

Knowledge Diffusion Via Specialist Best

Practice

Abstract

Enterprises have been turning to explicit- and even conceptualizing on tacit- Knowledge Management to elaborate a systematic approach to develop and sustain the intellectual capital needed to succeed. To be able to do that, you must be able to visualize your organization as consisting of nothing but knowledge and knowledge flows. Hence, creating the ability of further actively classifying existing organizational content evolving from and within data feeds, in an algorithmic manner, potentially giving insightful schemes and dynamics by which organizational know-how is visualized. In this paper, we discuss an empirical research study that was conducted previously to try and explore knowledge diffusion in a specialist knowledge domain.

Keywords: Knowledge Management, Knowledge Repository, Knowledge Diffusion

1 Knowledge Diffusion

The literature revealed a rapidly increasing body of knowledge relating to knowledge management, which cross level and cross-link many different disciplines and areas of interest to academics and organizational practitioners, especially knowledge is considered a common factor or input, on a parity with labour, capital and so on.

While definitions of any subject matter can be helpful regarding clarifying the scope and depth of the subject under consideration, they can also be notoriously difficult to articulate.

Definitions can often result in unwarranted simplistic reductionist arguments. When the subject that is being considered is in the management domain, the difficulty is compounded even further due to the subjective and diverse nature of the field. Such types of model categorize knowledge into discrete elements. For instance, Nonaka’s model is an attempt at giving a conceptual representation of knowledge management and essentially considers it as a knowledge creation process. *Figure 1* shows Nonaka’s knowledge management model reflecting knowledge conversion and dissemination modes.

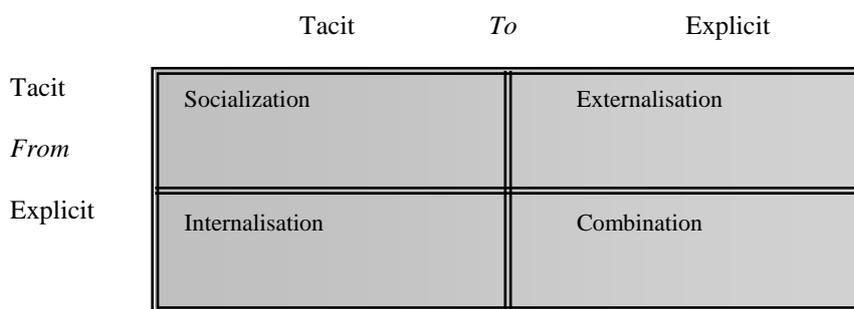


Figure-1 Nonaka and Takeuchi’s Knowledge Management model (Nonaka et al, 1995)

As can be observed from the figure above, knowledge would be composed of two constituents, Tacit and Explicit. Tacit Knowledge is defined as non-verbalized, intuitive, and unarticulated. Explicit or articulated knowledge is specified as being formally structured in writing or some pre-defined form.

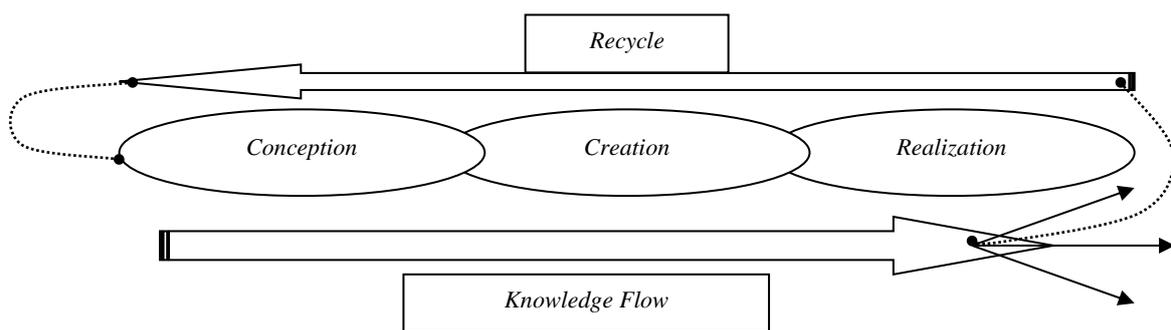


Figure-2 Three-Tier Knowledge Lifecycle

In accordance to diagram above, we believe that knowledge creation undergoes a nested set of computerized processes [explicit] and accompanying practices [tacit], allowing as well for its inter-linkages and cross levelling to diverse specialist areas of expertise and to those it would

tend to restrain, as knowledge would be considered as highest level available for awareness on the object of concern. Hence, aim is rather to *acquire automatically, represent visually, and reason collectively* on textual content contained. This research empirically investigated the creation of new technical knowledge, and how it diffuses (flow in addition to adaptation), text being the chosen *currency (symbol of exchange)* for communicating descriptions of such specialist knowledge. It extends Nonaka *et al's* (1995) organisational knowledge creation theories (*knowledge conversion model*) into the area of research and development ventures, within satellite engineering, that may be requiring a cooperative, computer mediated environment.

2 Research Study Framework for the Diffusion of Knowledge

One can distinguish to a certain extent the highlights of the research and experimental phases in research documents, and that of consolidation and utilization in commercial documents. The transformation of ideas from science onto business applications is a complex and at times an enduring process. The articulation of ideas and knowledge throughout such process be represented by the specialist terminology, that created and evolving within the domain. The figure below represents a possible spectrum of documents within the domain investigated and field project. Such can be referred to as formulating the basis of a knowledge repository that is in turn formed of sets of text repositories. For the purposes of this research study, the regions covered by research and commercial documents in the spectrum below are assumed to be overlapping at times. As research documents are thought to feed into commercial documents for the case of this field project, representative of knowledge diffusion (i.e. flow and adaptation also referred to as acquisition and conversion). The use of terminology by scientists reporting within the collection of documents was identified to be differing. Though within the same domain, it tended to relate to distinct phases of a knowledge lifecycle - from conception to

utilization, thus containing traces of the domain knowledge at differing levels of an organization and consideration by domain experts.

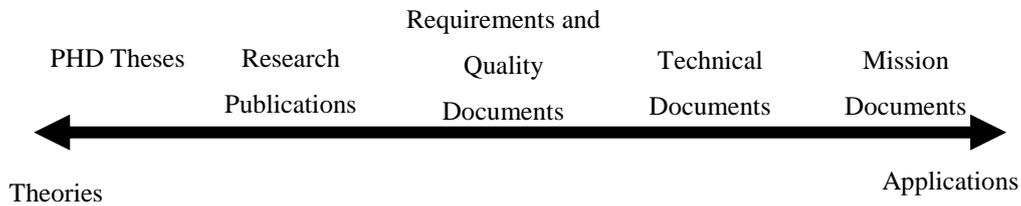


Figure 3 – A knowledge text-based repository of a domain

The methods and systems used for enunciating ideas and their realizations in a given language tend to enable a shared set of protocols for communicating either knowledge of science or the business application. Scientists report in their natural and/or specialist language, and throughout the evolution of their research. Terminology used gets adapted, hence created at times, to the novelty of their work. Thus, at times new terms are coined. Such has been used as a communication instrument to report research and intent behind any other type of research reporting to permit for the knowledge to flow and adapt amid knowledge workers.

This research was about understanding and identifying how scientific knowledge is converted into the knowledge of a business application. We have used a model for the conversion of scientific research into a business enterprise, thus the flow and adaptation (together leading to the diffusion) of specialist knowledge from research documents onto commercial documents. We focused only on such conversion of research documents to commercial documents. A field project (for the PhD research 2003 – 2007) within the context of a spin off enterprise (SME, Small to Medium Enterprise) was conducted. Our hypothesis was to attempt and identify through comparative and diachronic studies how research documents (science: theories, assumptions, *fundamental knowledge: i.e. higher education institution*) feed onto commercial (business: models, practices, *applied knowledge: i.e. spin-off of higher education institution*) documents. Whilst covering the organizational structures supporting the flow of knowledge

and its adaptation within the same domain of application (s) of science, through the observational study. Collectively and in general, we considered to what extent an SME is to create dynamics of innovation, by expanding on Nonaka et al's (1995) *knowledge conversion model*. Considering the diffusion of knowledge as a parameter based on evidence in terms of attempts to manage knowledge, in contrast to the creation of knowledge, per se. We have selected a specialist domain of investigation for our research and as our pool of text-based data, that on satellite technology, though for which knowledge is continuously evolving due to the undiscovered nature of space environment, as of yet. Such is narrowed to LEO (Low Earth Orbit) satellites manufacturing organization, alike those developed and managed by SSTL, Surrey Satellite Technology, in which a field project was conducted. Hence, we have carried an introspective study using *Case Methodology* (Yin 1993, 1994) and guided at times by *Grounded Theory* principles (Glaser, 1978). The latter being a positivist approach towards creation of knowledge, as it is believed that knowledge is created from experiences, because reality or truth are argued to be knowable. Accompanied by use of methods for corpus linguistics being focused on the specialist language in use, and guided by the generally agreed statement, that frequency of lexis is a correlate of its acceptability (Quirk et al, 1985). To assess our corpus-based approach for studying the flow and adaptation of knowledge we had equally pursued a case study. To be able to investigate the gap in knowledge diffusion within SSTL, we did an observational study, and a study of language used in satellite engineering in general. Both studies have an empirical basis. Diffusion of knowledge within organizations, may take different forms and mediums. In this research, knowledge diffusion is regarded as a two-tier process. Involving the flow of knowledge (displacement of belief) and its adaptation (replacement of belief), we looked at:

- Employee to employee knowledge diffusion (online, synchronous feedback): Through the questionnaire survey (and face to face interviews).

- Employee to organization knowledge diffusion (offline, asynchronous feedback): Partial coverage through the questionnaire survey, but analysis of knowledge diffusion is mainly driven by results from the lexical analysis (single words and compound terms) of the collated sets of documents. Those are of research (i.e. higher education institution, specialist research groups) and commercial (i.e. spin-offs of higher education institution, domain specific enterprise) nature and source.

A bimodal research method was followed. Inclusive of:

- Observational study: questionnaire and interview based
- Historical study: analysis of text repositories. Involving extraction and modelling of specialist terminology collated from: public domain publications (i.e. NASA, BSI, and BMP), specialist domain publications (i.e. Surrey Space Centre and SSTL).

3 Contributions and Primary Conclusions

Through such research studies the following contributions were made,

- We had developed a method for a systematic study of knowledge management within a small to medium enterprise. Especially those focused in high technology ventures.
- The method developed includes questionnaire surveys, face-to-face meetings, and corpus-based analysis.
- Attempt was made to see whether documents could facilitate diffusion of knowledge (i.e. research to commercial teams). Such that these documents are accessible by different members of the knowledge creating crew (ranging from researchers to marketing people, and from administration to engineers; for instance).
- We had expanded Nonaka's et al (1995) knowledge conversion model (largely based on intuition and for knowledge creation), to a model on knowledge diffusion based on empirical evidence (for flow and adaptation of knowledge).

The observational study helped us deduce that text-based knowledge diffusion may be the solution to alleviating knowledge bottlenecks as a hypothesis. Thus, it led us to conduct the historical (due to diachronic nature of text) type of study. We looked at written text in the form of both research-driven papers and commercially-driven papers. We attempted to show a connection between the two forms of reporting scientific research and commercial research per se, thus diffusion of knowledge. Suggesting that research papers have an effect on applications driven papers, by having attempted to demonstrate that there is a cohesion where commercial interests are existent, and, indeed, a distinction at the level of choosing and adapting a set of lexis by the knowledge workers of the domain, on a par with the practice followed within an organization. Such choice is representative of the knowledge of the technology within the domain of the application. However, being grounded to intent behind such commercial activity, once the transition from research type of documents to commercial type of documents is compromised. This is related to the terminology of the domain that is diffused and utilized by knowledge workers of specialist domains. The choice of lexis may as well be analyzed through cross-citation of authors contributing to a specific domain of a technology, which could be compounded further if the domain is multidisciplinary. Though such may provide the basic framework by which knowledge diffuses, for instance from research documents to commercial documents. Whereas appearance of specialist terminology in patent documents may be looked upon as an intermediate stage in the transfer of knowledge from research labs and centres to commercial organizations and ventures. The observational study has paved the way for us to model and investigate how knowledge may flow, including supporting technologies and organizational structures (i.e. management, practices, rules and so forth), alike the development of knowledge maps for such specialist domain.

References

- Boisot, M. (1987), "Information and organizations: The Manager as Anthropologist", Fontana/Collins, London.
- Bradley, J. H. Paul, R. Seeman, E. (2006), "Analysing the Structure of Expert Knowledge". *Journal of Information and Management*, vol. 43, pp. 77–91, Elsevier B.V.
- Drucker, P.F. (1995), "Managing in a Time of Great Change". New York, NY: Truman Talley.
- Drucker, P. F. (1993), "The Post-Capitalist Society", Butterworth-Heinemann Ltd.
- Friedman, M. (1993), "Remarks on the history of science and the history of philosophy". In Paul
- Glaser, B. G. (1978), "Theoretical Sensitivity: Advances in the Methodology of Grounded Theory". Hedlund, G. (1994), "A model of knowledge management and the N-form corporation", *Strategic Management Journal*, 15, 73-90.
- Horwich (eds.). "*World changes: Thomas Kuhn and the nature of science*". Cambridge, Mass: MIT Press. Pp 37-54. Mill Valley, Ca: Sociology Press.
- Kreng, V. B. Tsai, C. M. (2003), "The Construct and Application of Knowledge Diffusion Model". *Journal of Expert Systems with Applications*, vol. 25, pp. 177–186, Elsevier Science Ltd.
- Liebowitz, J. Beckman, T. (1998), "Knowledge Organisations: What Every Manager Should Know". St. Lucie Press.
- Liebowitz, J (1999), "Knowledge Management Handbook", CRC Press.
- Liebowitz, J. (2000), "Building organisational intelligence: A knowledge management primer", Boca Raton, CRC Press.
- MacGarvie, M. (2005), "The Determinants of International Knowledge Diffusion as Measured by Patent Citations". *Journal of Economics Letters*, vol. 87, pp. 121–126, Elsevier B.V.
- McLoughlin, H. and Thorpe, R. (1993), "Action learning – a paradigm in emergence: the problems facing a challenge to traditional management education and development", *British Journal of Management*.
- Myers, P.S. (1996), "Knowledge Management and organizational design", Boston, Oxford: Butterworth-Heinemann.
- Nonaka, I. (1991), "The knowledge creating company", *Harvard Business Review*, November-December, 96-104.
- Nonaka, I. (1994), "A dynamic theory of organisational knowledge creation", *Organisation Science*, vol. 5, no. 1, pp. 14-37
- Nonaka, I. And Takeuchi, K. (1995), "The Knowledge Creating Company: How Japanese Companies create the Dynamics of Innovation", Oxford University Press, Oxford.
- Nonaka, I., Umemoto, K., and Senoo, D. (1996), "From information processing to knowledge creation: a paradigm shift in business management", *Technology in Society*, 18(2) 203-18.
- Onga, T-H. Chenb, H. Sung, W-K. Zhu, B. (2005), "Newsmap: A Knowledge Map for Online News", *Journal of Decision Support Systems*, Vol. 39, pp. 583– 597, Elsevier Ltd.
- Quirk, R. Greenbaum, S. Leech, G. Svartvik, J. (1985), "A Comprehensive Grammar of the English Language". London and New York: Longman.
- Surrey Space Centre (University of Surrey) - SSTL, *George Edwards Library* (University of Surrey) collection of text documents 1979-2002, <http://www.surrey.ac.uk/Library>, <http://www.ee.surrey.ac.uk/SSC/>, www.sstl.co.uk.
- Yin, R. (1993), "Applications of case study research". Beverly Hills, CA: Sage Publishing.
- Yin, R. (1994), "Case study research: Design and methods". (2nd ed.). Beverly Hills, CA: Sage Publishing.