


# From Atomism to Networks in Social Systems






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# From Atomism to Networks in Social Systems

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## Abstract

Informal networks provide a critical mechanism for learning and knowledge transfer in organisations. The growth of methods and tools to understand social networks suffer from a variety of issues related to the formalisation of natural processes, some of which are fatal to their sustained use as means of understanding the interactions between individuals. It is argued such tools are useful if we (i) switch the unit of analysis from the atomism of individuals to the coalescence of identities and (ii) use non-Jungian archetypes as a representation to reveal difference perceptions of learning and knowledge exchanges within organisations. Moving beyond analysis a new technique, social network stimulation is explored which aims to stimulate the formulation of cross silo informal communities, and reduce the degrees of separation, based on trusted exchange, to the point where the need for formal management of knowledge and learning is minimised?

## Key Words

trust, networks, identity, community, archetype, knowledge, cross-silo

## Introduction

There is a general consensus that communities and community interaction provide a critical mechanism for learning. In knowledge management, the manifestation of that consensus has been through the creation of various communities seen as aggregations of individuals focused on a common interest or function. Various terms "Communities of Practice", "Communities of Interest" and even "Networks of Interest" (Duguid 2005); their formalisation is becoming a recipe in which management seek to replicate the knowledge and learning advantages achieved in naturally occurring communities within the formal structures of their organisations. An industry of methods, software and measurement tools has grown up to support this interest which, with some honourable exceptions, privilege the formal over the informal and the explicit over the implicit.

I have argued elsewhere (Snowden 2002a and 2002b) that:

1. informal self formed networks carry more intrinsic trust than formal networks and respect the truth that *knowledge can only be volunteered it cannot be conscripted*. Further that is impossible to formalise the informal, while preserving the trusted nature of informal knowledge transfer and that in consequence we need to focus on the co-evolution of the formal and informal for effective learning. Informal communities arise through mutual interaction and interdependency over time, they evolve but cannot be designed, although as we will see later, we can design the starting conditions and influence that evolution.

2. context is critical to knowledge and learning. Remembering what we know is contextual: *we only know what we know when we need to know it*. Context can influence the nature of trust in an exchange. Weick & Sutcliffe(2001) identify the special types of trust that exist in forest fighting teams and the crew of aircraft carriers, partly measured by their ability to share failure. Although such behavior is possible in the context of a fire, or a cruise, it could not be replicated as is in say a government office without creating the same context and, regrettably setting light to that office every morning.
3. That the distinction between tacit and explicit knowledge, while it provided utility as a means of making knowledge a less problematic word, is no longer useful, since the concept of tacit knowledge has become problematic in turn. We now need to recognise the importance of both narrative and concrete knowledge: *we always know more than we can say and we will always say more than we can write down*. Learning communities act as critical mechanisms for the transfer of concrete knowledge through imitation and mentoring, but also define and are defined by their narratives.

Both referenced articles (Snowden 2002a and 2002b) warn against the ineffectiveness and high cost of attempting to manage knowledge through a *sole* focus on abstracted knowledge shared in formal communities. They also attempt to redress the balance in favour of informal communities, coupled with knowledge in narrative and concrete form, by suggesting and describing methods and techniques that support those approaches, and argue for the primacy of *context* in understanding knowledge and learning.

This article attempts a similar rebalancing in respect of the use of social networks in knowledge management; in particular it looks at a switch from seeing communities as an *aggregation of function* to the more adaptive concept of *coalescences of purpose*, and from a primary focus on *individuals* to one on *identity*. This is achieved by firstly reconfiguring a tool for understanding the interaction between individuals (social network analysis or SNA) to understand the interaction and interdependency between identities, and also between abstractions of community represented by non-Jungian emergent archetypes. This leads naturally to an argument for the generation of voluntary formed cross-silo informal identities as a prime generation of learning within and about organisations, through an experimental technique: social network stimulation. In effect a switch from the top down management of desired outcomes to the top down stimulation of starting conditions, from which novel and desirable emergent phenomena can be nurtured, while undesirable ones can be detected early and either destroyed or influenced so that they self destruct.

The article is a concept piece, designed to provide a criticism of current research and possibly an evolution for the future. The new techniques described herein arise from the interaction of practice and theory within the Cynefin Centre (2005) and its predecessors over the past seven years, but this article is not designed as a multi-client set of cases.

### **Social Network Analysis**

Of recent years we have seen a growth of interest in the role of social networks, partly fuelled by the growth of tools and methods for Social Network Analysis (SNA). Most recently we have *The Hidden Power of Networks* (Cross and Parker 2004) which provides an excellent summary of both the practicalities and the issues involved in SNA, although it is somewhat uncritical in its treatment of some of the data as we will see later (the book forms a launch point for this paper). Other well known author/practitioners include Krebs (http://www.orgnet.com), Borgatti (1999 & http://www.analytictech.com/borgatti) and Carley & Hill (2001). The claim of SNA is that by mapping the various interactions between individuals in a network it is possible to better

understand how things happen, and to intervene to structure those networks to reflect organisational objectives.

We can see two types of SNA approach:

1. A focus on mapping evidence of interaction such as email traffic, telephone conversations, document access and the like. There are major issues with ethics associated with such approaches and also with the quality of the data input, however these approaches are outside the range of this article.
2. The second approach, exemplified by the work of Cross & Parker (2004) relies on asking individuals questions about other individuals with who they interact. This can either work by displaying names and asking questions of each individual about each of the other individuals, or it can be unprompted by asking people about who they network with and then matching names later.

Taken at its most basic SNA works by identifying the various individuals within a network, and then proceeds to ask each of those individuals' questions about their relationships with the other individuals in the network; typical questions include "Do I regularly go to this person for information?", "Do I ask this person to help me understand the meaning of information?", "Do I have a warm relationship with this person, are they easy to approach?" The answers are typically scored on a numerical scale and the results plotted at different levels of significance in the form of a network chart that demonstrates the relationships that exist. Typically it identifies individuals who act as connectors within the network, boundary spanners who connect networks, information brokers and people who are peripheral to the network

#### **Issues with SNA Between Individuals**

There are a range of issues with SNA between individuals which question its sustained use, or its ability to produce objective data. These are:

1. It confuses the individual as a personality from that individual's role or function, for example the network may show that one particular individual is a key hub for knowledge transfer and this can be used to imply that removal of that individual would break the network. However if the others have answered the question in respect of that persons role or function, then their loss will be replaced without too much disruption.
2. A related confusion occurs between the formal and informal aspects of an individual in respect of the informal and formal aspects of other individuals. The context in which the question is asked and/or answered would influence the nature and consistency of the answers.
3. There are issues about the consequences, for example unethical behaviour by people in power who are unhappy with the results of the SNA. Cross and Parker (2004) identity cases where attempts were made to marginalise a "connector" identified by the SNA who was not designated in that role by senior management. In the quoted case, thanks to a high level intervention, the negative impact was avoided, but anecdotal data from many SNA's indicates that this behaviour is common, and will not in practice be overcome by exhortations to senior executives not to do it.
4. A fatal issue, a variation of the fundamental attribution error is also identified in Cross and Parker (2004), although the consequences are not developed. A case is provided in which a fictional network is presented to a senior executive who did not "hear" that it was fictional, and proceeded to explain the actions and behaviours which had produced the

fictional network. Cross and Parker caution practitioners to make sure executives understand what has been presented, but they fail to realise the consequences of this. If an executive can account for a fictional network by his interpretation of the past, then interpretations of actual networks in terms of past actions are also suspect and the utility of the approach therefore comes into question.

5. The fundamental issue is that elaborate analytical constructs are built on the basis of data derived from the initial questions on the assumption that the answers to those questions are accurate and honest. Given that the results of the survey make visible the nature of relationships, it is naïve at best to assume that questions which impact on issues of power and status will be answered honestly, and that a person will say that they do not have a warm relationship with her/his boss or a key colleague when they know that the results of that question will show up on a chart.

This final error, which is a variant of the formalism mentioned earlier, is also replicated in other attempts to represent natural network phenomena. For example, some of the public databases such as 'Linked In' which allow you to designate people with whom you have a link, and then to provide endorsements. The fact that those endorsements are visible, when a phone call or casual chat is both private and deniable, means that one comes under pressure to endorse people whose estimate of their relationship with you does not match yours of them. As a way to link and connect people such systems are useful; however, as a replacement for the natural discourse of what I will later describe as *trust tagging*, they are deficient.

Practitioners will argue that, by constructing more direct questions about relationships, some of the problems can be overcome, but as the questioning moves from the qualitative to the quantitative, much of the claimed richness and the context of the communication is lost. There seems to be a massive trade off between asking a valuable question about the quality of the linkage, with the consequential danger of gamed answers, and the simplistic quantitative question that loses context and therefore meaning. The claim is also made that proper interviews of key managers to review the result can overcome role confusion and clarify and allow the expert (generally the researcher or consultant) to interpret the results to the managers. While this may be true, methods that rely on skilled interpretation are difficult to scale. They are also susceptible to pattern entrainment by the expert-created coherence based on the patterns of that expert's prior experience, rather than creating a unique interpretation. It is an argument inherent to this paper that the expert should as far as possible be removed from interpretation of results; instead the process should produce results which are susceptible of accurate interpretation by the target population itself.

### **SNA Between Identities**

One approach which overcomes the above issues to a substantial degree, but not totally, is to switch the unit of analysis from the relationships between individuals to that between identities. Identity is an interesting aspect of human sense making (Kurtz & Snowden 2003). Humans are able to maintain multiple identities, both in parallel and serial, from the deeply personal (parent, spouse etc) to the collective both formal (work group, organisation) and informal (sports club member, management course attendee, cohort group). Identity is a broad subject in human systems, but in the context of an organisation we can see three main types of identity, or rather six, as each has formal and informal manifestations. These are:

1. A role or function, mostly linked to an individual. Formal examples will normally be functions such as the CEO; informal examples could include the company joker or the peace maker. The informal examples tend to be archetypal and more useful in SNA

- between abstractions defined next, but can be included in an SNA between identities. A bureaucratic community such as Internal Audit is more likely to be considered as a role or function than as a community, and will be depersonalised in most people's perception unless the organisation is small.
2. An identity which has continuous membership over time independent of specific activities. Work Groups and professional communities are obvious examples of the formal, the informal tends to be linked to past activities such as attending a course together, the cohort groups who join the organisation at the same time and the ubiquitous smokers' room.
  3. An identity which forms in a specific context around an activity or situation. Crisis management communities, either formally or informally constituted, are obvious examples as are some project teams.

The process is then very similar to that for individuals, but instead of asking individuals about other individuals, each identity is asked the questions about others' identities. This can be done using a sample of individuals associated with an identity (and remember that any one individual will be associated with several identities) and then examining results, accepting the average if there is a low standard deviation, possibly breaking up the identity into two or more units if there is a high deviation. Other methods include group discussion and the appointment of representatives.

Care needs to be taken to poll as many parts of the organisation as possible to ensure coverage and this can be done in workshops, or by electronic polling. Individual communities can be clustered. For example, it is sometimes necessary to list every expert community but not always. In the latter case it may be sufficient just to have an identity "expert community", or possibly one level down "professional communities" and "practice communities". Where an individual is strongly associated with a particular role it is important to avoid association with that individual as a person – asking about prior holders or future holders is one way around this. However the use of direct questions around current aspects of an organisation will always produce a degree of gamed answers, particularly if the results are visible.

The result of this approach can make visible the interactions between different types of identity. In my five years of doing this sort of work there is one clear (but not universal) pattern in which as one moves from questions about information flow, to those of interpretation and warm relationships, the formal communities surrender centrality to the informal. Indeed it is not infrequent to discover that an informal community, such as an officers' mess or a football supporters club, provides a critical mechanism for learning. Most people know this, but the advantage of using an SNA tool is that it provides quantifiable evidence that can justify maintaining the cost of physical space to allow informal networks to sustain themselves, and to emerge to meet the requirements of social interaction.

### **SNA Between Abstractions**

Switching the unit of analysis from individual to identity means that we are running at one level of abstraction from the reality of "me" while at the same time reducing the number of units that we have to analysis. The limitation on numbers is important as there is a natural limit of a few hundred (and some would argue less) for the number of individuals who can participate in an SNA, and for whom the results can be meaningfully represented. The abstraction means that the results are more reliable since they are less dependent on data capture where providing the data can be seen to influence an individual's future position or standing in the organisation.

However, there is still a degree of linkage between the answers, albeit at a collective level and their consequences, so a cautionary approach is advisable. Results can also be obtained with increased level of objectivity of data input, or more material for quantitative (which should be privileged over quantitative) analysis. SNA between abstractions is one new method to do this

The method uses an ancient aspect of the way that people create simplicity out of the complexity of their lives through the use of archetypal story forms. As people tell stories about their lives, characters emerge from those stories, and as more stories are told about those characters, the characters stabilise as archetypes representing different aspects of that group. Archetypes can be objectively produced from a volume of narrative material (Snowden 2001), and as cultural signifiers of a community. Archetypes can be person based, that is to say that the representation is as a persona (the Dilbert cartoons are illustrations of this in the modern day); they can also be situational based or community based. Archetypes are normally produced by a two stage process (Snowden 2001) in which people first identify the obvious (characters, formal and informal communities etc) and then identify the attributes positive and negative attached to the obvious. Those attributes are then separated, randomised, clustered and labelled as archetypes. This indirect process reduces gaming and increases objectivity.

Once a set of archetypal identities is established, normally somewhere between five and twelve, although no attempt should be made to constrain the numbers, then these can be used as the unit of analysis for an SNA. However in this case we go to different groups of people in the organisation and ask them to fill in the standard SNA questions for each archetype about each of the other archetypes. The result is a different set of SNA outputs for different groups. The results of this are interesting and include, but are not limited to the following:

1. A identity perceived as a router of knowledge by one group, may be perceived as a blocker by another
2. An isolate for one group may be central to another
3. Statistical data and indices can be produced to indicate how different groups perceive social interaction between archetypes,
4. Measure of dissonance can be produced to show how groups who are meant to be working together perceive interactions between abstracted representations of their own behaviour.

The power of this technique lies in the depersonalisation of the material and the capacity to show objective comparisons from multiple perspectives. It also creates a value neutral way in which conversations can take place around the way or means by which people work. It can also be done from multiple perspectives: how do we perceive the relationships and then compare the same questions with the other group.

As in the case of SNA Between Identity, the same technique is used, but by changing the unit of analysis away from the individual we produce data which has greater validity, and which also creates quantitative data relating to different perceptions between identities of network functionality or disfunctionality.

### **Context of Social Network Stimulation (SNS)**

To date we have talked about SNA as a technique for learning about networks, either directly or through various levels of abstraction; in effect as a diagnostic technique. It is now time to talk about consciously creating a learning network, focusing on the ecology of learning rather than its objects. The type of problems addressed by SNS include the perennial issues of cross-silo

collaboration within and across the boundaries of organizations; the production of locally situated solutions that can utilize local cultures and capabilities, rather than attempting to impose a homogenous solution developed in one culture and learning environment; and to provide an alternative mechanism for the distribution of constrained resources. There are of course others, but those are all significant issues for most organizations. In effect we wish to replicate the advantages of the cabal without the perniciousness of its secrecy and elitism.

SNS as a technique needs to replicate the process by which informal trusted communities form, to reduce the overall degrees of separation within the organization considered as a function of *trust tagging*. Trust tagging is a natural human phenomenon that is critical to knowledge transfer and the validation of authority as well as general problem solving. Imagine that you face a difficult problem, you phone up a friend, let's call her Gwyneth and after a short conversation about a project on which you worked together, or some social activity that you share in common you ask if the friend if they know anyone who can help. A day later, someone you do not know phones you up and says "Gwyneth says you need some help, and any friend of Gwyneth's is a friend of mine". You have just been trust tagged in a network linkage. Now imagine that everyone in an organization is within no more than three degrees of separation of everyone else, based on a similar trusted relationship. In those circumstances knowledge will flow freely, customer problems can be resolved by personal contact and new ideas will become visible quickly to senior management. Such a programme would connect the organization in such a way as to create a learning ecology both within the organization and also (potentially) across the boundaries of the organization: that is the objective of SNS as a technique.

However it is important to recognize that such trusted links do not form as a result of corporate direction, they arise in consequence of working together on a project (often the more difficult the deeper the bond), sharing common interests, enemies or a myriad of other factors. Critically such bonds emerge over time and are *voluntary* in nature. We work out very quickly on first contact if we like someone or not; it's not necessarily a rational process, but it is the reality of human interaction. Trust emerges over time but can be lost in seconds, it cannot be manufactured but it can be nurtured. There are also limits as to how many trusted links we can invest energy to maintain, a working limit is around fifteen, although anthropologists will argue it is higher at around thirty, but they tend to work in tribal societies where there is higher innate social trust.

We already have successful examples of the impact of trusted connections in several cases; one of the most powerful is the Grameen Bank (Yunas 1999) which was created in Bangladesh to provide small loans to poor people. In the Grameen Bank everyone who took out a loan was required to be a part of a self regulating borrowers' group in which each member of the group had to take responsibility for the debts of the others. This simple rule which costs little to administer produced a 97 percentage repayment rate comparable with best achievements of the large banks; there are now over two million clients of the Grameen bank and the approach has proved both scalable and portable. Critically, while the rules for the formation of the borrower's groups are set "top down" the decision about who is in your group is "bottom up", it is voluntary, hence the power of the technique. SNS techniques learn from, and were inspired by the case of the Grameen Bank and seek to stimulate within a controlled framework the natural processes of informal community formation.

### **The Structure and Process of a Social Network Stimulation**

One of the ways that a learning community forms, where the participants are not trust tagged or previously known to each other, is that a disparate group of individuals come together and through some common shared activity form a trusted bond that persists beyond the activity itself. For example a group of management trainees joining a company fresh from different universities



create the potential for such a new community, and such communities will frequently form. Note the emphasis on the plural. The fact that this particular group of students has been selected by management does not mean that they will form a sustainable bond over time, and in practice there may be major differences. However the probability is that different sub-groups will form which will persist over the following decades, sometimes with overlaps of membership (boundary spanners in the language of SNA). Some project teams create an identity which persists beyond the end of the project, but not all project teams even when formed under similar circumstances persist.

SNS design then includes two elements derived from this understanding, namely the need for some form of problem solving environment or common threat/opportunity, together with the introduction of novel new contacts to allow new identities to form. However natural processes involve time, and the intrinsic rewards of social interaction that act as their own reward take time to build in other than crisis situations. As a result, in SNS design we build in more explicit rules to force diversity into team formation plus a third element, the use of explicit reward structures together with a process to engender engagement.

The three elements are then:

1. An intractable problem or problems. Intractable problems are suitable for informal networks, they are generally those which cannot be solved by normal techniques and may be difficult to understand or define. They are also attractive for experimental projects, as the past failure creates a greater willingness for risk taking. It is also important to create a measure of successful resolution of the problem that is objective in nature, and which can not be perceived to be subject to internal patronage.
2. A reward normally achievable through patronage; these are many and various, they can (and have) included promotion, access to senior management development programmes, sabbaticals or even tickets for a football match. Such rewards are often not available to mavericks in organizations, their troublesome nature excluding them from the normal power relationships, but often making them more suitable for innovative ideas and solutions. The reward needs to be capable of being allocated to a team
3. A set of boundary conditions or rules within which a team is permitted to form. The purpose of rules is to create new identities, not just provide a reward mechanism for existing groups. Rules will need to be explicit and based on readily available data which can be rendered into search mechanisms so that people can construct teams. For example of the technique is being used to merge silos post a merger then a rule might be at one third of the team has to come from organization A and two thirds from organization B; the asymmetry here is to avoid conflict, 50-50 rules tend to engender dominance games in the context of a merger. Another rule might require one member of the team to have an arts degree, or less than three months service. Limited a team to the natural limit of 15, or ideally less also makes sense as an overall constraint

The basic theme of SNS is then to link the patronage reward to the ability of a team to form and resolve the intractable problem. The sequence of a SNS programme is as follows:

1. Identify an intractable problem or problems and a patronage reward or rewards. This can range from a simple one to one coupling to complex menus of options in which people can choose rewards and/or problems; possibly balancing off ease of resolution with desirability of reward.

2. Gather all possible demographic and related “factual” data and model the impact of different rules on team formation in terms of the speed in which a dense network could form. This modeling can be done by discussion and back of an envelope calculation but is best achieved through agent based modeling software which can provide a staged delivery in its own right, demonstrating the sensitivity of the network to different starting conditions.
3. Initiate the programme and facilitate team formation. If the rules have been designed correctly it will be difficult for people to create a team from their existing social networks, although a core group of two to three may be able to form. To gather the rest of the team will require assistance: methods that can work include the using of dating agency software (matching rules is rather like filling in a form to say what sort of characteristics you have and are looking for in a partner), speed dating and virtual or physical hiring fairs in which people can encounter others and form teams based on who they choose to work with.
4. The programme then runs for a designated period as intractable problems are solved, rewards are allocated. This can be continuous, or event based and/or first come first served based or various permutations of combinations thereof. What is vital is that there is no element of judgment involved in the determination of success – if it’s achieved you get the reward.

The function of an SNS is not to determine the way that a problem is solved, or to define the acceptable types of solution, rather it is to create a framework within which a network can itself solve problems in novel and unconventional ways, tapping into the considerable knowledge residing in information networks both within and without the organization. Like the Grameen bank, the method sets the boundaries and attractors and allows beneficial patterns to emerge. Yunas did not tell people which lending community they should be part of; neither did he set up a cross community working party. Instead lending community is self selecting: the barriers are the rules for community formation and the attractor is the loan itself and the lack of bureaucratic process. SNS works in a similar ways; it is *radically* different from HR or senior management creating cross-silo or functional teams.

### Summary

The purpose of this article has been to focus on the role of networks in organizations as a critical aspect of knowledge management and learning processes. It has built on an established technique, namely SNA, by shifting from individuals to identities and then to abstractions. The reason for that shift is to overcome some of identified issues with the data feed, while fully utilizing the powerful representations of conventional SNA tools and practices. Coupled with this is the ability to provide a different, more quantitative (but context rich), less qualitative basis to understanding network effectiveness. All of that focuses on SNA as a diagnostic technique. SNS in contrast, although it builds on the principles of SNA, is an intervention technique designed to use the power of self-forming volunteer networks to tap into informal as well as formal knowledge bases, and to create novel solutions to seemingly intractable problems. The article has focused on problem resolution, but the technique also shows potential as a generic innovation tool, and as a possible model to create an alternative mechanism for the distribution of funding within organizations including governments.

Knowledge creation and exchange, together with learning mechanisms, require forms of community interaction. However management theories conventionally see communities as aggregations of individuals focused on a particular function; the dangers of such atomistic

ontologies are well summarized by Weissman (2000) in respect of society and the organization. SNA between individuals reinforces that approach and inherits the dangers. In contrast, SNA between identities or abstractions permits a network perspective on what happens, and as importantly, what is perceived to happen in respect of network effectiveness. SNS as a technique focuses on creating coalescences of purpose to create a generic learning capability by reducing the degrees of separation between identities. By making the shifts identified above, we build on a solid and tool-rich body of research, but in effect we focus on using the network intelligence rather than assemblies of atomistic individual intelligences: the whole is greater than the sum of the parts, but only if we understand it as a whole.

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