The Social-Network Toolkit

Building Organisational Performance through Collaborative Communities

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Author profile

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She is a recognised leader in the field of social-network analysis for knowledge management, and is a frequent speaker and writer on the topic.

Before becoming an independent consultant, Anklam held key positions at Nortel Networks, Digital Equipment Corporation and Compaq Computer Corporation (now HP). At Nortel Networks, she was director of knowledge management for the Global Professional Services organisation. During her career at Nortel, she developed a practice in social-network analysis in conjunction with researchers from the Institute for Knowledge Management; instituted communities of practice for worldwide expertise groups; and oversaw the information-architecture and technology-infrastructure development for KM practices.

She was formerly a senior consultant at Compaq Services Group (formerly Digital Services) of Compaq Computer Corporation. In her 25 plus years in the computer industry, Anklam has worked primarily in systems software and systems-integration groups where she held senior architect and strategy roles.

In addition to her practice in social network analysis, Anklam also supports companies who are implementing collaborative software platforms and is a partner of Cynefin North America, a training, research and practice group that applies principles and methods in social complexity to solving hard business problems.

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Executive summary

In the days when knowledge management was still thought of as comprising activities for capturing and organising content, or creating knowledge bases and portals, the Institute for Knowledge Management (IKM) conducted a survey of 40 managers in a company known for its knowledge-management leadership. Respondents were asked to reflect on a project that was important to their careers and indicate where they had obtained knowledge critical to their success. Eighty-five per cent said they received this information from other people.[1]

These 'other people' are the social network: the people we are connected to and to whom we turn when we have an idea, concern, problem or question. The social network is not only the first place we go to when requesting knowledge, but is also the place where we are most likely to find it. But what happens if the social network is inadequate? What if we do not have the right connections to find the information we need for crucial career events or running a business? The IKM survey found that 15 per cent of managers who received information from impersonal sources, such as computer archives, the internet or KM databases, were relatively new to the organisation and had presumably not had time to develop their networks.

Consider another story from a software-development company with offices and development sites in India, the US and Europe. During group meetings, there were often people who were unaware of new product features or design options that were being actively considered and, more importantly, had been in the product's design document. As a result, meetings were ineffective as people had to explain new features or design changes rather than make decisions for the future. The product's lead architect decided to investigate the patterns of communication across the group. The map looked like the one shown in *Figure 1*.

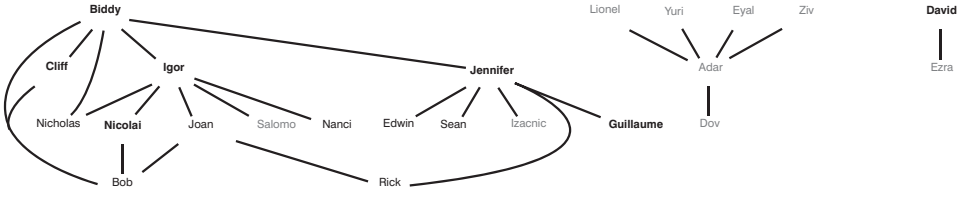

Figure 1 Patterns of communication

Lines between the names of people represent communications links. Note the larger, connected group on the left and two isolated groups on the right. This map gave the team insight into why communications had failed. The team immediately made a plan to ensure that people would be better connected and created opportunities for more frequent and consistent communications.

This example is typical of the situation in many firms, and illustrates the value of

examining the connections that exist between people in organisations. The map helped the managers understand what was happening, and stimulated action to improve the knowledge and information flow in the company. This insight is a cornerstone of the study and practice of social networks and knowledge management within organisations.

This report is based on a few simple premises: [2]

- Networks matter: the new nexus of knowledge management is in the network. It is where work gets done;
- Networks are everywhere: as fish are unaware that their environment is water, we are often not conscious that networks form our knowledge environment. Most of the important networks underlying every organisation are the relationships that are invisible to management;
- Existing networks can be identified, analysed and measured: knowledge of what is happening in networks can lead to action that improves individual and organisational performance;
- New networks can be intentionally created, grown and supported: individuals, enterprises and communities can reach out and create networks to achieve specific purposes and common goals;
- Networks will be important in the future: organisational leadership will be based on a leader's ability to gain rapid insights into existing and potential networks within the organisation, and take action to leverage them.

Many businesses are struggling to understand how to leverage talent, skills and experience from across the organisation to improve their effectiveness, competitiveness and agility. New organisational capabilities are focused on networking practices. Just as a fisherman's livelihood depends on keeping his nets mended, managers (especially KM managers) must work at keeping networks healthy. New practices described in this report are helping managers detect, sustain and leverage networks to enable more cross-organisational working practices, communications and collaboration. This report brings the need for these capabilities into focus, and presents some of the networking practices and tools that are being adopted by leading commentators and organisations.

The first section of this report describes the trends that have converged to make networks a matter of importance in knowledge management. Subsequent sections discuss:

- Why should managers care about networks in their organisations?
- What do managers need to know about networks?
- What knowledge-management practices and methods support network creation and growth?
- What software tools, products and platforms support network creation, growth and leverage?
- How can you introduce the practice of social-network management into an organisation without it becoming an end in itself and a distraction from the business's purpose and goals?

Each discussion includes the experiences of pioneer practitioners in this new domain of knowledge management, most of whom have just completed a pilot project and are at the 'now what?' stage of implementing knowledge-networking practices.

Terms in context

"What in the past could be taken for granted and sometimes even minimised can no longer be ignored or left to chance."
Laurence Prusak and Don Cohen[3]

'Social network' is an academic term that has slipped into the knowledge-management vocabulary. Outside of knowledge management and other specialised academic areas, it is not a term that people use with comfort. Officially, it means nothing more than a network of people (in contrast to networks of computer systems or railroad lines). However, to some people, the word 'social' connotes gossip, parties and getting together outside work. To keep things simple, this report uses the terms 'network' and 'social network' interchangeably. In addition, it introduces the qualified terms 'personal network' and 'organisational network' to distinguish between types. I also talk about 'knowledge networks' and 'knowledge networking', which in some companies are more acceptable terms than knowledge management.

Social capital, networks and third-generation KM

The knowledge-management community is made up of practitioners who are self-aware and constantly exploring new ideas and concepts. Because the underlying principles of knowledge management touch so many diverse disciplines, innovations from different schools of thought have allowed knowledge management to continually grow and expand. The trends and developments influencing the emergence of social-networking practices into KM include:

- The ongoing KM theme that social capital can be a measure of an organisation's value;
- The science of networks and study of social networks that have led to social-networking applications;
- The evolution of knowledge management into its third generation that builds on collaborative infrastructures and social software developed in the previous generations.

These topics introduce both the context and terminology that will be used as the report goes into more detail on the development of knowledge strategies that address these social phenomena.

Social capital

Most KM practitioners are familiar with the model in *Figure 2*. This model was first used to help companies distinguish between traditional thinking about capital as accounted for on the corporate balance sheet (cash assets, inventory and property, for example) and intellectual capital. It suggests that intellectual capital is really the sum of human, structural and customer capital, and that corporations need to look for methods to account for (literally) the intellectual capital of the enterprise. Without intellectual capital, there are no people, no relationships with

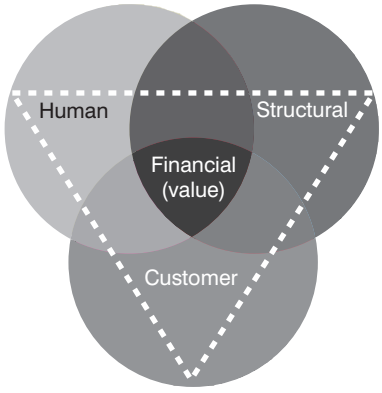

Figure 2 Forms of intellectual capital

customers, no innovation and no competitive processes.[4]

Human capital: The necessary capabilities of individuals to provide solutions to customers; for example, the company's core competency;
Structural capital: The capabilities of the organisation to meet market requirements; for example, its processes;
Customer capital: The value of an organisation's relationships with the people with whom it does business; for example, its brand.

As I began working with social-network concepts, I returned to the models I used for developing KM practices, and realised that there is another way to look at this classic model. Consider that these three elements intersect or connect through the relationships of the people in the firm. Replace financial value in this model with social capital and you begin to see another picture.

In their book, *In Good Company*, Prusak and Cohen define social capital as, "The stock of active connections among people, the trust, mutual understanding, and shared values and behaviours that bind the members of human networks and communities and make co-operative action possible."[5]

Wayne Baker, an expert in organisational networks who teaches the University of Michigan, is more explicit and personal about its value in his definition of social capital. "Social capital refers to the resources available in and through our personal networks. These resources… include information, ideas, leads, business opportunities, financial capital, power and influence, emotional support, even goodwill, trust, and co-operation."[6]

Note that none of these forms of capital (human, structural, customer or social) are as easy to quantify as the methods for counting traditional capital, such as material assets, inventory and cash. In most respects, however, they represent what companies are actually valued for today.[7] You can often sense social capital in the atmosphere of a company or on its intranet bulletin boards, for example. As you walk through a company you see people smiling and cartoons on the walls. You observe informal knowledge being exchanged through gossip, stories and anecdotes, and hear engaged, purposeful dialogue in meetings. People respect and seek each other's opinions, share what they know and trust that their contributions will be acknowledged.

From a knowledge-management viewpoint, social capital reflects how knowledge does or does not move in an organisation. For example, leaders may instinctively know that organisational stovepipes or silos are unhealthy, but they may accept them as a fact of life or a simple communication problem that can be fixed with more information technology. Knowledge-management practitioners know that anything that impedes the flow of knowledge can be detrimental to the business. Recall the example of the software company at the beginning of this report: absent social ties meant that critical knowledge was not shared.

Prusak and Cohen emphasise four specific areas where social capital benefits organisations:

- Better knowledge sharing due to established, trust-based relationships, common frames of reference and shared goals;
- Lower transaction costs because of high levels of trust and co-operative spirit (both within the organisation, and between the organisation, its customers and partners);

- Low turnover rates reduce severance, hiring and training costs, avoid discontinuities associated with frequent personnel changes, and maintain valuable organisational knowledge;
- Greater coherence of action due to organisational stability and shared understanding.[8]

Valdis Krebs, who has worked extensively with organisational networks, began drawing diagrams of these networks in 1987. He applied them for the first time during a project measuring organisational diversity at TRW, a defence and electronics company. During that time he began working on methods and software for what he called organisational-network analysis (ONA). He is one of the leaders (and a great teacher and mentor to many) of the application of network analysis to organisational effectiveness and knowledge management. One of Krebs's earliest findings was that the engineers with the highest commitment to the organisation were those who were connected with the key information flow and decision-making paths. More and better connections led to more social capital, higher commitment and stronger individual performance and improved business results.

The concepts of social capital and research on its measurement and impact, are not limited to the business, organisational and knowledge-management domains. It also applies to nations, the quality of relationships between the people of a nation and the quality of relationships among nations. It applies to corporations, industry networks and the management of relationships through the interactions of individuals. In this context, it should be intuitive that the firms with more social capital – more relationships characterised by trust, shared experiences and culture – will occupy a more positive position in the market.

To investigate this proposition in the organisational realm, the IKM, under Rob Cross's direction, carried out research on social-network analysis in knowledge management in 1999. It examined what it would mean to be able to measure social capital and whether instruments could be placed in an organisation to detect how knowledge is flowing and how people 'feel' about the environment. Ultimately, it looked at whether it is possible to take the readings from a variety of organisations and plot these measures against the balance sheet of the company to look for improvements on a year-to-year basis.

Networks

The past three to four years have brought an explosion of interest in the science of networks of all types: computer networks (including the internet), terrorist networks, traffic networks, network spread of diseases, and so on. Much of this interest has been fuelled by the availability of computing resources that enable researchers to plug in vast amounts of data to analyse networks. Many of the scholars have written books that have crossed over into the mass market following the success of Malcolm Gladwell's *The Tipping Point*.[9]

Gladwell, a writer for *The New Yorker* magazine, explained a number of concepts about social networks as he sought to show how major changes in society and culture can happen through a series of almost unnoticed and seemingly inconsequential events. To explain how ideas spread through populations of people, he recounted some of the history behind sociological research into social networks. He began by highlighting a study by Dr Stanley Milgram in 1967 that was the basis for the phrase 'six degrees of

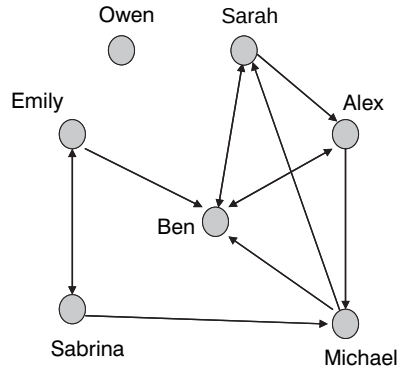

Figure 3 Social-network maps: Ties, nodes and degrees

separation'. The concept holds that you, I or anyone on the planet is connected to everyone else by no more than six connections: me, somebody I know, somebody they know, somebody this third person knows, and so on. The methodology of the Milgram study, and therefore its conclusion, now appear to have some inconsistencies, but the magic of the notion remains.[10]

Alongside the magic are a number of useful basic properties of networks, structural patterns and heuristics for analysing networks that have been developed and passed into some mainstream disciplines, like knowledge management. These concepts come with a small number of tools that enable practitioners to collect data about networks, plug the data into software that can perform all kinds of analysis and draw maps such as that shown in *Figure 3*.

In *Figure 3*, the circles represent *nodes* in the network: each node represents a person. Arrows between people are the *ties* – they show where people are connected and in what direction. For example, if the relationships in this network represent who goes to whom for advice, then ties to Ben indicate that four people go to Ben for advice.

The numbers of ties between two people represent degrees: one tie is one degree. Ben and Sarah are connected by one degree, but Sarah and Emily are two degrees apart. Hence, Ben and Sarah have a direct tie, and Sarah and Emily an indirect tie.

This is a small network, and you could probably draw this by hand if you knew all the people (in fact, this is a practical way to do some simple network analysis). Chapter four, 'Network-analysis and tools', describes the methods and tools for collecting data, drawing maps and reviewing statistics when a network consists of a large number of people. The software involved is generically called social-network-analysis software, or SNA software. Chapter two, 'Network structures, patterns and views', goes into more detail about how to read and understand maps. For now, it is helpful to understand the two basic sources of data: surveys and data mining. Surveys ask people within a clearly defined network about their relationships to other people. In *Figure 3*, for example, Sarah has indicated in the survey that she goes to Alex and Ben for advice.

Surveys provide qualitative information about relationships, but can be difficult to administer in large groups. Data mining involves the use of software with applications that include social context. In e-mail, for example, this social context consists of the sender and recipients (direct or copied). As you will see in the next section, social software and social-networking applications can provide data for analysis using social-networking tools

Social software and social-networking applications

Terminology is a source of great confusion, especially between the terms 'social software' and 'social-networking applications'. I differentiate these terms as follows:

social software refers to software applications that foster the development of social networks, such as collaboration tools, e-mail, instant messaging, weblogs (also called blogs), wikis and other tools that you are already familiar with.[11] These tools help form connections on a person-to-person basis, strengthening individual relationships and in most cases, improving the social capital of a group as well. Consider the extent to which you use e-mail, not just for business correspondence with colleagues, but also to set up lunches, celebrations and other social activities. The more e-mails you exchange with a person, the more you develop a common language, shorthand for frequently used terms, and generally improve the ties between you and that person. Multiply that by all the people in an organisational network and you can see how social software nurtures and sustains social capital.

Social-networking applications, on the other hand, enable users to network digitally and step across the degrees of separation. You may, for example, be looking for information on paperweights and want to find someone who knows something about them. You can search the web or your intranet to find a paperweight expert, but you know that your conversation will be a lot easier if you have had an initial introduction. Social-network referral software is designed to help you find people who can introduce you to the people you want to meet. This software is based on the degrees-of-separation concept. LinkedIn is an example of such a referral tool.[12] If you want to contact a person in a particular company on LinkedIn it will tell you how many degrees away you are from them. It can tell you that, for example:

You know → Sally, who knows → Per (who is an expert on paperweights)

Both software categories – which will be described in more detail later – are useful and available in both organisational settings and in everyday life. In an organisational setting, social software represents an essential element of a knowledge-management framework that is sustained by an understanding of how people and groups collaborate. Social software improves connections among people and groups. Network-referral software, which is being field tested on many public websites, can be introduced into an enterprise to solve specific types of knowledge-management problems, such as those related to expertise location, contact management, relationship management and relationship mining. Social-networking applications use the connections themselves as a knowledge asset.

Both applications accumulate proxy information about connections between and among people, either overtly (as in the referral software) or implicitly. E-mail logs and saved or shared folders, for example, are a rich source of data about who communicates with whom, with what frequency, and (when the contents of e-mails are searched) about what topics. As more organisations and researchers become interested in the nature and value of networks, the silent collection, or mining, of this data grows in importance.

Third-generation knowledge management

It is become a truism among those of us who work in knowledge management that the term itself has become problematic. We would rather use something else, but it has become a shorthand way of identifying a school of thought that is more practice than theory and more about applied technology than about technology itself. We work in the real world and are constantly learning – from our own and each other's experiences

– and acquiring new tools. What we like about working with knowledge management is the learning culture, and that the principles we apply to knowledge management in an organisation we apply to ourselves. We collect ideas, try them out, share them with others and notice how they are transformed through sharing. And we are reflective. There are many opinions on the nature of the various knowledge-management generations. My synthesis of these opinions leads to the first premise of this report: networks are where work gets done.

The first generation of knowledge management was heavily focused on technology. Knowledge assets were primarily information resources and re-usable artefacts, such as intranets, document, databases and files. The initial market surge in knowledge management focused on providing software to assist in managing these assets. This generation coincided with the introduction of web-based technologies into corporate environments: intranets, content-management systems, web-based portals, search engines and so on.

The second generation came as the distinction was drawn between explicit and tacit knowledge. As more thinkers and practitioners understood these differences, process improvement and organisational disciplines started to take hold through the sharing of good practice, continuous improvement, reward and recognition policies, change management, and communities of practice. The second generation proved that the real knowledge of an organisation lay in its human resources.

The exact nature of the third generation, which is upon us, is still emerging from the conversations among practitioners and theorists. Some say that it is about business transformation. One of the largest communities of knowledge-management practitioners is the AOK network.[13] As its facilitator, Jerry Ash, says, "Managing knowledge is not the latest fad. It is a shift in the value of knowledge due to fundamental changes in political, social, economic, business and work environments brought about by the passing of the industrial age and the arrival of the knowledge economy." David Snowden, who introduced the concept of complexity to knowledge management, argues that KM is the management of the ecology of knowledge.[14] Snowden also introduced the term, 'emergent knowledge management'.

Social-networking and knowledge-networking practices are a central focus of this current generation's ecology of emergent knowledge management. That is the connections among people in organisations and across organisational boundaries. If we say that in the first generation knowledge was in artefacts, and in the second it was in people, we need to say that in the third generation we understand that knowledge is in the network. These generations are summarised in *Table 1*.

When knowledge is in the network, it emerges from the interactions of units within the network – individual to individual, individual to group, group to group. The network is not just the social relationships, but organisational relationships and relationships among people, groups and artefacts as well. Snowden refers to three general heuristics about the knowledge worker in this generation:

- Knowledge can only be volunteered; it can never be conscripted;
- We know more than we can tell, and we can tell more than we can write down;
- We only know what we know when we need to know it.

In the third generation, a central idea of knowledge management is about

Generation of KM	Where knowledge 'lives'	Type of knowledge	Implications
First generation	Artefacts	Explicit	Create the infrastructure for capturing, collecting, refining and re-using artefacts
Second generation	Individuals	Tacit	Focus on collaborative behaviours and person-to-person knowledge exchange
Third generation	The network	Emergent	Provide the conditions for enabling knowledge and action to emerge

Table 1 Generations of knowledge management

understanding what can and cannot be managed. As you can infer from these heuristics, it is nearly impossible to manage what people know when they are not always aware of it themselves. We therefore use the term 'emergence', which comes from the science of complex systems, also referred to as complex-adaptive systems (I will use the shorter term, 'complex', throughout the report to mean a complex-adaptive system). Emergence is what happens at the point where two systems meet. Knowledge emerges when people connect with each other within and across networks, and when networks reach touch points.

A closely related concept that is appearing more frequently is that of network-centric warfare (NCW), and its companion mantra, 'power to the edge'. NCW effectively links all possible information sources – satellite images, intelligence data, global positioning information about supplies and equipment, mobile audio, video and computer-networked connections to people, and so on – to provide precise global and situation awareness. By linking sources of information and knowledge, the network is the centre of the command-and-control operation, and it is possible to move decision making to the edge. That is, to the people closest to the situation, wherever that may be. This is also a complexity-based model, as it reflects information's constantly changing nature and the relationships between individual people at the edge and what is happening at the network's core.

If you remove the warfare connotations from this concept, you find that 'power to the edge' also resonates in the context of global, agile corporations. David Krackhardt, another pioneering researcher in social-network analysis, summarises power as the ability to mobilise resources and get things done.

The more networked the information and knowledge, the easier it is to move decision making – the power – to the people closest to the customer. The ability to identify potential innovations can also be shifted to the organisation's periphery, and people across a global enterprise can readily and quickly share context. As David Albers and Richard Hayes say in their report, *Power to the Edge: Command and Control in the Information Age*: "Until quite recently, networking was too expensive for us to realise the value proposition. Communications technologies provided an opportunity to be more robustly networked. As bandwidth becomes less costly and more widely available, we will be able to not only allow people to process information as they

see fit, but also allow multiple individuals and organisations to have direct and simultaneous access to information and each other. We will also be able to support richer interactions between and among individuals."[15]

Knowledge management in this network-centric environment means trusting people to make the right decisions when they are provided with the right context. And, because the context is complex, it can never be wholly known or understood. Managing networks is about managing complexity, that is, being able to chart a course, provide direction and enable action at the edges of the network, even as the network itself is constantly changing.

Summary: the intersection of knowledge and networks

As *Table 1* shows, the role of knowledge management must focus on enabling the conditions for knowledge to emerge.

This report examines what is possible once you have made the connection between social-networks ideas and knowledge-management practices. *Figure 4* shows a map of the concepts and ideas that have emerged, are coming together again and changing in practice.

If, like me, you have always considered knowledge management a lens through which to view current business problems, then you can consider organisational networks a new frame – although unfortunately it does not have a fixed shape. The lens is still knowledge, and you continue to draw on the methods, tools and practices in your KM toolkit as needed. But you also have an additional set of tools that let you examine and leverage the power and knowledge that are in the networks around you.

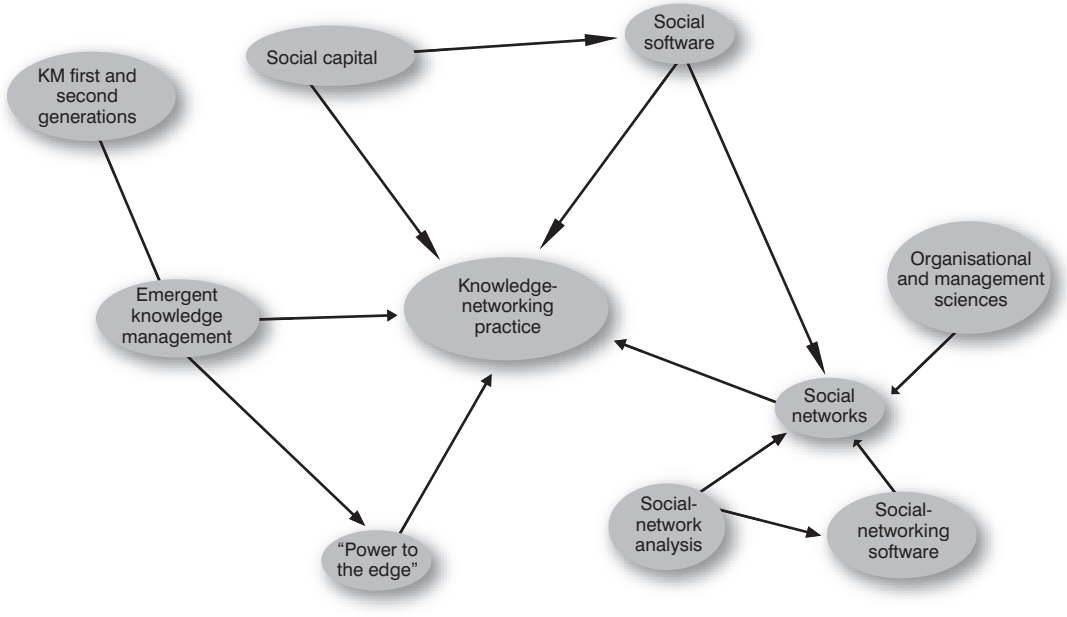

Figure 4 Emergence of networking practices

Brief history of SNA and KM

Social-network analysis has always been a rich and multidisciplinary field. It began in the 1930s-40s with research and discoveries in psychology, sociology and anthropology. These insights were first explored using mathematical analysis in the 1960s among a group led by Harrison White at Harvard University. (See www.analytictech.com/networks/history.htm. For a great photo of the first symposium on the topic held at Dartmouth College in 1975, visit http://eclectic.ss.uci.edu/~drwhite/Networks/MSSB1975.html.) The International Network for Social Network Analysis (INSNA) was founded in 1978 and has been holding annual conferences since 1979.

David Krackhardt, Daniel Brass, Ron Burt, Ron Rice and Karen Stephenson were among the first to apply network analysis to people, organisation and culture and to develop the vocabulary of network types and metrics, which is key to this report. In 1993, Stephenson, Gerry Falkowski and Valdis Krebs worked together at UCLA and then at IBM developing the methodology for organisational-network assessment (ONA). They introduced ONA into the IBM consulting group where Falkowski used it internally to support IBM's re-organisation efforts as it moved to a services-oriented business model. He continued his work with the consulting group and worked with Krebs to enhance InFlow, the mapping and measuring software that Krebs created as a class project in 1987 while working at Toyota and taking courses in artificial intelligence.

Meanwhile, academic research on social networks flourished. In 1998, Duncan Watts and Steven Strogatz published an article on small-world networks that brought a new group of academics – physicists and complexity scientists – into the study of network dynamics.

In 1999, Rob Cross approached Larry Prusak with an idea for bringing the insights of social networks to knowledge management. Cross, Stephen Borgatti, who created the UCINET software, and Andrew Parker collaborated on bringing these methods and tools to companies participating in the IKM. Over the following years, Cross and Parker worked with dozens of companies who were members of the IKM to expand on the knowledge base of social-network analysis, which introduced network analysis to the broad and diverse knowledge-management field.