THE DISTRIBUTION OF KNOWLEDGE AND POWER

The Relationship Between Network Power and the Distribution of Knowledge Within an Organisation

Chris Malcher, 2006

chris.malcher@electrons.com.au

TABLE OF CONTENTS

Abstract 2

Introduction 3

Distribution of Knowledge 4

Knowledge and Power 10

Distribution of Power 13

The Social Network in the Organisational Context 15

Social Networks and the Distribution of Knowledge and Power 17

Conclusions 19

References 20

ABSTRACT

Examines the relationship between power and the distribution of knowledge within an organisation. Demonstrates the importance of distributing an organisation's knowledge, power and social network connections at the operational level to allow staff to make the rapid and informed decisions required by the modern work environment, and argues the importance of encouraging staff at all levels to form their own connections to others, both internally and with other organisations. Hypothesises that the distribution of knowledge follows the power-law and can be predicted based on the number of knowledge transactions occurring.

INTRODUCTION

The field of social network analysis is shedding increasing light on the movement and influence of knowledge and non-hierarchical power within an organisation. However, the relationship between these two has not yet been examined in detail. This paper commences an exploration of this relationship.

It is important for the sharing of knowledge in almost every type of organisation to distribute power as widely as practicable and to encourage staff to form connections to others both within and between organisations. The distribution of power may be difficult and may not be in the best interests of those who currently possess power and knowledge, but without allowing operational staff on the "front-line" to make decisions appropriate to their role the organisation will not be able to respond in a timely, informed or competitive manner to an increasingly complex and fast paced environment. The most prevalent form of distributed power in the modern organisation is the social or organisational network through which staff can exchange knowledge, and influence decisions across the organisation's structural and hierarchical boundaries.

The paper examines four key areas – the importance of distribution of knowledge, the relationship between knowledge and power, the resultant importance of the distribution of power, and the social network's relationship to the distribution of knowledge and power.

DISTRIBUTION OF KNOWLEDGE

The effects of distribution of knowledge have been widely covered in literature on the topic. Most papers reviewed appeared to start with the assumption that distribution of knowledge is beneficial and go on to discuss its implementation. Few papers, however, delve into the reasons why distribution is a beneficial aim to begin with.

Rulke and Galaskiewicz (2000) examined whether distribution is actually beneficial within an individual team, and exactly what configuration was most productive. Their study involved a number of experiments with MBA students in management simulation games. Their finding of most significance to this paper was that groups made up of generalists performed better than groups made up of specialists primarily because the retrieval of the information is more likely when knowledge is shared within a group than when the knowledge is held only by certain individuals.

While Rulke and Galaskiewicz have made useful observations, three questions remain in relation to their study. Firstly, as specialists are a critical component of any organisation that aims to be at the forefront of its particular area of focus, why did teams of generalists perform better than teams of specialists, and what can be done to address this? Secondly, if teams of specialists typically do not share their knowledge well, what can be done to resolve this? Finally, can such findings be replicated across an organisation, rather than simply within specific teams? The answers to these questions are relevant to the field of distribution of knowledge. Further research is needed to determine the answers.

Dixon (2003, pp149-156) puts forward two models for the transfer of knowledge within teams or an organisation – Expert and Distribution.

In the hierarchically based Expert Model knowledge flows just one way. There may be a feedback mechanism, but these are typically in the form of review, advice and participation rather than discussion of the original issue. Dixon regards this as a less useful method of knowledge transfer than the distribution model.

In the Distribution Model each team or individual is treated as having something useful to offer the organisation and/or issue at hand. The contributors are treated as equals in the process rather than as reviewers after the event. The Distribution Model looks more like a network diagram than the hub-and-spoke of the Expert Model.

Dixon provided two examples of the distributed model in practice;

- Ford's Best Practice Replication System, which requires all production plants to contribute to documentation of lessons learned from running their operations
- British Petroleum's Peer Assist, in which those who are likely to require assistance on a particular matter in future are brought in to discuss the possibilities with a group that's pursuing the matter in question now.

Dixon also discussed Peer Review as a model, but regards it as an Expert Model as the team is offering advice and evaluation, not joining in the knowledge-creating process.

In 1993 Minkler highlighted the shift, due to competition, to a demand for flexible firms able to make on-the-spot decisions in order to compete in the global market place. In such a competitive environment front-line staff "come to have decision-making advantages over superiors higher up the hierarchy." (Minkler, 1993). The modern world of the knowledge worker and just-in-time supply systems "force[s] employees to use their knowledge to solve problems".

The term “Knowledge worker”, coined by Peter Drucker in 1959, describes those whose work focus is an “economic environment where information and its manipulation are the commodity and the activity” (Spira, 2005). As the term implies, the value of knowledge workers is the knowledge they possess and what they are able to do with that knowledge. The shift to the knowledge-based economy requires a dispersal of knowledge throughout the organisation – particularly to front-line staff required to make on-the-spot decisions.

One example of existing practice of distributed knowledge in business is the just-in-time system. Just-in-time can provide greater efficiency and flexibility than traditional mass-production methods by preparing and delivering products when they are needed. It requires those involved in the production processes, whether they are factory workers, knowledge workers or even medical professionals, to have the knowledge and latitude to make informed decisions with immediacy in order to keep the processes operating at the high speed and responsiveness demanded. Although just-in-time may be regarded as superseded by other more recent business concepts and processes, its foremost need for flexibility, immediacy and rapid responses to its environment remains relevant to modern organisations and to the questions being examined in this paper.

Just-in-time systems require the distribution of both knowledge and power, as illustrated by Morikawa and Kerschberg (2005)

> “In order to enable the making of real-time process decisions, the [front-line] decision maker must have access to the latest data regarding the specific instance of the process, as well as literature regarding state-of-the-art practices within the field”.

Knowledge workers, and indeed most professionals, typically operate in an environment with characteristics similar to the just-in-time system. In their normal

operations they must frequently and quickly establish and continue communication with other knowledgeable people, and decide on the best course of action to address the issues at hand. In a diverse market with a diverse organisational team these issues can rarely be predicted by the organisational structure with a high degree of accuracy. In order to operate efficiently and effectively knowledge workers require the knowledge and latitude wherever possible to anticipate issues, foresee new questions, create answers and take action in real time appropriate to the individual environment and circumstance.

Minkler highlights a helpful illustration of the use and value of dispersed knowledge with contributions from research conducted for a book on the problems in the USA's manufacturing industry – *Made in America* by Dertouzos, Lester and Solow (1989); "In Italy we observed highly trained loom operators working together with fabric designers to exploit the technical possibilities of the loom and to dream up new products". Such ground-level cross-disciplinary cooperation can bring together the knowledge to solve existing diverse operational problems and identify potential new efficiencies in processes.

Made in America was written to identify, among other things, the problems caused by practices such as inadequate distribution of knowledge. It provides one useful example of such problematic practices;

> By defining jobs narrowly and making each job relatively easy to learn, American industry pursued flexibility through the interchange-ability of workers with limited skills and experience rather than the cultivation of multi-skilled workers. Employees could be hired and fired with the ups and downs of the business cycle without much loss of efficiency. The result was a progressively narrowing of worker responsibility and input and the tendency

> of management to treat workers as a cost to be controlled, not an asset to be developed [Dertouzos, 1989, p83].

Distributed knowledge and decision-making ability can help an organisation to identify the best innovation and solutions to problems by calling on the expertise and innovation of its staff. As Handy (1996) reminds us, the best ideas typically come from the edges. We need to listen for new ideas from throughout the organisation (and society). For the purposes of knowledge management, we may hypothesise that management should provide staff with the knowledge needed to allow them to come up with the ideas management need. Knowledge needs to be distributed throughout the organisation – including to the edges. At the same time, management needs to be willing to listen for new ideas from all components and all levels of their organisations, including where useful ideas are not normally expected.

Bouchaud and Mézard (2000) have provided an important mathematical theory which may be extrapolated to assist in understanding and predicting the distribution of knowledge.

It has been long known that the distribution of wealth follows the Pareto power-law tail –a small number of rich people have a large amount of wealth, and a much larger number of people with proportionately less wealth.

Bouchaud and Mézard used equations originally designed to predict the distribution of heat in a directed polymer to instead predict the distribution of wealth in a given country based on the frequency of transactions. They discovered a direct relationship and, as a result, were able to prove that one of the prime predictors of the distribution of wealth is the frequency of financial transactions – if there are

many small transactions, wealth will be more distributed than if there are just a few large transactions.

Watts (2003, pp104-107) has found that connections in social networks also follow a power-law distribution.

If we assume that, because of the important role social networks play in the distribution of knowledge (Allee, 2000; and later in this paper), the distribution of knowledge also follows the power-law distribution, we may hypothesise one key point;

> The distribution of knowledge within an organisation can be predicted in proportion to the frequency of transactions of knowledge.

In other words, if knowledge is to be widely distributed within an organisation there must be frequent exchanges and interactions between those who know and those who need to know. For the purposes of this paper, a transaction can be defined as a single exchange of an item of knowledge between two individuals. This distribution is, however, dependent on these transactions spanning social networks - on people who act as connectors (or boundary spanners) between different social networks carrying ideas from one group to another. Such a hypothesis can also serve to highlight the importance of social networks in the distribution of knowledge.

While this may appear self-evident in the light of the benefits of distributed over expert mode team structures (Dixon, 2003, p149) and communities of practice, the ability to clearly predict how well knowledge will be distributed based on the transactions that occur, combined with the evolving understanding of social networks, can have deep consequences in helping us to plan, map and predict a knowledge management initiative.

It is worthwhile at this point to provide a note of caution. Distributed knowledge can create uncertainty and make it difficult for decision-makers to determine options or outcomes [Minkler, 1993]. In addition, while distributed knowledge means that different people know different things, it also means that different people have different expectations [Dew et al, 2004] and these expectations must be managed.

However it must be remembered that the users of organisational output are typically multifarious – in both knowledge and expectations. An organisation will benefit if its output can accommodate the many and varied requirements of its customers, clients and other stakeholders. This is best achieved through distributed knowledge and distributed power, explored later in this paper.

Like most complex initiatives, there are positives and negatives in the distribution of knowledge. We can't eliminate the problems and continue to gain the benefits, but we can prepare for the problems and manage them when they occur.

KNOWLEDGE AND POWER

Ray Gordon and David Grant open their 2005 paper on knowledge management and power with the statement that "to date, the knowledge management literature has insufficiently addressed the construct of power". This writer's own research supports this statement. We may therefore surmise that the theoretical and practical implications of the relationship between knowledge and power have not yet been sufficiently explored in the knowledge management literature.

In this context, power is the capacity to influence others (McShane et al, 2003) or the ability to act freely (Macquarie, 1991). Every organisation has at least two power structures – the hierarchical and the social (Watts, 2003; Krebs, 2004). In most organisations and situations power may also be based on the ability to coerce, reward, use alternative sources of power, keep an existing power in the

network or hierarchy, and/or provide a useful source of knowledge and expertise to others (McShane et al, 2003). A person may, for instance, gain power from being an important source for others of information, knowledge and connections to other social networks.

Ever since 1597 when Francis Bacon put forward the dictum that “knowledge is power” in his work *Meditationes Sacrae*, a relationship has been understood to exist between these two fields. Gordon et al (2005) uses an analysis of the work of Foucault to show that “the production of truth, and hence knowledge, is inseparable from power” and that those with power “are … capable of influencing how people see the world through the management of meaning”. In other words, those who have power can affect how knowledge is created, defined and used. Gordon goes on to say that a struggle for truth or knowledge is a result of a struggle for power. In other words, a dispute over whose knowledge is the more correct is, by proxy, a dispute over who has more power.

Providing weight to Gordon’s theoretical examination, research by Cross and Sproull (2004) into sources of actionable knowledge found that “superiors … frequently set standards by which a project and informant would be evaluated, and so were valuable for problem framing and prioritisation discussion.” Gordon goes on to say that

> The struggle for power within an organisation may influence the design, implementation and ongoing management of a knowledge management system, or for that matter, how the knowledge management system will influence the struggle for power.

Krebs (2004), in his analysis of the relationships within social network power, implies that an important component of power in any organisation is who we know

and who and where the connectors are – i.e. our social networks. Furthermore, Gladwell (2000, p55) asserts that the closer a person comes to a connector the more power and/or wealth they will achieve. In other words, who you know affects the power and/or wealth you have.

Allee (2000) indicates that rather than gaining advantage by hoarding knowledge, an organisation or person can gain more power through sharing (or selling) their knowledge. In other words, communication is what turns knowledge into power. Establishing communication between staff allows the benefits of expertise to be dispersed, and in the process facilitates the increase in influence of the of the individual or group with knowledge in demand. While communication can be useful through multi-point channels, the message and the power that goes with it may be reduced with every step a message takes to reach its recipient. Therefore the more connected the person is the more power they will be able to gain from the knowledge they possess or have access to.

Gordon's largely theoretical analysis of power, Cross' illustration of the practical importance of the relationship between power and knowledge, Krebs' work on power in social networks and Allee's link between knowledge, communication and power would appear to highlight the importance of the relationship between knowledge and power to the field of knowledge management. Although this field has not been thoroughly explored in the knowledge management literature, it may be asserted that knowledge and power are closely interrelated and should be dealt with as such.

DISTRIBUTION OF POWER

The sections above highlight the importance of distributed knowledge and the interrelationship between knowledge and power. If we accept that distribution of knowledge is beneficial to an organisation, and that knowledge and power are interrelated – whether it is formal or network power – then it follows that it would be beneficial to an organisation to distribute its power as widely as practicable. This does not immediately translate into advocating a flat organisational structure. As highlighted above there are many different forms of power, only one of which is hierarchically based. Distributed power can come from distribution of expertise, participation in multiple social networks and/or connectors in social networks.

The modern organisation is required to respond quickly to the environment in which it operates – an environment which is expanding with globalisation and instant communication, and simultaneously increasing in complexity and sophistication. In such a competitive and complex environment many decisions cannot be practically channelled through the formal hierarchy, and delegating operational decision-making to operational staff shifts from a theoretical curiosity to a business imperative.

Dertouzos' *Made in America* study, Minkler (1993) states, made clear that the modern organisation must reduce its levels of hierarchy …

> to more egalitarian organisational structures which induce more shop floor (process) innovation and coordination. The theme that worker knowledge is important and that organisations must harness their contributions is continually repeated throughout the study.

``Minkler's description of a shift from a centralised hierarchy to decisions by front-line staff in system which "force employees to use their knowledge to solve problems" (Minkler, 1993) is also an illustration of a shift in power in the modern

organisation. As we move to a faster operating environment for most organisations it becomes increasingly difficult to channel operational decisions through a centralised hierarchy (Watts, pp273-289). Instead, modern management imperatives such the just-in-time system and the growing prevalence of knowledge work and knowledge workers demand that the decisions, and the corresponding decision-making power, be delegated to those on the proverbial factory floor. The modern business world demands that some power and decision-making ability must be delegated to the front-line staff to ensure survival in a competitive environment.

Similar issues can be seen at a international level. The globalised organisation, with its diversity and complex interaction of disparate languages, cultures, laws and norms, creates an “incomprehensible plurality of forces and eventualities” (Woog et al, 2004) and therefore makes centralised rule impractical if not impossible. In such an environment, decisions regarding what is appropriate for a culturally or geographically distinct group are often best made by those with the most immediate knowledge of the relevant group, operating under the guidance of centralised strategy and principles.

Additionally, it may be argued that an organisation which practices distributed power and knowledge will, by necessity, be more open in its operations, and therefore less likely to allow unethical behaviour to hide in shadowy corners. Trust and ethics are important components of an organisational culture which aims for healthy distribution of knowledge (Davenport et al, 1998; McShane, 2003).

However, these arguments do not advocate an extreme form of flat organisational structure. Extreme distribution of power can lead to disruption of the organisational mission. What is advocated is partial distribution of power at tactical and

operational levels to give parts of the organisation and staff the flexibility and independence they need to fulfil their missions and do their jobs without constant referral up the hierarchy, and the corresponding obstacles in knowledge and time such additional processes can cause.

In knowledge workers and just-in-time systems, modern managers are frequently putting concepts of distribution of power at the operational level into practice within their organisations.

THE SOCIAL NETWORK IN THE ORGANISATIONAL CONTEXT

The social network, as much as anything else in an organisation, is critical to the distribution of knowledge. The "social network" describes the "relationships between individuals, indicating the ways in which they are connected through various social familiarities ranging from casual acquaintance to close familial bonds" (Sbarcea, 2005). Such relationships can occur within formal organisational structures or across the broader society.

As an illustration of the value of social networks Cross et al (2004), in a study of knowledge which has immediate actionable uses, articulated a clear procedural value of the networks we keep in our day-to-day business operations;

> When asked to describe sources of information important to the successful completion of their project, 85% of … managers immediately and spontaneously named one or more specific people … very few of the named people were simply organisationally designated `experts'; most were described as partners in information relationships.

That is, the people in the study obtained information from their social networks rather than the formal hierarchy. Importantly, such distribution of knowledge

sources implies and creates a similar distribution of non-hierarchical knowledge within the organisation.

Social networks are critically important for the transfer of knowledge (Allee, 2000) and are critical for the modern competitive dynamic knowledge-based organisation. Analysing social networks helps us to understand the movement and distribution of knowledge within the organisation, how people learn, where and whom they learn from, how they solve problems and, therefore, how to do it better.

The power of, and in, social networks stems from their ability to allow participants to work collaboratively to create innovative ideas, thereby expanding the options and choices available to the networks' participants, and to implement the resulting strategies as a group or individually with or without external direction (Booher and Innes, 2001).

The social network is important not just for communications (Watts, 2003, pp273-284) and as a tool for the distribution of knowledge, but also for its effect on power within the organisation (see below), distribution of workload (Watts, 2003, pp274-275) and multi-scale networks' robustness in the face of failure (Watts, 2003, p186). On this last point, Watts gives a useful example of a critical failure at Toyota from which, because of existing social networks and the exchange of knowledge, the company and its various subsidiaries and partners quickly recovered by rapidly rebuilding the knowledge and practice of a lost factory with which they had previously worked closely. They were able to use their existing networks to use what the network already knew, share information unknown by others in the network, and work together to assemble answers to questions they couldn't answer individually. They could rebuild because the required knowledge was widely distributed through their social and organisational networks.

Knowledge distributed through social networks can help to reduce or even eliminate single points of failure for the organisation's operations and mission, and thus increase organisational robustness. Distributed knowledge and staff's experience of appropriate empowerment can help the organisation to continue to function even if key people leave or otherwise become unavailable.

For social networks to be truly effective, however, diversity is also required (Booher et al, 2001). Most modern organisations operate in diverse markets and employ staff from differing backgrounds. To be able to respond to these internal and external environments effectively, organisations need to utilise the diversity they already possess. Social networks, like many distributed systems, can gain strength and increase their value to the organisation by encompassing, utilising and encouraging the diversity of views available.

The social network does not replace the formal organisational hierarchy, but does provide a dispersal of the power of the formal hierarchy by providing an alternative to that structure (Krebs, 2004) and the distribution of workload of those at the centre (Watts, 2003).

SOCIAL NETWORKS AND THE DISTRIBUTION OF KNOWLEDGE AND POWER

As Dixon (2003, p151) showed in her analysis of the Distribution Model and Watts (2003, p284) showed with his multi-scale network, the social network is a key component in allowing us to connect directly to our peers and to those we need to exchange information and knowledge with in order to be able to properly do our jobs. The interrelated nature of power and knowledge means that the distribution of links in the organisational social network is inexorably linked to the distribution of power.

Krebs' (2000) hypothetical analysis of the effect of network power in a conventional hierarchy demonstrates that the most important power is in the hands of connectors. Krebs' analysis, however, does not explore secondary and tertiary connections (two and three degrees of separation) nor formal power structures and the influence these can have on power within an organisation. What Krebs does do, however, is put numerical values to the power a person has based on their position and connections. Although the details or accuracy may be disputed, a system of assigning numerical value of power for connections can be helpful in articulating the effect of the connections available.

Krebs' final point in the article is of relevance;

> A centralised network, such as a hierarchy or a hub-and-spoke, has centralised power. These networks have a few nodes with many connections, while also containing many nodes with only a few connections. As the disconnected start to connect, power becomes more distributed.

In other words, wide social networks distribute power.

As argued above, it is beneficial to an organisation for both power and knowledge to be distributed. In his article Krebs has illustrated and provided a measure for a key relationship between organisational networks and distribution of power within the organisation. In effect, he has shown that the existence of a robust social network implies distribution of power. In addition, Allee (2000) has shown that a healthy social network is important for knowledge management.

Healthy social networks are key to the distribution of both knowledge and power throughout the organisation. Such distribution creates both a challenge and an opportunity for the hierarchical organisation as a traditional concept, and for management of such organisations, but it is a challenge which can be overcome through carefully directed management.

CONCLUSIONS

There is a close and direct relationship between organisational network power and the distribution of knowledge within an organisation. In short, if knowledge is to be effectively distributed then power must be distributed as well. The distribution of both of these is frequently achieved through the existence of healthy social networks.

Existing business practices such as just-in-time delivery, knowledge work and organisational robustness all require a degree of distribution of both knowledge and power at the operational level of the organisation to achieve their fundamental aims. Distributed knowledge and decision-making systems require, for their existence and operation, healthy social networks connecting staff directly to the people they need to know to do their jobs and to continue to gain knowledge in a knowledge-based work environment.

Further work may be required on a number of areas identified here, including methods of predicting distribution of knowledge based on frequency of transactions, and on some of the more detailed aspects of the relationship between knowledge and power.

REFERENCES

- Allee, V. (2000) Knowledge Networks and Communities of Practice" *OD Practitioner,* Vol. 32 No. 4, USA, http://www.odnetwork.org/odponline/vol32n4/knowledgenets.html. Viewed Oct 2005.
- Booher, D; Innes, J (2000) *Network Power in Collaborative Planning*, University of California at Berkeley. http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1005&context=iurd, Viewed Jan 2006
- Bouchaud, J.; Mézard, M. (2000) *Wealth Condensation In A Simple Model Of Economy,* CEA-Saclay, Science et Finance and LPTENS-Paris http://xxx.lanl.gov/abs/cond-mat/0002374. Viewed Oct 2005.
- Cross, R.; Sproull, L. (2004) "More than an Answer: Information Relationships for Actionable Knowledge" *Organization Science*, Vol 14, No.4, Jul-Aug 2004, pp446-462
- Davenport T; Prusak L (1998) *Working Knowledge: How Organisations Manage What They Know* Harvard Business School Press, USA
- Dertouzos, M.; Lester, R.; Solow, R. (1993) *Made in America; Regaining the Productive Edge*, MIT Press, USA.
- Dew, N.; Velamurib, R.; Venkataramanc, S. (2004) "Dispersed knowledge and an entrepreneurial theory of the firm", *Journal of Business Venturing,* Volume 19, pp659–679, Elsevier, USA.
- Dixon, N. (2000) *Common Knowledge: How Companies Thrive By Sharing What They Know* Harvard Business School Press, USA.

- Gladwell, M. (2000) *The Tipping Point*, Little, Brown and Company, USA.
- Gordon, R.; Grant, D. (2005) “Knowledge Management or Management of Knowledge? Why People Interested in Knowledge Management Need to Consider Foucault And The Construct of Power” *Tamara: Journal of Critical Postmodern Organisation Science* 2005; Vol3, No.2, Academic Research Library, p27
- Handy, C. (1996) "Time for Inspirational Measures" *Management Today*, London, Nov 1996, p27.
- Krebs, V. (2004) *Power in Networks*, www.orgnet.com, viewed Oct 2005.
- Macquarie (1991) *The Macquarie Dictionary, Second Edition* The Macquarie Library Pty Ltd, Sydney.
- McShane, S.; von Glinow, M. (2003) *Organisational Behaviour*, McGraw-Hill Higher Education, New York.
- Minkler, A. (1993) “The Problem with Dispersed Knowledge: Firms in Theory and Practice” *KYKLOS* Vol 46, pp569-587.
- Morikawa, R.; Kerschberg, L. (2005) "MAKO-PM: Just-In-Time Process Model," Workshop on Information Just-in-Time, *Seeking a New Knowledge Management Paradigm,* Kaiserslautern, Germany, April 11, 2005.
  http://eceb.gmu.edu/pubs/MAKO_Morikawa_Kerschberg.pdf. Viewed Oct 2005.
- Rulke, D.; Galaskiewicz, J. (2000) “Distribution of Knowledge, Group Network Structure and Group Performance” *Management Science*, May 2000, Vol 46, Iss 5, p612

- Watts, D. (2003) *Six Degrees; The Science of a Connected Age*, William Heinemann, London.
- Woog, R; Dimitrov, V (2001) *Globalisation; Democracy In Decline* http://www.zulenet.com/VladimirDimitrov/pages/GlobalDemocDecline.html, Viewed Nov 2005.
- Sbarcea, K. (2005) *Understanding social networks and communities of practice* (unpublished). For further information see http://www.thinkingshift.com
- Spira, J. (2005) “In Praise of Knowledge Workers” *KM World*, Vol 14, No.2, 2nd Feb 2005. http://www.kmworld.com/publications/magazine/index.cfm?action=readarticle&Article_ID=1991&Publication_ID=128. Viewed Oct 2005.