

BUILDING BETTER ORGANIZATIONAL NETWORKS

We all use Networks to communicate instructions, ideas and to share knowledge. We have Networks of friends, career advisors, co-workers, clubs, teaching mentors etc. And experience suggests that it is Networks within an Enterprise that get things done rather than simple reliance on the organization chart.

Dramatic progress is being made in understanding 'Small Worlds' (we all may be within 6 degrees of separation of everyone else) and 'Scale Free Networks' (represented by the Internet, the airline hub and spoke systems, the gene expression pathways in the body etc.). These imply ways to make Networks more robust, and to speed up communication. Perhaps even more importantly Networks seem to have deep rules of operation which are independent of what they actually do. It is thus possible that we will be able to better separate organizational 'functionality' (i.e. what its goals are) from 'topology' (i.e. how it functions most efficiently). From a design view a good starting point may be 'Communities of Practice'.

Communities of Practice (CoP)

A CoP is an affiliated group of individuals that share common concerns or passions about what they do but who are not formally or hierarchically linked. Etienne Wenger defined three building blocks:

- o The domain: A CoP is not merely a club of friends or a Network of connections between people. It has an identity defined by a shared domain of interest. Membership implies a commitment to the domain, and a shared competence that distinguishes members from other people.
- o The community: In pursuing domain interests, members engage in joint activities and share information. Relationships emerge that enable mutual learning and creation of new knowledge.
- o The practice: A CoP is not merely a community of interest - people who like certain kinds of movies, for instance. Members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, and ways of addressing recurring problems.

Guillaume Soenen showed that CoP's tend to self-select, unlike work groups which are pre-defined. And they arise where there is a gap between 'real work' (what it actually takes to do the job) and 'prescribed work' (how it is formally defined). When the gap is small, CoP's are not needed. CoP's with complex problems, with good skills and broad experience are the most effective. Generally speaking, therefore, CoP's emerge with common purpose, rather than are created deliberately. Establishing insights into how Networks evolve may allow us to design the benefits of CoP's into traditional organizations.

Network Science

Walter Powell pointed out the distinction between markets, hierarchies and Networks – and Karen Stephenson noted that hierarchies have qualities of the other two – governance (akin to market contracts) and repetition in activities (like Networks). It is not that Networks replace current structures, but rather that they co-evolve with them.

And our research has consistently revealed that effective Enterprise Networks and real-world organizations share two critical commonalities.

First, both have purpose which can be pre-defined and then their outputs measured. This is not always the case with such well known Networks as the Internet. Second, they must be actionable in the sense that they are constructed in ways that allow something useful to happen.

Yet we also note that Networks have ways of operating which are quite different to the hierarchical frame they are in.

Let us now examine what is 'unique' about Networks, and its implications on organization design.

Nodes: are the fundamental building blocks – the agents or individual people in a system. Several writers have reviewed the types of roles that nodes fulfil. Karen Stephenson identifies hubs (the Network 'glue'), gatekeepers (through which everything passes), pulsetakers (who monitor Network health), stars (who are key

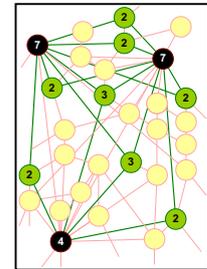
to its effective operation) etc. She notes that these all operate simultaneously in layered Networks within a formal organization (e.g. work, career, social, advice, expert, innovation).

Dan Brass' work is also helpful as it defines nodes in terms of the kinds of linkages they have – in and out degree (connectedness), closeness (how easy it is to reach other parts of the Network), betweenness (is a node mediating between other nodes?), centrality (how important is a node to the Network) etc.

Combining roles and linkages with in depth understanding of individual needs and purpose leads us to the inclusive concept of nodal identity, discussed further below.

Links: are the connectors between nodes. A strong link is one a node has with immediate family, work team members etc. Weak links are distant and only vaguely connected, and have been demonstrated as being critical to finding new knowledge (Mark Granovetter).

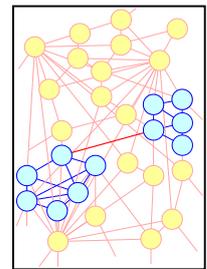
Hubs: are nodes which get connected to many other nodes, and operate as a clearing house or routing station. Network science now shows that when a hub is already quite well connected, it is exponentially more likely to get preferentially connected to other nodes - think Google, and think of this as 'the rich get richer'. And we also need to think who the 'hubs' within organizations should be.



Hubs (black) & Authorities (green)

Authorities: are nodes in 'Small Worlds' (Jon Kleinberg), which are experts on certain subjects. They are content rich and linked to by many hubs. The type of link in the system builds a node's acceptance as an authority. In other words, the emergence of authorities is a demonstration of content richness.

Clusters: are collections of nodes linked together. The 'clustering coefficient' of a node is the fraction of potential links among the nodes in its cluster that is actually present. A high clustering coefficient means a node's neighbours are very likely to 'know' each other and be linked – a low coefficient means that they are distant. Nodes in a cluster may be immediate neighbours or they may be spread throughout the Network - which leads us into examining connectivity in 'Small Worlds'.

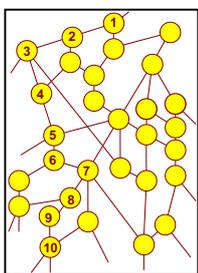


Clusters

Small Worlds

These are Networks where it is very easy for individual nodes in the system to communicate with each other and then find new nodes. We are all familiar with the unexpected discovery of acquaintances. If we can create 'Small Worlds' inside our organizations we can dramatically improve knowledge flow.

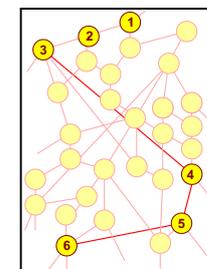
Consider the figure on the left. The connection of nodes takes 9 steps to cross the Network (recall old school stories of passing messages down the line, which get garbled). With the addition of two extra links, it takes just 5 steps – and these are often 'weak' links. How do we create these?



Traditional 'command and control' can often manage very few links from top to bottom – but lateral and cross functional links usually take many more steps, slowing down knowledge transfer and making new ideas less likely. And communication in hierarchies goes through a rigid command structure, which can get overloaded.

So, the deliberate creation of 'Small Worlds' can cut through these problems.

Duncan Watts and Steven Strogatz defined 'Small Worlds' as highly clustered and having short average link length, although the type of link and the nodal qualities are left somewhat open in their work. Interestingly, though, 'Small Worlds' are in fact a special case of 'Scale Free' Networks.



Scale Free Networks

These Networks contain few but highly connected hubs, while the majority of nodes are weakly connected. The Networks are considered scaleable as nodes can be theoretically added infinitely without affecting the structural integrity of the Network, its communication flow, or its resultant activities.



In most Networks few nodes are connected, and plotting distribution of the number of nodes against the number of their links yields a bell-shape. A 'Scale Free' Network results in a 'power curve', with a few well-connected hubs and many 'left out' nodes.



The 'Scale Free' model delivers a very robust Network (Albert Lazlo Barabási). Because of the hub structure, there is a redundancy of paths across which information or action can flow, and any random 'attack' on the Network is unlikely to succeed unless most of the hubs are destroyed simultaneously. By contrast a random Network is tough to entirely destroy or disrupt, because of the distributed nature of its nodes. But it is prone to catastrophic failure, as every node is as important as every other. Creating Scalable Networks in an Enterprise should thus better secure communication flow.

Design considerations

With this Network background, how then can we build more effective human systems? Starting with the ideas of Community of Practice, we first must have clear definition of the domain of interest and the creation of vehicles for working and learning. We must define a Network that actually does something.

'Small World' thinking then suggests building 'weak' links between seemingly unconnected parts of our Networks to generate more efficient communication through the entire system, and to encourage the creation of new knowledge.

And 'Scale Free' science posits clear identification of the appropriate Hubs and Authorities for both search and content reasons.

Beyond this, our own research suggests that attention must be paid to the following five issues.

1. Purpose. We repeat the earlier comment that effective organizational Networks have a human or organizational purpose, which must be pre-defined and then its outputs become both useful and measurable. This is of course not always the case with Networks studied in the scientific literature. Nor is it immediately obvious when defining Networks in terms of 'roles' or 'linkages'.

2. Nodal identity. The skills, knowledge, motivations, problems, geographic location, time linkages, goals and beliefs of every node are critical to how they interact. This again goes beyond a catalogue of roles in the Network, or a catalogue of linkages. Identity demands a deep data based understanding of the characteristics of all Network members. Publicising these identities and proactively connecting 'like' individuals will help form affiliation clusters from which useful work will emerge. The sheer amount of data involved suggests, by the way, that computational power could be central to this endeavour.

Clarity on nodal identities will also help define where the leadership should be (and maybe already is?) distributed in an organization, depending on the topic or issue at hand.

3. Trustworthiness. The concept of 'authorities' raises issues about how we can trust their information. We offer that the combination of the nodal identity of an authority (which is transparently available to all affiliation cluster members) and the actionability of the links within the cluster contribute to a Network's 'trustworthiness'. We also surmise that defining an authority relates to information flow – possibly it is a net exporter of information. This, and practical actionability of the information over time will build trust.

4. Searchability. This is critical in finding existing data, generating new knowledge and thus delivering on the purpose of the Network. Examples of the types of insight we may be seeking include:

- o Informational – 'Where are all the good Thai restaurants in town?'
- o Intellectual – 'What can I learn from the local history?'
- o Actionable – 'How can I get better sales results in this country?'
- o Relational – 'How can I work better with my local fellow employees?'
- o Judgmental – 'How can I decide the real truth in the local politics?'
- o Contextual – 'How can I integrate the varied aspects of my life?'

It is not necessary to predict an exact search path through a 'Small World' Network – just to start it on the right trajectory. Peter Dodds, Roby Muhamed and Duncan Watts note that successful search is conducted

primarily through weaker links, does not require highly connected 'hubs' to succeed, and disproportionately relies on professional relationships. The individual must also develop an understanding of any obvious 'structural holes' in their Network (Ronald Burt), for example in a given area of expertise, in order to 'complete' their knowledge.

Successful search paths must then be captured and stored – and reused as appropriate. An effective affiliation cluster keeps these paths 'on file' for all of its members to use. Again, computational power may be central to this, and may provide real clues on what an 'adaptive system' really is.

5. Actionability. Towards our goal of designing Networks where something new actually happens as a result of their existence, we focus on actionability. One corollary is that the links between members of the Network must be actionable - meaning that they have practical value in real interactions. Our work also implies that searchability occurs when a preponderance of links within an affiliation cluster are 'actionable' in this way (i.e. have useful value). For example:

We may be within one 'link' of the Prime Minister of Country X, having met him in an earlier role. Whilst it still may theoretically be possible to engage him in a discussion about his Country's economics, the probability of a serious talk about Network theory is essentially zero. This link is 'closed' or 'non-actionable'. On the other hand, we may know Network theorists via conferences - so a Network conversation will be extremely easy. These are 'open' or 'actionable links' which will help maximise communication flow inside Networks.

We suggest that a prerequisite of actionability is that individuals must be able to engage in a useful 'conversation' with other cluster members – there is little 'social distance' – and we thus propose that

The actionability of links in an affiliation cluster must be some positive function greater than the perceived social distance between the nodes, reflecting the domains and shared interests of Communities of Practice.

Defining this 'conversation function' is a critical issue in creating effective Organizational Networks.

Summary

Our research shows that understanding of Networks can significantly influence how Leaders interact with their organizations, and how Enterprises can construct more effective structures – to improve communication, share and build knowledge and to get better outcomes via 'distributed leadership'.

Network understanding provides alternate ways to do things, and suggests organizing in ways which are independent of the strategic function of the Enterprise.

This is not in complete replacement for the well-established dictum that 'structure should follow strategy', but it is a useful addition to the organizational design and leadership armoury which if executed well can give competitive advantage.

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'Leadership is the energetic process of getting other people fully and willingly committed to a new and sustainable course of action, to meet commonly agreed objectives whilst having commonly held values'

Related resources, further study and references can be found at www.leader-values.com.



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