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Social Network Analysis Report

Sample Organisation

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Contents

Background	3
Key Observations	5
Advice Network	6
Key Observations	7
Trust Network	8
Key Observations	9
Conclusion & Areas for Development	10
Notes	11
Appendix	12
References	19

The following sociograms have been created for Sample Organisation on the basis of data collected from the 14 members of the senior team. For ease of interpretation, the diagram has been colour coded to illuminate Jan, the CEO, Michael the COO, Matt, Head of Communications, and three sub-teams and their leads: yellow headed by Susie, green by Simon and blue by Jane.

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Background

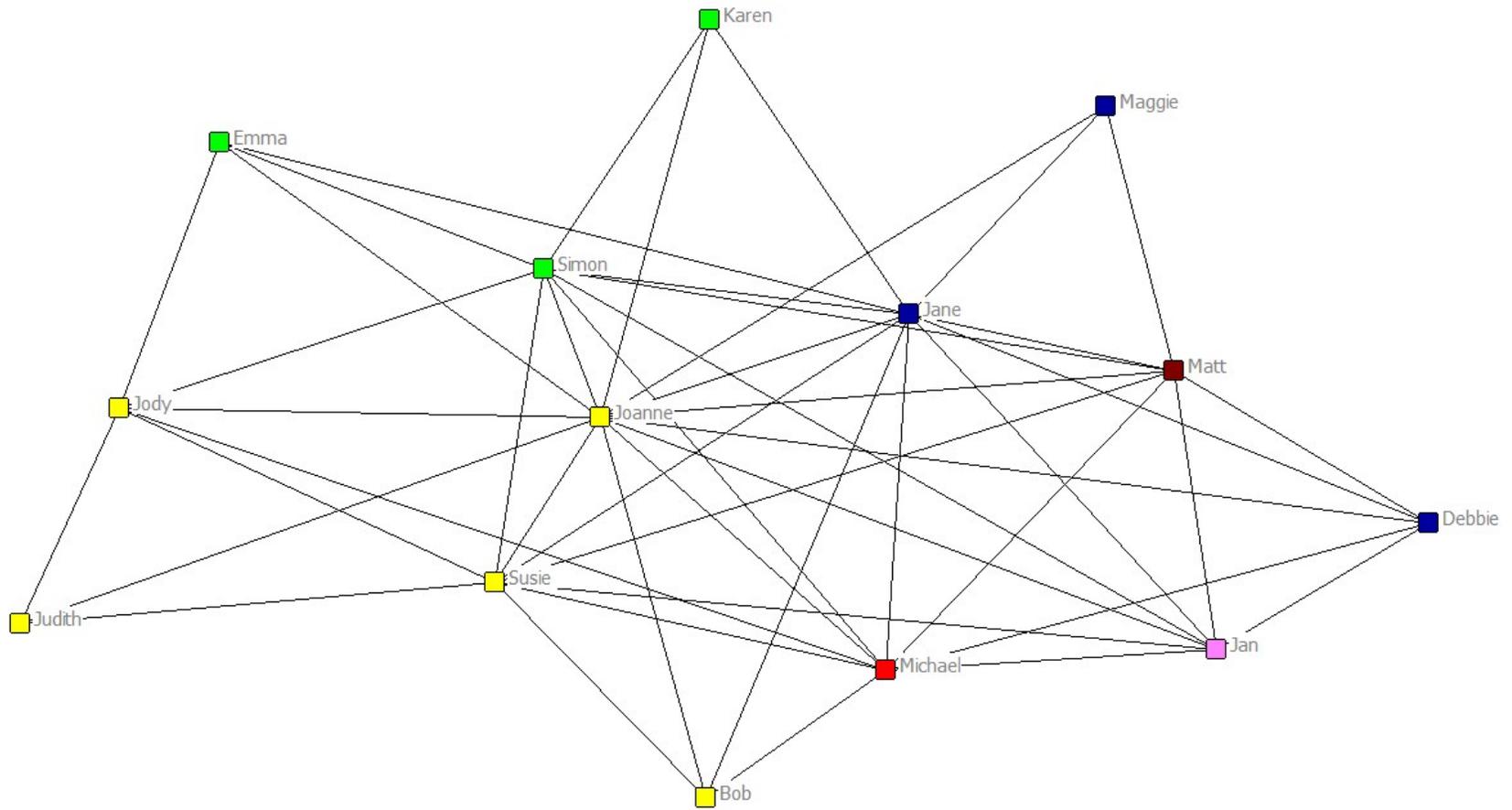
Research indicates that more information and knowledge flows through social networks at work than through official organisational hierarchy and structures (Bryan, Matson and Weiss, 2007), which suggests that the formal structure of companies, as manifested in their organizational chart, may give little indication of how most of their work actually gets done. Consequently, understanding the reality of these social networks would enable organisations to understand why information reaches some employees, but not others; why they struggle to generate new ideas; and why they have failed to implement necessary changes.

The first organisational charts were created in 1854 by Daniel McCallum, a Scottish-born American railroad engineer, as a way to easily visualise reporting relationships among employees, line managers to direct report. However, while they represent reporting hierarchies very well they don't show how co-workers actually interact with one another, nor do they show personal relationships. The first social network diagrams appeared in the 1930s, when Romanian sociologist Jacob Moreno used graphical depictions of social networks in his book, *'Who Shall Survive?'*

A 'social network' is an organized set of people consisting of two elements: human beings (nodes) and the connections between them (ties). The science of social networks provides a distinct way of seeing the world, because it is about individuals and groups, and about how the former become the latter (Christakis and Fowler, 2011). In effect, social networks can be seen as superorganisms, where the particular pattern of ties are often more important than the individual people themselves and allow groups to do things that disconnected individuals could not.

For example, two football teams whose players have similar abilities can perform very differently depending on how good or bad the interactions between the players on and off the pitch. In other words, the performance of the team is an emergent phenomena (collective behavior that cannot be predicted by looking at the single elements forming the system), one that depends not only on the quality of the single players but on the network of interactions between them (Caldarelli & Catanzaro, 2012). More information on social networks can be found in the appendix.

Communication Network



Communication Network - Key Observations

Communication networks reveal who talks to whom about work related matters on a regular basis. They provide information about news or events at work.

The visualisations are configured such that the most connected individuals are in the centre of the diagram and the least connected are on the periphery.

There are 14 nodes (team members) and in the case of 66 ties (lines) between them out of a possible 196.

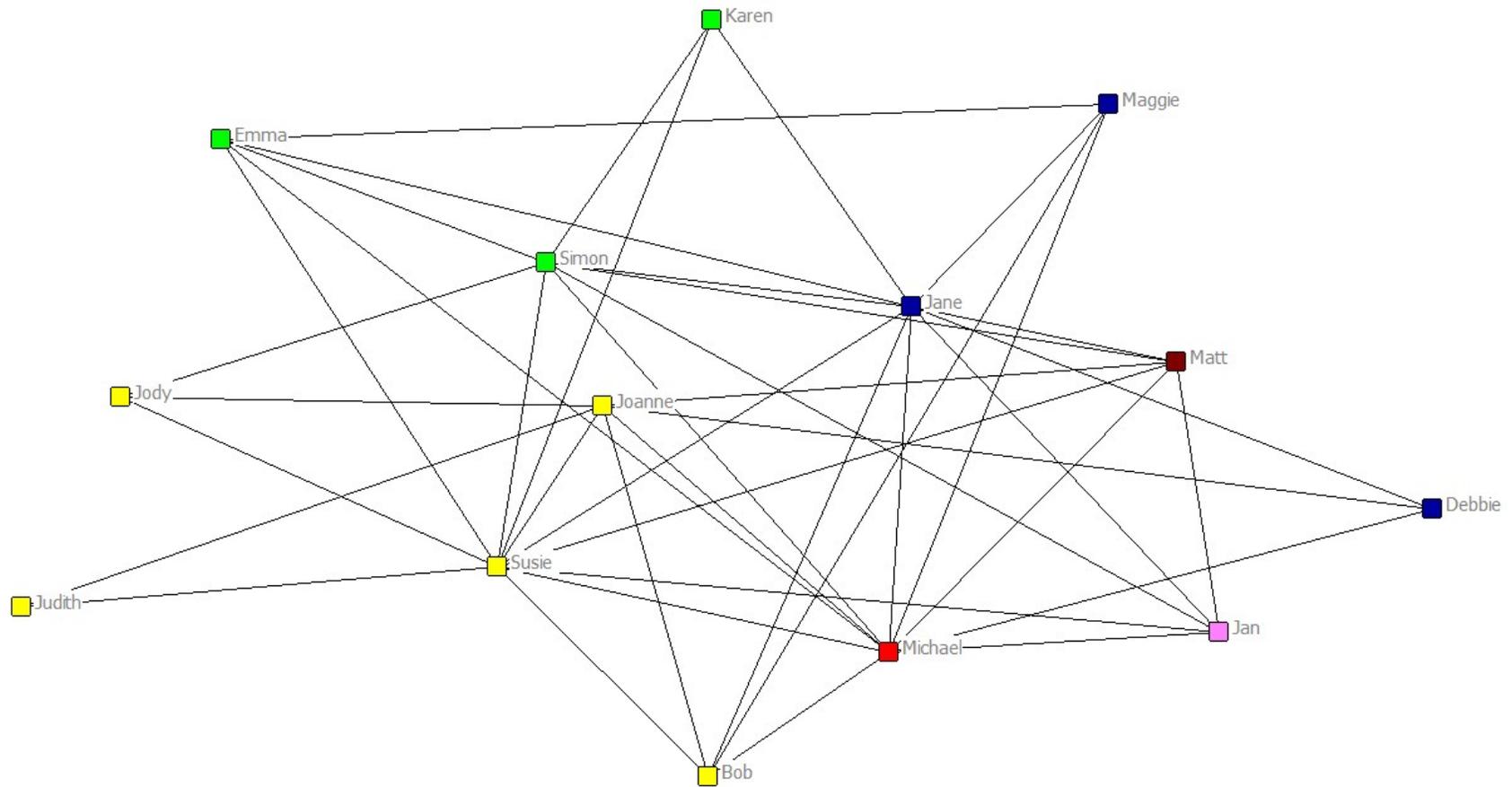
Jan is on the periphery, her senior team are clustered in the centre, and the rest, with the exception of Joanne are toward the edges.

Interestingly, Joanne, who is not a senior team member is at the centre of the network.

So What...

1. It is not unusual for the CEO to be on the periphery, reflecting their position in the formal hierarchy and her senior team are well placed in the centre, connecting to both her and other members of the senior team.
2. The team as a whole is reasonably well connected, with no one excluded from the flow of information. There do not appear to be any fragile structures.
3. Joanne's position in the network is significant as she provides links vertically and horizontally throughout the organisation. She is by no means a 'bow tie', but without her information would tend to follow the more traditional hierarchical flow and be rather slower. It would be worth investigating how and why she is so key.

Advice Network



Advice Network - Key Observations

Advice networks show the prominent members in an organization on whom others depend to solve problems and provide technical information.

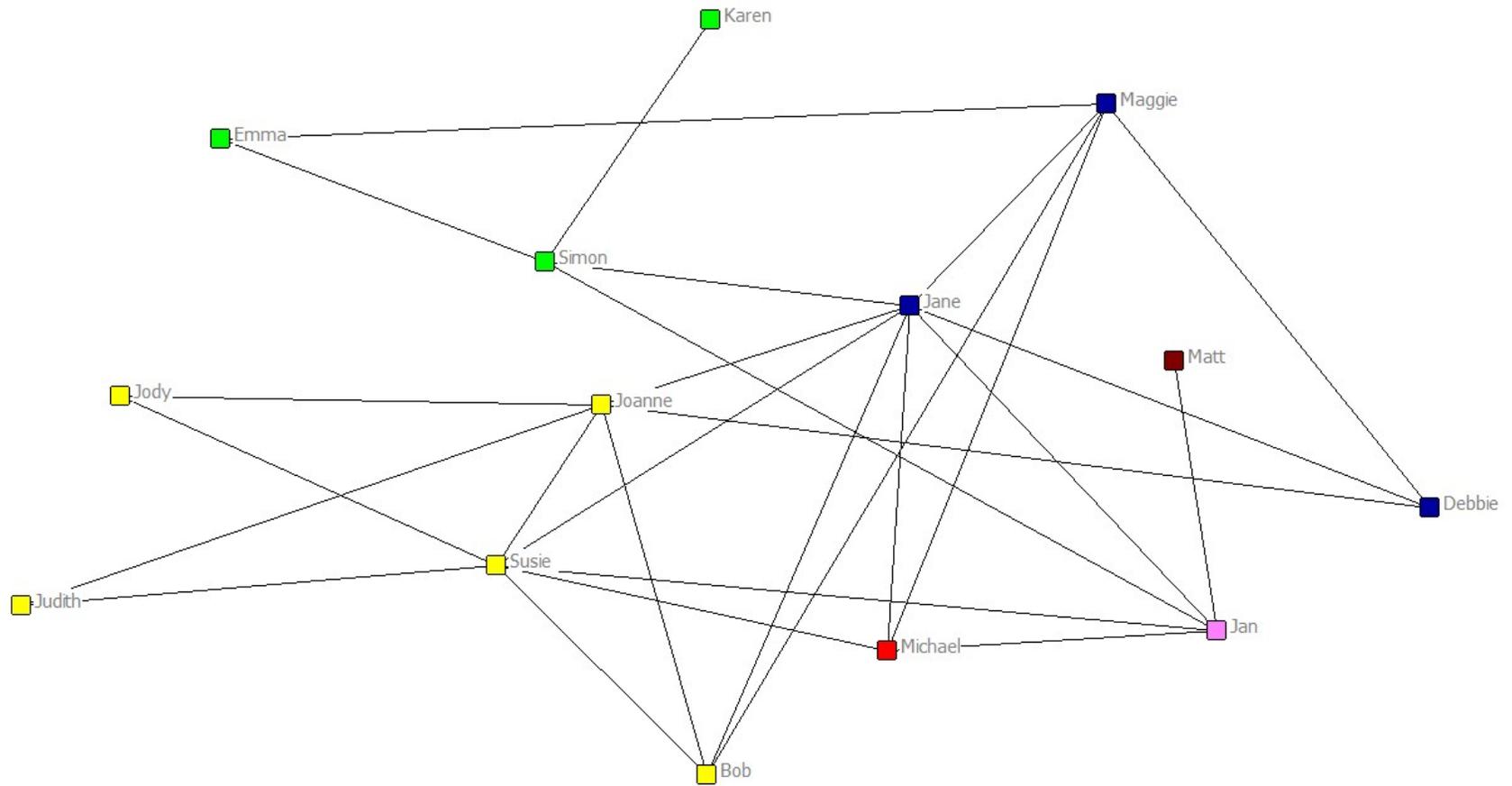
The Advice Network is similar in structure to the Communication Network, with only 5 fewer ties, 61 out of a possible 196.

The ones that are lost are between the members of different sub-teams and between the core and the periphery.

So What...

1. The decline in the number of ties is small, but significant because they further divide the sub-teams into independent entities and separate the senior team from the broader organisation.
2. It is also worth noting that Jan's connection to the peripheral members of the team is limited and tends to be mediated through her senior team. This may suit the organisation well and is not unusual, but it could lead to the CEO becoming rather isolated from the front line members of the broader organisation.
3. Such a configuration may slow the pace of incremental change and lead to a slow planning and problem solving response time.

Trust Network



Trust Network - Key Observations

Trust networks show who employees share delicate information with and who they back in a crisis. Having trust in someone is about having the confidence to know that their intentions are good and there is no need to be protective or careful around them. It is only when members feel truly comfortable with one another that they can focus their energy and attention on the job at hand.

The Trust Network has considerably less ties, only 36 out of a possible 196 and there is evidence of fragility. There are now clear gaps between the sub-teams and among the senior team, although Jan's connections with the senior team are still strong.

Among the senior team Matt is isolated, but for Jan; and Simon is isolated but for Jane and Jan. In the wider team Karen and Matt have only one tie each, while Emma, Jody and Judith have only two.

Jane is the most 'trusted' member of the team and Maggie is the only sub team member connected to a member of the both other sub teams.

So What...

1. The lack of trust within this organisation may cause problems, particularly if you are considering implementing major change or experiencing a crisis. Such non-routine situations involve both uncertainty and the need to generate new ideas about things to do, ways of doing them and support for those ideas. This is less likely in teams with low levels of trust.
2. The pattern suggests that trust declines the further team members are from the centre of the organisation. This in turn suggests that front line members of the organisation may be even more disengaged from events and direction from the senior team.
3. The danger is that the organisation is dragged apart. While the senior team and the front line may still be doing things right, increasingly they may not be doing the right things and there is a danger that centre fails to learn from the front line and the front line does its own thing.
4. Jane and Maggie may be key in bringing the organisation closer together.

Conclusion

Communication

In terms of communication the organisation is reasonably well connected and there are no fragile structures.

Nevertheless, Joanne, is clearly key in this regard and information may pass more slowly without her.

Advice

The advice network is similar in structure, but with slightly fewer ties, revealing a slight distancing between the sub-teams and the between the senior team and the periphery.

Trust

The trust network is significantly fragmented and has elements of fragility.

Areas for Development

Communication

Investigate how and why Joanne is so key, can this be replicated for less connected members of the organisation?

Advice

The reduction in ties may slow the pace of incremental change and Jan may not be getting a true picture of front line services. Consider how the team can be better integrated from the centre to the periphery.

Trust

Any significant transformation or requirement to deal with a crisis is likely to be problematic. It is important for the senior team to get to know each other better and develop levels of trust, in order to work out areas of disagreement in advance. It is also important to draw the rest of the organisation closer together to ensure greater alignment around strategy, goals and ways of working.

Notes

Appendix

Social networks flourish informally and spontaneously as people connect around work projects, shared interests and knowledge. Most large organisations have dozens if not hundreds of informal social networks: peer groups; communities of practice; sports clubs; or simply groups of like-minded people who go for coffee together. It therefore seems incumbent upon leaders, at a time when the ability to create value depends increasingly on the ideas and intangibles of talented workers, that they do all they can to harness the power of these networks; investing in the capabilities needed to make them work in support of the formal structure.

Specifically, social networks help visualise the concept of social capital, a term popularised by James Coleman (Coleman, 1988). In essence, social capital is an investment in friendships and community which are appropriated in the work environment; just as physical and human capital can increase productivity so can social contacts. It exists where people have an advantage because of their location in the network, with contacts providing information, opportunities, new perspectives and innovation. Modelling social relationships is therefore akin to creating an index of social power.

An understanding of social networks is also important because, valuable as they are, they have shortcomings: they can increase complexity and confusion; and, since they typically fly under management's radar, they elude control. Part of the problem is that the effectiveness of social networks, as ad hoc structures, varies considerably. In large companies, for example, a number of social networks may form on related topics but never integrate, while people with valuable knowledge or skills may not join the most appropriate network, or fail to discover that a network exists.

Social networks can also reflect a darker side to our nature: the tendency for human societies to fragment into competing groups, with minds all too ready to adopt prejudices and pursue genocidal feuds. In some circumstances communities can become excluding and inward looking, leading community members to view the outside world with suspicion. While those within the in-group benefit from its protection and help, those in the out-group are seen as competitors and therefore distrusted.

The challenge for companies, therefore, is to identify and understand their social networks, then design and manage new formal structures that harness the value of these informal groups, mitigate their weaknesses, and enable leaders to apply the energy of diverse networks in order to realize collective aspirations. As Alex Pentland observes (Pentland 2014):

By making group members more aware of the patterns of communication within and between groups we are improving their social intelligence, which leads to greater productivity and creative output. Managers need to visualize patterns of internal and external communication and take steps to make sure that ideas flow within and between all of their work groups. Thinking about your job as improving idea flow, getting everyone to talk to each other and connecting between groups, can be very effective in improving performance.

The benefits are huge in terms of increased information sharing, greater productivity, and improved creativity and innovation.

Connection and Contagion

There are two fundamental aspects of social networks: connection and contagion. Connection, which can be of variable quality and quantity, refers to a network's shape or structure, its topology (the arrangement of nodes and ties). It is represented by Network Visualization Software, which creates a 2D picture of the network, placing those who are more connected in the centre and those who are less connected at the periphery. Contagion, on the other hand, refers to the network's function or physiology, what, if anything, flows through and across the connections, whether it be ideas or germs. Understanding why social networks exist and how they work requires that we understand five rules regarding connection and contagion (Christakis and Fowler, 2011).

Rule 1 - We shape our network

Homophily (birds of a feather flock together) refers to the fact that, consciously or unconsciously, we tend to associate with people who resemble us. We also choose the structure of our networks. We decide how many people we are connected to; we influence how densely connected our friends and family are; and we control how central we are to these social networks. For instance, research suggests that we typically have a 'core discussion network' of between 2 and 6 close social contacts, with whom we discuss important matters.

Transitivity refers to how connected our social contacts are, thus how tightly interwoven our network is. If you know Alan, Alan knows Michelle and Michelle knows you, the relationship is transitive. High transitivity normally indicates those deeply embedded within a single group, while those with low transitivity tend to make contact with people from several groups who do not know each other.

Rule 2 – Our network shapes us

Being more central (high transitivity) makes you more susceptible to whatever is flowing in the network, whether it be gossip, behaviour or germs. Network position is key. To increase the adoption of a particular behaviour in a network it is necessary to identify the hubs in the social network and target them. The influence of influential people depends, in part, on the structure of the network they inhabit: for a fire to spread it needs the right conditions.

Malcolm Gladwell provides a good example in what he calls the 'Law of the Few', describing how in epidemics a tiny majority of people do the majority of the work. He refers to:

1. Connectors, who spread the message. They are gregarious, intensely social and know the right people.
2. Mavens, from the Yiddish meaning one who accumulates, who figure out stuff and want to tell you all about it.
3. Salespeople who have the skills to persuade us when we are unconvinced of what we are hearing. Great salespeople have a greater quantity and quality of answers to our questions, as well as energy, enthusiasm, charm and likeability.

In short, Mavens are data banks who provide the message, connectors are social glue that spread it, and salespeople are the ones that persuade us to believe it.

Rule 3 – Our friends affect us

One fundamental determinant of contagion or flow (e.g. of ideas) is the tendency of human beings to influence and be influenced by (copy) one another. This is conformity. The networks in which we are embedded therefore function as 'reference groups' and affect us in two fundamental ways: comparative effects, how we or others evaluate ourselves; and influence effects, the way others dictate our behaviours and attitudes. The more paths that connect you to other people in your network the more susceptible you are to flows within it. However, the nature, not just the number, of social contacts is also important.

Principally, we tend to measure ourselves against our friends. Friends affect us more than parents and spouses. For example, mutual best friends (both name each other as best friends) have a triple obesity risk. A medical study by Nicholas Christakis showed that body weight can be strongly influenced by social networks of friends. A densely connected network of over 12,000 people was examined over a period from 1970 to 2003. A person's chances of being obese increased by 57% if a friend became obese, 40% if a sibling became obese and 37% if a spouse became obese (Christakis and Fowler, 2011).

Smoking, happiness, obesity, loneliness and even terrorism are all like viruses that spread best among friends. The key difference between terrorists and most other people in the world lies not in individual pathologies, personality, education, income, or in any other demographic factor, but in small group dynamics where the relevant trait just happens to be jihad rather than obesity. People radicalize when personal rage resonates with moral outrage, but they only tend to act on it if their friends do (Atran).

The question of cause and effect remains however. Do people of similar ideas gravitate toward each other (homophily), or do people who socialise together gravitate toward similar behaviours (conformity), or is there a causal effect, where one person causes the

adoption of an idea or behaviour in another (social contagion). It is also worth noting that a concordance of norms (a shared expectation about what is appropriate e.g. weight gain is okay) does not necessarily lead to a concordance of behaviours (eating too much and not exercising enough). People can spread norms even if it doesn't affect their behaviour. A thin person can accept the norm of obesity, but not change their behaviour.

Rule 4 – Our friend's friends' friends influence us

Hyperdyadic spread refers to the tendency of effects to spread from person to person (like germs), beyond an individual's direct social ties. This is easy to understand in a linear network, like a bucket brigade, but hugely complicated in a social network. The key is to look beyond simple, sequential dyads. We need to see the whole network at once. We also need to understand the dynamic properties of the network, how it changes over time.

Varieties of hyperdyadic spread include germs, gossip and information, where once infected additional contact is redundant. As opposed to norms and behaviours, which may require reinforcement by multiple social contacts (e.g. Milgram's 'sidewalk experiment' – the more people who are staring, the more other people are likely to look). Beyond three connections, however, the fidelity of information decays as it spreads, which may always constrain our ability to connect, even using technology. This might be explained by intrinsic decay (Chinese whispers); network instability, the evolution of the network makes links beyond three unstable; or our hominid past where there was simply no one beyond three degrees of separation.

Rule 5 – Our network has a life of its own

Social networks can have properties or functions that are neither controlled nor even perceived by the people within them. You cannot understand a traffic jam by asking a single driver. Social networks obey rules of their own, rules that are distinct from the

people who form them. Social networks have emergent properties – new attributes of the whole that arise from interaction and interconnection of the parts. Examples include ‘La Ola’, the Mexican Wave at sporting events, shoals of fish and flocking birds.

Social Network Analysis

Social Network Analysis (SNA) is an analytical tool for understanding social networks, designed to identify patterns, locate influential entities and examine network dynamics. It does this through quantitative mathematical analysis and the incorporation of theories from the social sciences to interpret and add social context. In the first instance SNA is based upon three types of social network: communication, advice and trust (Krackhardt and Hanson, 1993). Each of which have proven useful in diagnosing a particular sort of organizational problem:

Communication

Communication networks reveal who talks to whom about work related matters on a regular basis. They provide information about news or events at work. Mapping communication networks can help identify gaps in information flow, inefficient use of resources, failure to generate new ideas, and help diagnose inefficiency or low productivity. Are workers expending time and energy working the rumour mill instead of working and should the formal organization therefore use formal means to disseminate information more effectively. At the other extreme, workers may hardly communicate at all, which can create alienation, stress and morale problems.

Advice

Advice networks show the prominent members in an organization on whom others depend to solve problems and provide technical information. Because these networks show influential players in the day-to-day operations of a company, they are useful to examine when a company is considering routine changes. Advice networks can also uncover routine conflicts, recurring disagreements over

how things should be done, or on what assumptions one should operate. Advice networks diagnose such disagreements by showing when there are fragmented sources of expertise or none at all.

Trust

Trust in someone is about having the confidence to know that their intentions are good and there is no need to be protective or careful around them. In essence, individuals who trust one another are comfortable being vulnerable in the belief that their respective vulnerabilities will not be used against them (i.e. weaknesses, skill deficiencies, interpersonal shortcomings, mistakes, and requests for help). It is only when members feel truly comfortable with one another that they can focus their energy and attention on the job at hand, rather than being strategically disingenuous or political with one another.

Trust networks show who employees share delicate information with and who they back in a crisis. Mapping trust networks can uncover the source of political conflicts and failure to achieve strategic objectives. Companies should examine trust networks when implementing a major change or experiencing a crisis. Because non-routine situations involve uncertainty and the need to generate new ideas about things to do, ways of doing them and support for those ideas.

Common Social Network Structures

The key in all three cases is in identifying certain common structures that can predict a problem. These include:

1. Imploded relationships – where members of a group only have social relations with others in the group and no social relations outside.
2. Irregular patterns – the opposite of the imploded relationship

3. Structural holes – when two parties, who would be expected to have a social relation on the basis of workflow, don't have a relationship e.g. a trainee failing to go to more experienced co-workers, or members of one department failing to go to another for advice.
4. Bow ties – when all or most social relations go through a single or central person. If the centre were lost then the informal network would cease.
5. Fragile structures – close to meeting the above definitions.

Identifying these structures, however, is like finding a clue rather than solving a problem. Further examination is required to understand the root of the problem and possible solutions.

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