

# Unsocial Networks – Restoring the social in social networks

## Abstract

*Over 20 years ago New Economic Sociology showed that economic activity cannot account for social formations like organizations and persons. The idea of a “network” was used to better capture the multiple causes of the formations. Human interaction networks are becoming increasingly visible through social networking software, IM, email and phone networks, but even as they have, they are often viewed as the result of atomic actors with independent qualities, an unsocial view. This paper explains the meaning and benefits of using networks for a more social view of communities, organizations and people; shows how this can be used for better empirical measures of information systems, organizations and society and points the way towards new ways to manage social constructions like innovation.*

## 1. Introduction

Over 20 years ago New Economic Sociology showed that economic activity does not account for social formations like organizations and persons. They cannot be the consequence of the independent action of atomic actors. The idea of a “network” was used to better capture the multiple causes of social formations [1, 2]. A recent recap of the work since that time has showed these observations have held up to extensive empirical evaluation [3]. Human interaction networks are becoming increasingly visible through social networking software, IM, email and phone networks, but even as they have, they are often viewed as the result of atomic actors with independent qualities, an unsocial view. This paper the meaning and benefits of using networks for a more social view of communities, organizations and people.

The paper refers social networking software and software like *LinkedIn* and *Facebook* have little or no published scientific studies of their networks *qua* networks. However, there are results from other areas that are applicable and some research results are starting to appear. The paper relates the software to the underlying science.

This paper uses a mixture of observations, thought experiments and empirical evidence to

present a view of networks that is from the ideas of New Economic Sociology, especially Harrison White and Mark Granovetter. This is a major paradigm in sociology and anthropology. It is rarely cited in information systems literature, but has spawned some of the key ideas for social networks. The paper highlights several aspects of the “social” in social networks building on the idea that economic activity takes place embedded in social relations and shows how this can be used for better empirical measures of information systems, organizations and society and points the way towards new ways to manage social constructions like innovation.

## 2. Social Networks

The most talked about type of social networks, “Small World” networks, are networks that connect discrete objects with a scale free distribution of links. “Scale free” means that a few nodes have lots of links most have only a few. The Web is this way, with Google having many links and most sites only few. Understanding and describing such networks is especially useful for understanding social searching and binary diffusion processes like disease transmission (binary because we either get sick or we don’t). In this view links and nodes are discrete and almost mechanical.

An alternative use of the idea of networks is as a way of talking about emergent or situational “qualities.” “Qualities” is in quotes, because if something is emergent in this sense, it means that it is continuously created by the ongoing situation and the “qualities” are a matter of us perceiving them rather than them being an essential part of the “object.” Many things: leadership, motherhood, innovativeness and like “attributes” are relationships one thing has to another thing. Leaders have followers, mothers have children, and innovators are recognized as such because of the social acceptance of their work.

The term “network” has many different uses. It is not unusual to see the meaning shift even in a single sentence. An overarching definition of a “social network” that it is a network of relations between social objects. They can be represented as a graph of lines and dots or by some other representation, such as matrices, but these are maps or representations not the networks themselves, they are, at best, snapshots.

Our perception of the nodes can change when relationships change. The increased or decreased deference to a person may indicate change in status. Change in the number of members of a team or a family will usually cause a reshuffling of the roles and duties of those who remain. The “social” in the “social objects” emphasizes that the objects are objects we agree to, like roles, persons, organizations, businesses and more.

Businesses are social objects, as are teams, countries, people and even products and they can all have some relationship to each other. The relationships can be “is boss of,” “buys from,” “is friend of,” “is supplier of,” “sells to” and so on, so in fact, business network and organizational networks are also social networks [4]. In general, social networks tend to be dynamic, with people, businesses, teams, and countries coming and going over time. The Web is often looked at a social network and the patterns of its links, tags, and so are often analyzed for insight into the behavior of networks and complex systems.

Other networks, such as neural networks, also change over time, but they do it in goal seeking ways that are generally modeled in different ways. The type of link has little variation. There are fixed networks such as the pipes in a house or city, the network of wiring on a computer chip. Connectionist networks are used to model language [5]. Information systems often attempt to model organizations with static network configurations[6]. These other network paradigms are not as flexible about the types of possible relationships as social networks. For instance, information systems is generally task oriented in its description of the work place and does not model friendship or other non-business related relationships.

One distinction that will be made throughout the paper is between an “ego-centric” view of networks, a network from an individual’s point-of-view, and the “network-centric view” which is the network viewed as a whole at the same time[7]. A way to think of a network is as a system of roads. Starting in one place, we can travel down the roads to find things. We could travel in all directions and get a more complete view of the roads around where we are. Likewise, when we send spacecrafts out into space and peer from earth into the distance we see the universe, but from our perspective and there is a lot we miss. What we might miss traveling down roads is that there are areas of structure that are replicated, towns along the roads, the internal consistency of towns. In space we might miss solar systems and galaxies. In the social world organizations, families, baseball

teams and many things are remarkably similar, not unlike solar systems in that respect. Only a supreme being could see the whole universe at once, of course, but the owners of the network data are slowly getting closer to that vantage point.

Not everyone is connected to everyone else in a meaningful way. People in a rural village in China and a rural village in Mexico may well have no contact. In a practical sense even in a small town there are groups of people that probably do not even know of each other’s existence. A poetry club of grandmothers and methamphetamine manufactures, for example. The same can be seen in *Facebook*. It is many smaller communities with perhaps some linkage, but almost certainly, like real life, there are areas that are just not connected. A probe from one point would not reach another by existing paths. The disconnectedness of a network is not limited to big social networking sites like *Facebook*. In an organization with hundreds of people, we know our immediate contacts, but we do not know everyone. Of the people we know, we do not always know who knows who and once we get to friends of friends, it rapidly gets beyond the limits of our cognition to keep track of that information. Until recently there was no way to view the network as a whole.

One of the questions that is often asked about networks is “how do networks form?” after which the question “how do links form?” becomes an obvious follow up. One idea is that the networks of relations between businesses, people, countries and so on follows a similar underlying pattern to the Web or other networks, such as the network of disease transmission all have some underlying common pattern that indicates a natural law that applies from everything to proteins to the Internet [8, 9]. This leads to the question: “how does a node establish a link?” A common view places the establishment of a link as a choice that is made by the node, the node becomes the actor. This leads to a view of networks as created by the independent decisions of individual actors. This is an “economic” view of networks, that they are created by preference decisions based on rational choice. This view has been shown to be unable to explain social formations. Networks in sociology are used as way to model the social that does not make that assumption. If there is only the transaction, then things like trust must be part of it, but rather than being something that is exchanged

... social relations, rather than institutional arrangements or generalized morality, are mainly responsible for the production of trust in economic life. But I then risk rejecting one

kind of optimistic functionalism for another, in which networks of relations, rather than morality or arrangements, are the structure that fulfills the function of sustaining order. There are two ways to reduce this risk. One is to recognize that as a solution to the problem of order, the embeddedness position is less sweeping than either alternative argument, since networks of social relations penetrate irregularly and in differing degrees in different sectors of economic life, thus allowing for what we already know: distrust, opportunism, and disorder are by no means absent. [2, p. 491]

Granovetter is emphasizing that both economic activity and social structure are necessary to understand trust. Trust is not part of a transaction, but part of the environment in which the transaction takes place and cannot be modeled with simple economic preferences.

Much of the interest in social networks now is in “social networking” sites like *Facebook* and *LinkedIn*. This interest is predated and paralleled by interest in the more general properties of networks and connectivity dating back to the famous Milgram “six degrees of separation” study of 1967 [8-13]. Since in a “small world” a few members have lots of links and most have few the result is a network with areas of density connected by “weak ties.” That these networks are small world networks is exciting because it provides evidence for theories about how social connections are organized and provides theoretical support for services like *LinkedIn* and *Spoke*. It also shows that organizations are this way and provides a direction for empirical studies of networks in organizations using information systems. Recently there have been flurries of excitement over discoveries that various things, like Internet tags and MSM have Small World properties [14, 15].

One of the aspects of this view is that networks are seen as “flat” in that a link is either binary (there or not) or valued “weak” to “strong.” In 1963 a social scientist, Anatol Rapoport, did a study of a junior high school where he traced the links between the children and the intensity of the links (how good a friend it was). This study was later reexamined by Granovetter.

Granovetter derived from Rapoport’s results the conclusion that ties and network were intertwined in a manner that was, at first sight, paradoxical. Ties that were intrinsically weaker, more casual, yielded higher connectivity across the network: weak ties are strong. That

is, the way in which weak ties spread themselves around is such that they connect a larger fraction of a world together than do the same number of strong ties spread out in their way [3, p. 43]

Web 2.0 “social networking” users do not provide demographic or geographic information unless they want to so it is difficult to target advertising [16]. There is great hope to use the networks to spread products and other messages, but it has had limited success. Granovetter’s observation provides an explanation for this. Invert what the quote above and consider not just that the weaker ties connect to a larger fraction of the world, but that the stronger ones to a smaller fraction. Add this to the observation by Granovetter that any two of your close friends are likely to eventually meet each other if they have not before[11], and it is not difficult to see that network density and strength of ties are related. The ties in a dense area have less reach and must be stronger. While it makes sense that one can get information from weak ties our strong ties are where we get our status and approval.

Someone that wants to sell a product or otherwise influence many people can use a broad approach like television, radio, billboards and other sorts of ads. Advertisers can get better results by targeting ads to geographic and demographics areas, advertising expensive items in zip codes with high incomes and lower cost items in others. They can target ads to women on television shows generally watched by women and ads to men on those watched by men. Google has become rich because their ads are targeted based on the keyword that the user is using to search and the user not only has the correct attributes, but an active interest in what is being advertised. This has been more difficult to achieve on *Facebook* [16-18]. The structure of Small World networks would predict this because as the ties are weaker the network becomes many small clusters and it is difficult to guess their demographics.

One of the main uses of networks like *Spoke*, *LinkedIn* and *Facebook* is searching by attributes. We can search out people who know something we need to know the way that we search for jobs, through weak ties. This type of search is analogous to finding an apartment. Certainly some apartments are advertised, but the best ones are spoken for before they become vacant. To find them it is necessary to search using people, word of mouth. Network search traces through the links radiating out from an individual node search for nodes with the desired properties. How does the matching take place?

The answer is: profiles with lists of attributes such as age, sex, location, job title and so on. Maintaining this information is both labor-intensive and intrusive on the user's part. It is good for search, but what about advertising, health promotion or other ways of pushing out to the networks?

Suppose people are trying to sell soda pop. Years of market research has show which demographics are the most likely to buy their brand of soda pop. A social networking site can become a database of demographic information about individuals and the marketers simply need to do standard database searches to find the information about who is most likely to buy it and present ads to them, no different than television. That, perhaps, is a dream and the goal of social networking businesses, but it does not have much to do with networks at all. The social networking aspect is a way of influencing people to give marketing information, an entertainment and search platform paid for by advertising.

Though *Facebook* has a database of connections between people, the user's experience is ego-centric and the network-centric features are barely used. Users maintain their profiles and log in to update their status or check what's happening. Applications are distributed from one user to another. This is a bit like going down the road to probe for what is out there. The application starts at a single point and the spreads from that point. There is no reason to assume the whole network is connected. (Disconnected parts of networks are called "components"). The owners of the data from *Facebook*, *LinkedIn*, the phone networks, IM sites like MSM and Yahoo, email hubs do have the whole view. They are supreme beings in their own domains and have the ability to see if there are separate components. How can a network-centric view, by either a marketing organization or an organization's information system take advantage of that information?

The network-centric view requires some concepts that are not quite so obvious when thinking about the network from an ego-centric view. The network view emphasizes the idea of cohesion; areas of the networks are denser than other. Network analysts often call these areas of density "clusters," but the term "community" gives a sense that the links are not arbitrary[19]. In an application like *Facebook*, communities are part of what it is about. We link to friends and friends of friends and we meet people that are like us or that we have some affinity for. If the network gets too big and we start having links to many people we don't know, it isn't as much fun. It is harder to be sure what we say won't be misinter-

preted. This is no different than with off-line social networks in that regard. The interest in bridging by into different communities would vary depending on the goal. In an application like *LinkedIn* or *Spoke*, where people are looking for specific things, jobs, employees, or sales members would want to bridge into these other components. Growing the size of one's network in *LinkedIn* is just for this purpose, increasing the likelihood that there will be a link to some person or resource they would like to find. In *Facebook* the opposite can happen, children don't let their parents be friends because they want to be able to talk freely with their peers about thing their parents may not approve of. There is a purpose to keeping the components separate.

What causes communities to form? Why are some people connected and not others? There is no one answers to that question, but a useful way to look it is to say it is because they share a view of the world [20]. There are many things important to us that come from our social relations. Self-concepts like status are not things we can derive purely psychologically. Status is relative to others. Not just any others, but the specific others with whom we feel ourselves similar. We do not have the final say on fashion, music, art, or who we are in terms of being friendly, creative, sexy, or any number of things. We can imagine ourselves to be well coifed, schooled in the arts, friendly, creative and sexy but those are judgments about us and are ultimately made by others. They are dependent on a particular community, the dress and language of corporate CEO's and gangsta's are appropriate to their communities. Communities are to some degree measures of perceived similarity, people who share a view of the world [20].

We are members of many networks: a network of family members, a network of work colleagues, a network for volunteer work, or a network of old college chums. If we view them as just links we will see the communities with ourselves as the link between them. The data from the Microsoft IM network shows this. But, as was pointed out, this is a "flat" view of the networks and misses the richness of the multiple relationships.

Suppose we took the same picture and colored the links for family in one color, the links for work in another and so on. That would be getting at the concept, but it does not show that at any given time, you might be active in one or more networks but not in the others. Think of the experience of someone asking for information and then remembering that someone would know the answer that you know in a completely different context than the one in which the

question was asked. Some people, more in some countries than others, deliberately keep their networks separate and don't talk about family at work or work with family. If one has a hobby it is possible to not know the occupation of fellow hobbyists. In a flat network, a person in that situation would appear to be a bridge, but in practice no information would flow from one group to another through them.

In addition, you might have multiple links to another; you might work with a family member with whom you share a hobby. This is to some degree a measure of tie strength and in a flat drawing the different relationships would be hidden. Beneficial diversity is probably not just diversity of communications links, that that would be a consequence, but also diversity of the reasons for the relationships.

One of the promises of social networking software technology in information systems is that within organizations, social networking can become a routine part of the work process. Major ERP vendors like SAP are incorporating social networking software into their offering. The networks can be personal or business related as many corporations these day take the view that employees with good networks besides work will have fewer personal problems and be better employees. Because there are multiple social networks for different purposes, unlike the "flat" networks we can see from the cell phone or IM traffic they have meaning and allow us to see the persons that emerge from the multiple relations.

There are non intrusive ways of giving "meaning" to email IM and other traffic. For a given email it is hard to know if it is positive, negative, simply or simply a gratuitous CC. Latent Semantic Analysis (LSA) can classify messages and relate them to each other in ways that mirror human subjective classification so it is possible to segregate networks in IM and email traffic [21]. We are starting to have the ability to do this, but what will we gain?

It is especially important to consider difference between flat and multiple networks here. Relationships are not pipes hooked together with fittings, they take effort to create and maintain. Places where multiple points of view and sources of information intersect are where innovation takes place. It is not just individual action that initiates our judgment that innovation has take place, but the special intersection of roles, something we may be able to see with new generations of social software, network analysis and network awareness.

### 3. Relations

A major topic of information systems is classification, the Semantic Web, for instance is based on ontologies based on attributes. It is also possible to classify things by their relations. Either way of classifying is valuable but by using relational classifications we can then discuss what we have classified in terms of networks.

Usually we classify things by their attributes, qualities or essences. This is how we search the internet, say for a male or female. Profiles are ways of listing the attributes of individuals. Over the years there have been many schemes to classify human beings by attributes. Many of them are still widely used. Some examples are: race, intelligence, income, sexual preference, location, and personality. One of the Nobel Prize winning discoverers of the double helix of DNA, James Watson, created a hubbub when he said that the problems in Africa were intractable because blacks were less intelligent than whites [22]. Though Watson later said he was misunderstood, his statement made sense to many because intelligence is, like race, seen as a attribute or quality, something that is part of what someone is. But looking at either race or intelligence carefully show countless other explanations [23]. An alternative method of classification is by relations.

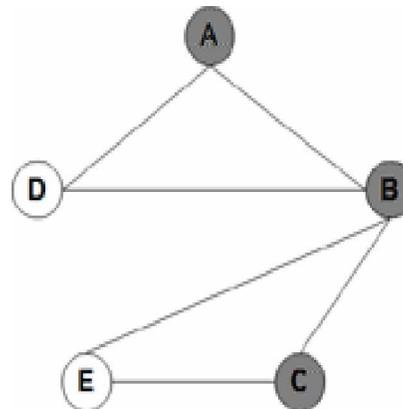


Figure 1 - Boys and girls

The "relational view" [24] can be explained by looking at the drawing in Figure #1, "Boys and Girls." The white circles represent boys and the dark ones girls. The lines between them mean they know each other and talk to each other. This is a tiny example, just 5 individuals but it is meant to illustrate a point. If we divide the group based on the attribute "boy" or "girl," we will get the sets [A, B, C] and [D, E]. But A and C do not talk to each other and D and E do not talk to each other so from a relational point of view the sets [A, B, D] and [C, E] are more natural. The attribute view also misses the special nature

of [B], who is in both groups. Besides the different logical division there is another point to the relational view which is that if any node or edge is removed the relationships of the entire graph change. Removing [B] would split the graph in two. Removing the link between [B, D] would increase the distance a message would need to travel to [D] and put [A] in the middle. This is the role of a “broker,” who can control the communication between [A] and [D] and is a powerful role[25]. Removing a girl node or boy node would have no affect on the “girlness” or “boyness” of the other nodes. Attribute based categories assume independence, relational categories assume interdependence. In addition, the patterns of relationships are only useful in a global view.

What do the network providers have access to that is different than the users? There are basically two types of special positions in networks that can be useful to the network providers, those that link communities and those with special positions within a community.

As has been discussed, communities are places in the network that are denser. There is a considerable amount of work that has been done showing that the areas of less density, the bridges between the communities are areas of great interest in networks. This is the area where the most work from a network-centric point of view has been done.

For instance, there are a number of studies that show that even with a flat view innovation is more likely to occur at areas where there is bridging between communities. One reason that is given is that ideas are borrowed from one network into another. People who bridge multiple communities make more money, do better at their jobs, and have better health [26].

At first glance, it would appear that the inside of communities would be less interesting from a network-centric view. More would be visible from within the community. It would be more like exploring ones’ own town or solar system. However, to carry the metaphor a bit further, wouldn’t it be interesting to find that other towns had city halls and libraries and that other stars have planets and even living creatures? A network-centric view allows us to observe similarity between the communities as well as connectivity between the communities.

#### 4. Roles

An important part of communities is the idea of a “role.” It is something that we are all familiar with

and roles are discussed in many areas of life. A dramatic example of a role is a police officer. When a police officer pulls over a speeding vehicle the driver of the vehicle is probably not thinking about personal attributes of the officer. When the officer and the driver interact, it is most likely in a socially prescribed way; both participants will know their roles. To some degree it might matter who the police officer is, but often it is an anonymous transaction.

If we go into a market, we may joke with the cashier but it is also possible to interact with the cashier in a completely generic way where the interaction is completely scripted and known by both participants. The same is true in a restaurant and even with and an accountant, lawyer or doctor.

Within communities people have different roles. There are the familiar roles of leader, father, mother, or bookkeeper and there are also roles like “icebreaker,” “clown,” and many others. Once a role is assigned in a community, it is difficult to change. However, each of us can have multiple identities, different identities in each network. The person that we are is that confluence of networks. What makes us unique is not only our genetic makeup, but also the multiple roles we play in social networks [3, 27]

The concept of a “role” is foundational in sociology, but agreement on roles is more difficult. In information systems, roles are strongly tied with the idea of a “system. Systems interact with their environment, they have subsystems, they have a goal, and they transform input into output. For instance, a living creature is a system that transforms food into energy and waste. It is made up of subsystems, like the circulatory system and the skeletal system. Its purpose is to live and reproduce.

Many in sociology and information systems have viewed society or organizations as systems. For instance, organizations have a goal, to make profits. They have subsystems: the accounting department, the marketing department, the production department and so on. Within each of these systems there are smaller systems, in accounting there is bookkeeping, taxes, auditing, A/R, A/P and so on. Each of the subsystems at some level becomes a role that interacts with other roles in a way that benefits the whole organization, much as a healthy circulatory system in necessary for a human body to be healthy. This view is termed “functional” because all of the parts and the whole all have a function. This could be a way of analyzing the communities we find by looking at the greater social networks. However there are several drawbacks to this method.

Why is it that the way things are the best way they could be? An essay by Steven J. Gould's on evolutionary biology called this approach "panglossian"[28] emphasizing that we do not know of other possible ways creatures can function because they function the way they do. The panglossian view is that we live in the best of all possible worlds. Granovetter show that economics institutions are socially constructed and not only are the details of their function not predictable before hand, but we now know that the ways they chose were at social cost [29, 30]. For instance, the way that the electric power industry wound up being configured and the rates we are charged had little to do with function and everything to do with politics and preexisting relations [31]. It is increasingly clear to many that simply thinking of profit as the function of an organization might be missing other functions it performs, jobs for the community and the social value of the service it provides.

The functional view is static; we are not expected to grow new organs any time soon. In a world with constantly shifting alliances and products it does not provide an adequately dynamic view.

Still another problem with the functionalist approach is that it uses values as a reason for the behavior of the system. Suppose we think of a function of a group of people to promote symphonic music. Presumably, it is because of their shared love of the music. But, symphonic music is expensive to produce so the people that are involved in financing its production must have the means. For all we know, it is the other way around, people learn to like or purport to like a certain type of music because it is part of the status involved in their community.

An excellent empirical study of this issue was a study of high risk activism by Doug McAdam. McAdam interviewed and followed the activities of a group of mainly white, wealthy students from the Northeast of the US who spent a summer during the early years of US desegregation registering black voters in the South as part of a movement called "Freedom Summer." It was extremely dangerous and several of the participants were beaten and even killed. McAdam showed that there was no measure of values or belief that could predict participation in the movement but that the type and number of contacts was. In others words, when close family members and others participated, then those close to them were much more likely to do it [32]. Belief and values may as often be explanations of behavior as causes.

How, then can we talk about roles except in terms of the function they provide to a system? It is easy to confuse a role with an individual. People get angry at tech support personnel over problem with software. There are countless books on leadership that treat leadership as an essential quality and don't consider luck and other factors. Roles might differ from culture to culture or company to company and, if we consider McAdam's study, they might be explanations as well as causes. This issue is one of the issues that Economic Sociology has addressed and one of the results is empirical models for roles as derived from patterns of relationships.

## 5. Structural Equivalence

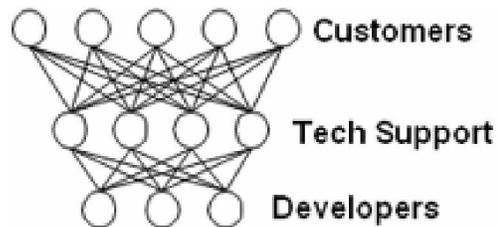


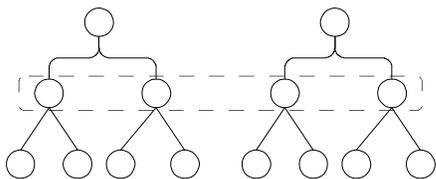
Figure 2 - Structural Equivalence

Looking at Figure #2 it is not difficult to see that even without assigning names to the nodes, the nodes on the top level have the same patterns of links to the nodes on the middle level and that pattern is repeated from the middle level to the bottom. If this were to be represented as an array, the rows on each level would be identical. There are many similar configurations in society such as professors, TA's and students; auto manufactures, auto dealers and customers. This type of pattern is called "structural equivalence" and research shows that people in the same "set" (who are at the same level) are often perceived as "similar" by observers [33].

There are several types of these types of equivalence with structural equivalence the most restrictive and regular equivalence the least. Regular equivalence would recognize that vice presidents generally appear in the same relation to presidents and general managers (which can be identified by their relations as well) and are not restricted to having a relationship with a specific president or general manager. In the drawing, if the organization had exactly this many customers, tech support people and developers the drawing would represent structural equivalence, but if they are general types, then it is regular equivalence (this paper follows Harrison White and refers to all types as “structural equivalence”).

Recall the “solar system” or “town” analogy when talking about local regularities in networks. Structural equivalence cuts across communities in the small world sense. Solar systems have suns and towns have main streets or mayors. Suns are more related to each other in one way that they are to the planets and main streets more closely related than back alleys. There is strong evidence that ideas, products (and other innovations) spread for people that think of themselves as the same, not like disease in binary diffusion, but across structurally equivalent sets. Strong evidence for this was provided by University of Chicago sociologist Ron Burt.

Burt reanalyzed a study by James Coleman on diffusion of a medical innovation, tetracycline [34]. He discovered that if he compared the hypothesis that the innovation spread by contact like a cold, to the hypothesis that innovation spread across structurally equivalent sets that structural equivalence was a far better predictor [35] of the spread of innovation. To rephrase this, the hypothesis that people are more likely to adopt innovations from people they think are like them than those that are not like them is verified by social network analysis [36]. The difference is that by using “structurally equivalent” as the criteria for matching, we are not as dependent on profiles.



**Figure 3 - equivalent set**

The spread of innovations across structural equivalent sets does not require the members are in contact[33]. Look at Figure 2 again and you will see that the customers, the tech support and the develop-

ers do not have ties among themselves. In Figure 3, the set of nodes at the second level could represent company vice presidents or others who might feel and be perceived as similar to each other.

It is not possible to make these types of comparisons with an ego-centric view of the network. The network as a whole much be considered and areas for comparison identified. The greater availability of whole network data is making this more possible. People are members of many communities, their professions, their families and so on. Structural equivalence and related techniques allow us to cut across the Small World networks of connections and can be a valuable addition to the information systems toolkit.

## 6. Conclusion

The models that are being developed of networks are providing great insight into some processes, but they tend to look at networks either as systems or as the result of individual action. Both views fail to take social structure into account. New sources of network data are becoming available is making it possible to compare areas of the network. In addition, enterprise social networking software allows taking a more realistic, multiple view of networks. This is allowing us to start looking at not just the connections, but the communities.

In social networking sites, the profile information logically belongs to the owner of the profile and it is his or hers to share as he or she sees fit. Likewise, if a user has a PDA hooked to the cell network or and Internet, he or she would not expect the cell phone company to be looking at the private data in the device (though within US companies, the companies can look the data). However, who owns the knowledge of the pattern of links between the devices? At this point in time, the attributes belong to the individual and the network belongs to the network provider.

Structural equivalence and related techniques provide a way of analyzing communities in different ways. Much of information systems design is interpretive, and the roles and flows are determined by observers. Analyzing the networks as part of that process and as a way of measuring success can provide empirical tests for the validity of the systems. In addition, some of the issues of semantics on the Web are being solved by ontologies. This implies that objects are classified by their essential properties. But, as we have seen, many objects emerge from the situation and do not have essential qualities. Relational

classifications can help and classifying objects (people, companies, etc) by structural equivalence will provide another, dynamic alternative to essentialist ontologies.

The analysis is computationally challenging, the ownership of the information will be hotly disputed, but the biggest barrier to using these tools and concepts is learning not to see ourselves as an undivided, atomic entity, but partially created by circumstances. Then we can stop looking for innovation, leadership and other critical aspects of organizations and society in people's heads, but in the dynamic confluence of networks where these things are created. To realize that, "[y]ou, the reader, are a social construction in a practical and current sense, as much as are communities"[3, p. 127] and that new information systems can make these social constructions visible.

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