and minimises the requirement for extensive training in the use of multiple software packages. This enables access information in a large variety of formats.

Issues for consideration in developing an Intranet as part of a knowledge management strategy include a clear definition of the intention for the development of the Intranet. The Intranet should support the business objectives of the organisation. An Intranet should provide seamless access to all explicit knowledge resources available to the organisation regardless of its location and irrespective of the software application used to store that knowledge. The Intranet should support knowledge transfer taking into account the need for organisational information security and a the same time acting to build bridges over barriers to knowledge transfer by the dissemination of explicit knowledge broadly across an organisation.

Organisational use of Intranets appears to be a growth area for knowledge management strategies. This notion will be further investigated as survey results continue to be evaluated.

6 FUTURE RESEARCH

This study will enable further research in other possible directions:

- It will allow comparison with studies in other countries, on the understanding of the concept of knowledge management by company officers and with studies in other countries, on uptake trends in knowledge management as a management tool.
- It will allow possible collaborative research with similar studies currently being undertaken in Singapore, Hong Kong and Taiwan.
- It will allow review of current academic teaching and research practice in this area.

7 CURRENT STATUS

The survey has been mailed to 3000 individuals in named positions in the top Australian resident public and private organisations.

A total of 15.1% of questionnaires were returned to August 2001. Initial results indicate a high level of awareness of knowledge management as a tool for the management of proprietary knowledge. These results also indicate that while a level of awareness exists, that most initiatives are in their initial stages. Knowledge management strategies are being put in place as a means of adding value to organisational structures and that this investment will be reflected in performance indicators. Those organisations that have programmes in place face barriers to effective implementation.

These responses have been collated to produce preliminary aggregate results for analysis. The final report will then be written. The report will be published as part of a Masters by research thesis in the School of information Management and Systems, Monash University Victoria, and articles published.

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