

# KM and the social network

An organisation's ability to realise its full operational potential is dependent on the strength of the relationships between its employees. Patti Anklam explains how social-network analysis can be used to collate and analyse the patterns of relationships that exist in an enterprise, and outlines the potential benefits the methodology can bring to a corporate knowledge-management programme.



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“Knowledge flows along existing pathways in organisations. If we want to understand how to improve the flow of knowledge, we need to understand those pathways.” Larry Prusak.

The effectiveness of an organisation – innovation, productivity and employee satisfaction – hinges on the strength of the relationships of its people. The sum of the relationships among people, norms, values and shared meaning in an organisation is often called social capital. Social capital may be as important to the success of an organisation as structural, customer and human/intellectual capital. In fact, all these latter forms depend to some extent on the quality of the relationships among their stakeholders.

The understanding of the importance of social capital is now coupled with discoveries and research in the field of the network sciences, which provide mathematical evidence that there are physical laws that govern the structure, evolution and characteristics of networks of all types – mechanical, biological, electronic and human. This research shows that ‘small worlds’ are not just a curiosity, but a predictable property of some types of networks, and that six degrees of separation really is the average number of links between any two people on this planet.

Social-network analysis (SNA) is a diagnostic method for collecting and analysing data about the patterns of relationships among people in groups. Applied to knowledge management, SNA can identify patterns of interaction in an enterprise, including its properties, such as the average number of links between people in an organisation, the number and qualities of subgroups, information bottlenecks and knowledge brokers. SNA provides a view into the network of relation-

ships that gives knowledge managers leverage to:

- Improve the flow of knowledge and information;
- Acknowledge the thought leaders and key information brokers (and bottlenecks);
- Target opportunities where increased knowledge flow will have the most impact on your bottom line.

The method includes a simple survey that requests that people in an organisation indicate their rating of the importance of a given class of information and the person who holds it, as well as the frequency and quality of interactions with that person. Visualisation tools process the data to produce a snapshot view of the patterns of knowledge flow in the network. *Figure 1* represents the ‘information’ network of an innovation group in a high-technology company. Paul (right centre) is the group manager. The three colours indicate the three subgroups within the organisation, which had been newly formed. The directional arrows indicate responses to the assertion, ‘I frequently or very frequently receive information from [this other person] that I need to do my job.’

## Confirming intuitions and creating inquiry

You can understand the immediate impact that such a view can have on a manager, particularly if the organisation is intended to be an integrated, collaborative team. In most cases, a map will confirm intuitions about relationships within a group, but will almost always supply surprises as well. For example, Brenda is part of the Green team, but does not communicate frequently with other members of the team.

Look as well at the lack of connections to Ross (Red) and Jennifer (Green) apart

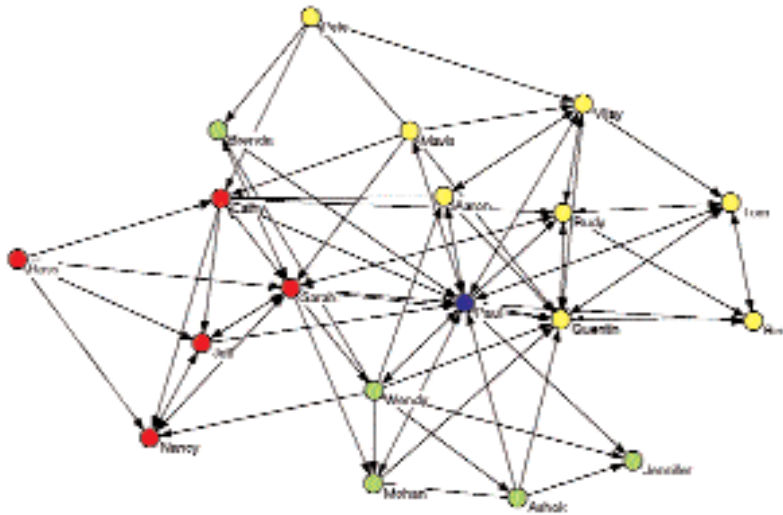


Figure 1 – view of an information network

from those with their own teams. It is tempting to think that perhaps they are not as important to the whole group or that they perform only peripheral roles. Yet it may also be the case that the work they do is not relevant on a day-to-day basis to those in other groups. Another possible explanation is that others are not aware of their expertise and experience. Giving Jennifer and Ross an opportunity at group meetings to talk about their work, experience and expertise could (and, in fact, did) remedy this.

Often an analysis will have a dramatic impact on managers when they realise the extent to which people rely exclusively on them for information. It is easy to infer from a pattern such as we see in *figure 1* that Paul's centrality in this network may deter individuals from seeking information from others in the group, and that Paul may quite possibly be a bottleneck.

Note that the results of the data analysis only suggest questions to ask about the interactions. The data will provide insights, but it is only by understanding the background context that the full picture really emerges.

**Numbers to support analysis and conclusions**

The quantitative data available in an analysis also gives insights into patterns of interactions. *Figure 2* shows the percentages of information-giving relationships that exist among groups out of the total possible number that could

exist; this percentage, in network terminology, is called the density of a network. This data shows that Yellow gets information on a frequent basis from members of the Green team using ten per cent of the possible paths, and from the Red team using eight per cent of the possible information paths. Among themselves, they use 43 per cent of the possible paths for frequent communication, and a whopping 88 per cent of the possible paths to Paul.

It is important to use data like this only as an indication and to guide questions during the analysis of the survey data. Once you learn that Paul and most of the Yellow team all worked together at a previous company, the corresponding figure is not very surprising at all. Similarly, when you know that Brenda and other members of the Red team only recently joined the organisation, you have the context you need to determine whether a

problem or opportunity exists. However, it is surprising that neither the Green team nor the Red team receive information from the Yellow team on a frequent basis. In this instance, there are quite a few questions that need to be asked.

**The methodology: how it works**

A typical social-network-analysis project starts with a problem statement or a business goal. What do you want to learn from doing the analysis? Some typical objectives of SNA projects are:

- To strengthen an organisation's ability to innovate, to respond to opportunities and challenges, and to improve the quality of a product or service offering. An analysis of the existing social network provides insight into changes that will enhance knowledge sharing and people-to-people access;
- To assess the effectiveness of the formal organisational structure, before or after a re-organisation or merger. A view of the informal structures will indicate how readily knowledge crosses group boundaries, and can help to identify people in the organisation who can make the change go more smoothly;
- To facilitate the staffing of projects or organisations to ensure success. Identifying the people who are critical to the flow of information in a network can lead to job or role assignments that leverage this brokerage role, and can increase employee satisfaction and retention.

**Survey**

The goal that is identified will lead to the identification of the group or groups who are to participate in the survey and the questions that will be asked. For example, if the goal is to build a more cohesive

	Yellow	Green	Red	Paul
Yellow	43%	10%	8%	88%
Green	0%	35%	12%	80%
Red	15%	8%	75%	40%
Paul	63%	80%	40%	

Figure 2 – statistics are a compelling complement to visual data

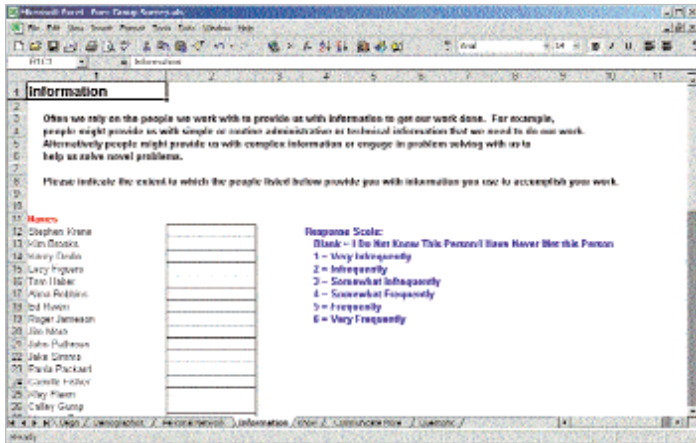


Figure 3 – Excel spreadsheet survey form for an information network

knowledge network – such that the people in the organisation will be able to access and interact with each other quickly and easily – then the questions should be related to some aspects of knowledge, for instance:

- How well do you know and understand the skills and experiences of others?
- Is the type of knowledge held by this other person important to the work that you do?
- Do you find it easy to access other people when you need help?

**Analysis tools**

Surveys can be administered by distributing simple spreadsheet documents as shown in figure 3 or by forms-based web programs. The people being surveyed mark their response to the question with respect to every other person in the survey, rating the answers on a scale from 0 to 5 or 6. When the surveys are returned and the data collated, the analysis begins. Software programs are available to manipulate the data and draw the network maps. Because responses are on a scale, the analysis can be tuned. For example, the network map shown in figure 1 illustrates the responses at a degree of 5 (frequently) and 6 (very frequently). A map showing the interactions on an infrequent basis would show many more lines, but may not be useful for the purpose of the project.

As we generate maps and data, we pull out some of the more interesting results and use these as the basis for interviews with the sponsoring manager and one or more of the individuals surveyed. The interviews ensure that the data can be presented in context. (Yes, Brenda is new to the group and has a function that is dissimilar from that of the others in the Green group.) The interviews can also ferret out information about the people who may be taxed by handling too many requests for information. Perhaps there is

some subset of knowledge held by this person that can be transferred to someone else?

**Example: a high-impact business result**

Social-network analysis can be invaluable to executives in gauging the work required to ensure successful collaboration across business

units. In this example, an executive team, recently restructured into five main groups, met to agree on common business goals and strategies. Prior to the meeting, the executives and their direct reports (a total of 54 people) participated in a social-network-analysis survey. The group included:

- Three product lines (A, B, and C);
- Two customer business units (L and S, for large and small accounts respectively);
- Operations staff, and human-resources and finance leaders.

The resulting network map is shown in figure 4. The large circles (nodes) represent the members of the executive team and the smaller nodes indicate the people reporting to these managers. Although relatively dense as networks go, this view

of the organisation startled the president and his staff:

- The dense cluster in the centre of the diagram represents the president, the operations staff and the human-resources and finance officers. These people are frequently the mediators between the business units;
- Although the organisation was structured into three product lines, it was important for increased revenue and market share that the customer business units that sold solutions to customers showed the ability to integrate products from the three product lines. The executive team assumed that the necessary levels of interaction were occurring among their teams. The map suggested that this was probably not true and, in fact, the extent to which it was not true became evident in the dialogue this presentation sparked;
- Product lines (A, B and C) appear to have little interaction below the executive level. On closer inspection, however, the key connectors who bridged the organisations turned out to be administrators and individuals who had been set up to be a single point of contact for a group;
- The customer business units L and S were clearly not leveraging learning from one set of accounts to another.

A version of the network, with managers and administrators removed, provided an even more dramatic view, as shown in figure 5. Note that in this view, the connections among the individuals within each group

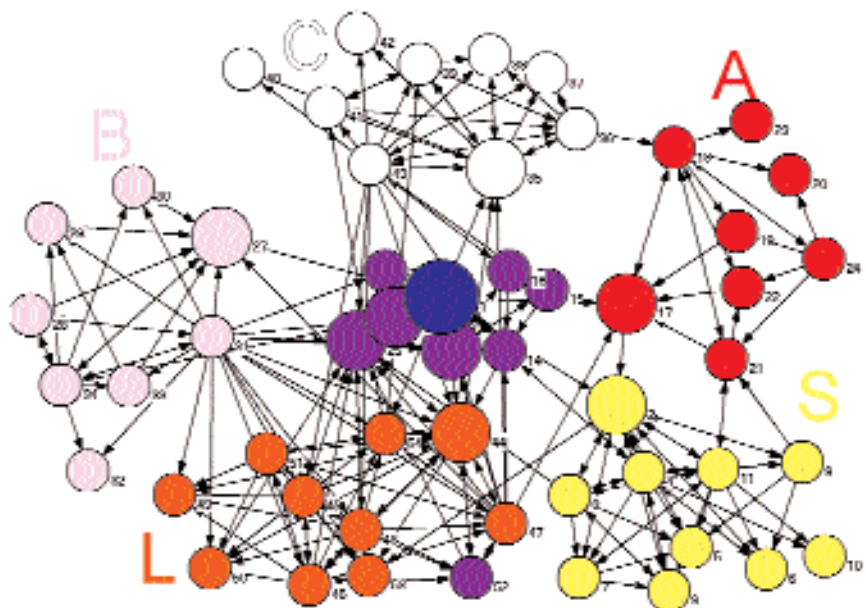


Figure 4 – a view of the network illustrates a business problem

still look strong, with the exception of product line C. The president noted this disparity immediately and suggested that work was required to improve the cohesion of this team.

The network diagrams are based on the numeric data from the surveys; the quantitative view of the data provides additional insights. In this case, the analysis focused on one of the properties of a network: its density. Density represents a percentage: the number of ties (links between people) that actually exist out of the total possible that could exist. In other words, it provides a comparative benchmark to use in assessing the strength of a given network with respect to related or similar networks or groups. You can see this in *figure 6*.

The numbers on the diagonal indicate the density of communication with a group. Scanning this line often reveals anomalies. Here, the disparity between product line C and the other groups becomes even more noticeable. As the executive team discussed this data, they correlated revenues of the previous quarter to the patterns in this density matrix; sales had not met expectations in those areas where, for example, communication between groups had numbers of zero and one per cent. Focusing on these low numbers in the matrix, the leaders hastened to make commitments to one another for immediate sharing of strategic information and plans, and to establish formal ties to ensure that knowledge – about products, customers, innovations and solutions – would thereafter be shared among groups on an ongoing basis.

It is important when looking at this data to recall that the analysis has been tuned to reveal only high-frequency patterns of information sharing. Zero per cent does not mean that there is no knowledge transfer, only that it is not frequent. The analysis is more meaningful when viewed in the context of the percentages among related groups and in the context of the business impact itself. Moreover, note that there is no absolute goal and that a density of 100 per cent in a very large group might itself indicate inefficiency.

### Interventions change the patterns

In the examples above, social-network analysis was applied in the context of changing the patterns of knowledge flow among the people in an organisation in order to further the business goals. Also, in each case there were specific outcomes of the analysis and interpretation of the results. People moved into action. We call these actions 'interventions' in the sense that they will disrupt or change existing

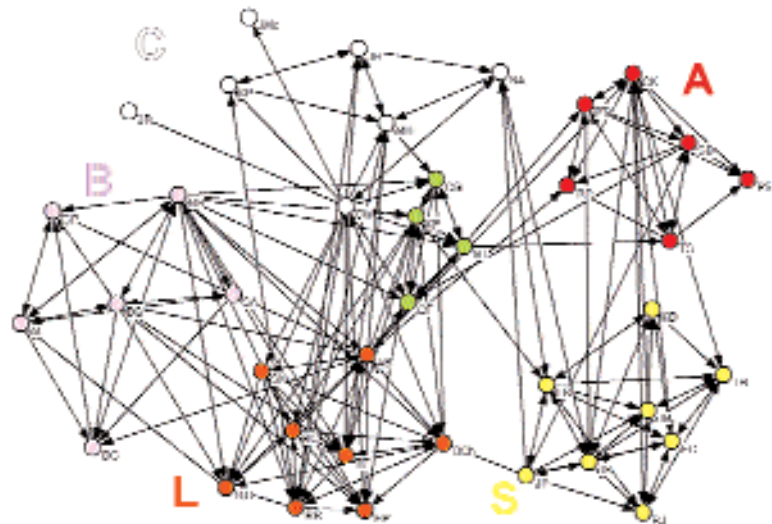


Figure 5 – executive staff with senior managers and administrators removed

patterns in the organisation, presumably for the better.

There are three types of intervention following a social-network analysis:

- **Structural/organisational** – an analysis may indicate the need to modify the organisation or to introduce people into new, specific roles to assist the knowledge transfer. For example, the leader of sales unit L in the executive team example in *figure 4* hired a senior manager to be accountable for business development in product line C. Brenda, the 'outlier' from the Green team in the innovation group (*figure 1*), informally joined the Red team following the network analysis, as it became clear that her work was more closely aligned with this team than with the Green team to which she had been assigned;

vidual lines of work and lost sight of their common purpose and goals. Despite severe budgetary restrictions, C's leader had previously decided that he had to bring the team together in a face-to-face meeting; the social-network analysis heightened the importance of this meeting.

Creating and maintaining the social networks in an organisation is a leadership responsibility that can be supported by good KM practices. Depending on the context, an organisation may accelerate its adoption of technologies to support expertise location, collaborative forums, virtual meetings, instant messaging and so on. Face-to-face or other real-time programs that bring people together to share their individual experience and expertise start to break down the 'don't know' barriers.

“Remember that social networks in an organisation represent a complex system in which relationships are changing all the time, and that you can never accurately predict the results of an intervention.”

- **Knowledge-network development** – frequently, the SNA may provide confirmation of prior intuition, but in a way that overcomes previous resistance to action. For example, product line C's team members had not met in person for over a year. They pursued their indi-

One of the most powerful interventions to develop network cohesiveness is to put people together in teams – working toward a shared goal is a great way to develop or strengthen relationships;

- **Individual/leadership** – everyone looks first to see their own position on a

network map. Most individuals, and especially leaders, will rapidly correlate the map to their own perceptions and intuitions about the context behind the map and take their own actions, either publicly or privately. For example, in one analysis of a fairly large organisation (72 people), a chief technologist realised that she had been very much a gatekeeper, though quite unintentionally. She began to sign her e-mails as Kerberos (the gatekeeper of Hades) to remind people that she was aware that she was often a bottleneck and that she wanted knowledge to flow around her and not always through her. Privately, she began to work with individuals who were on the outside of the network, to bring them into projects, to introduce them to teams, to make their work visible to others and to improve the overall cohesiveness of the group.

	SmA	Ops	PL A	PL B	PL C	LgA
	10	5	8	8	9	10
Small customers	72%	2%	11%	0%	2%	5%
Operations	4%	85%	10%	5%	7%	12%
Product line A	8%	3%	77%	0%	1%	4%
Product line B	0%	13%	2%	73%	0%	17%
Product line C	2%	16%	1%	3%	54%	17%
Large customers	2%	18%	5%	16%	12%	73%

Figure 6 – comparative view of density of interactions

**Social-network analysis as an iterative KM practice**

Knowledge management is a collection of disciplines, technologies and practices embedded in an information infrastructure that supports creation, sharing and leverage of intellectual assets – tangible and intangible – in an organisation to

be satisfied with their work and more likely to stay;

- Increased innovation, productivity and responsiveness – closing gaps in people’s knowledge of one another’s experience and expertise. Decreasing the amount of time it takes for people to locate and access needed knowledge.

Social-network analysis can be a one-time intervention or part of an adaptive approach to knowledge management. Remember that social networks in an organisation represent a complex system in which relationships are changing all the time, and that you can never accurately

diagnosing communities of practice. If you understand the patterns of interaction, you can leverage this knowledge to improve the flow of knowledge and information; you can identify the key information brokers (and bottlenecks); you can target opportunities where precious KM-programme dollars can have the greatest impact. And, you can create new credibility for KM by providing executives with concrete data to illustrate the dynamics of informal networks. As the HR manager for the organisation described above said, “SNA cracked the code of talking about KM with the executive team.” ■

**Acknowledgments**

*My work with social-network analysis was bootstrapped through working on projects led by Dr Robert Cross and Andrew Parker while they were at the Institute for Knowledge-Enabled Organizations (IKO). I am indebted to them for their coaching, mentoring and knowledge transfer.*

**Suggested reading**

*A number of books on the science of networks have appeared this year, many of which are accessible to general business readers (see [www.byeday.net/sna](http://www.byeday.net/sna) for a list of books and websites). The definitive book on social-network analysis in organisational development and knowledge management is currently in progress: Harvard Business School Press is publishing, later this year, a book by Robert Cross that describes the method in detail, with examples of his work (and that of his colleagues) from over 50 companies.*

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“If you understand the patterns of interaction, you can leverage this knowledge to improve the flow of knowledge and information.”

achieve business goals. Social-network analysis is one of those practices and is proven useful in approaching a number of common business problems:

- Launching large and distributed project teams – providing a view of the existing relationships among individuals who are assigned to the project to design the appropriate team-building activities;
- Retention of people with vital corporate knowledge – increasing the social capital in the organisation. People who are more connected are more likely to

predict the results of an intervention. Social-network analysis is a tool that can be used, with discretion and sensitivity, on an ongoing basis in the context of continuous organisational improvement.

**Cracking the code**

Social-network analysis is a powerful diagnostic method to support strategic KM. The recent explosion of interest and research in the properties of networks is providing insights into the dynamics of social networks, which I believe will be particularly useful in planning and