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Social network

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A **social network** is a social structure made of nodes which are generally individuals or organizations. It indicates the ways in which they are connected through various social familiarities ranging from casual acquaintance to close familial bonds. The term was first coined in 1954 by J. A. Barnes (in: *Class and Committees in a Norwegian Island Parish*, "Human Relations"). The maximum size of social networks tends to be around 150 people (Dunbar's number) and the average size around 124 (Hill and Dunbar, 2002).

The International Network for Social Network Analysis is the professional association of social network analysis. Started in 1977 by Barry Wellman at the University of Toronto, it now has more than 800 members and is headed by William Richards (Simon Fraser University) [1].

Social network analysis (related to *network theory*) has emerged as a key technique in modern sociology, anthropology, geography, social psychology, information science and organizational studies, as well as a popular topic of speculation and study. Research in a number of academic fields has shown that social networks operate on many levels, from families up to the level of nations, and play a critical role in determining the way problems are solved, organizations are run, and the degree to which individuals succeed in achieving their goals.

Social networking also refers to a category of Internet applications to help connect friends, business partners, or other individuals together using a variety of tools. These applications, known as online social networks are becoming increasingly popular[2].

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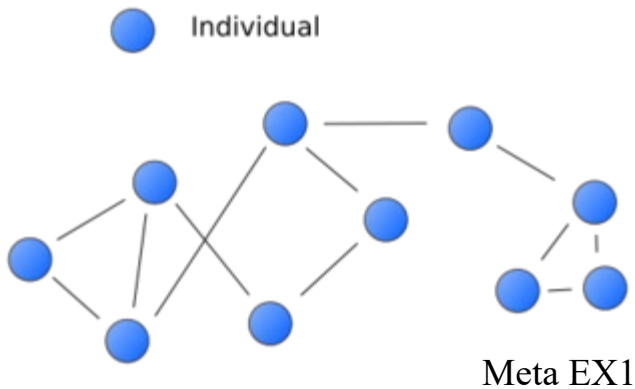
[edit] Introduction to social networks

Social network theory views social relationships in terms of *nodes* and *ties*. Nodes are the individual actors within the networks, and ties are the relationships between the actors. There can be many kinds of ties between the nodes. In its most simple form, a social network is a map of all of the relevant ties between the nodes being studied. The network can also be used to determine the social capital of individual actors. These concepts are often



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displayed in a social network diagram, where nodes are the points and ties are the lines.

An example of a social network diagram

The shape of the social network helps determine a network's usefulness to its individuals. Smaller, tighter networks can be less useful to their members than networks with lots of loose connections (weak ties) to individuals outside the main network. More "open" networks, with many weak ties and social connections, are more likely to introduce new ideas and opportunities to their members than closed networks with many redundant ties. In other words, a group of friends who only do things with each other already share the same knowledge and opportunities. A group of individuals with connections to other social worlds is likely to have access to a wider range of information. It is better for individual success to have connections to a variety of networks rather than many connections within a single network. Similarly, individuals can exercise influence or act as brokers within their social networks by bridging two networks that are not directly linked (called filling structural holes).

The power of social network theory stems from its difference from traditional sociological studies, which assume that it is the attributes of individual actors -- whether they are friendly or unfriendly, smart or dumb, etc. -- that matter. Social network theory produces an alternate view, where the attributes of individuals are less important than their relationships and ties with other actors within the network. This approach has turned out to be useful for explaining many real-world phenomena, but leaves less room for individual agency, the ability for individuals to influence their success, because so much of it rests within the structure of their network.

Social networks have also been used to examine how companies interact with each other, characterizing the many informal connections that link executives together, as well as associations and connections between individual employees at different companies. These networks provide ways for companies to gather information, deter competition, and even collude in setting prices or policies. Netwiki is a scientific wiki devoted to network theory, which uses tools from subjects such as graph theory, statistical mechanics, and dynamical systems to study real-world networks in the social sciences, technology, biology, etc.

[edit] Applications of social network theory

[edit] Applications in social science

Social network theory in the social sciences began with the urbanization studies of the "Manchester School" (centered around Max Gluckman), done mainly in Zambia during the 1960s. It was followed up with the field of sociometry, an attempt to quantify social relationships. Scholars such as Mark Granovetter expanded the use of social networks, and they are now used to help explain many different real-life phenomena in the social sciences. Power within organizations, for example, has been found to come more from the degree to which an individual within a network is at the center of many relationships than actual job title. Social networks also play a key role in hiring, in business success for firms, and in job performance.

Social network theory is an extremely active field within academia. The International Network for Social Network Analysis is an academic association of social network analysts. Many social network tools for scholarly work are available online (like "UCINet" or the "network" package in "R") and are relatively easy to use to present graphical images of networks.

Diffusion of innovations theory explores social networks and their role in influencing the spread of new ideas and practices. Change agents and opinion leaders often play major roles in spurring the adoption of innovations, although factors inherent to the innovations also play a role.

Socio-technical systems is loosely linked to social network analysis, and looks at relations among individuals, institutions, objects and technologies.

[edit] Popular applications

The so-called **rule of 150**, states that the size of a genuine social network is limited to about 150 members (sometimes called Dunbar's number). The rule arises from cross-cultural studies in sociology and especially anthropology of the maximum size of a village (in modern parlance most reasonably understood as an *ecovillage*). It is theorized in evolutionary psychology that the number may be some kind of limit of average human ability to recognize members and track emotional facts about all members of a group. However, it may be due to economics and the need to track "free riders", as it may be easier in larger groups to take advantage of the benefits of living in a community without contributing to those benefits.

[edit] Degrees of Separation and the Global Social Network

The small world phenomenon is the hypothesis that the chain of social acquaintances required to connect one arbitrary person to another arbitrary person anywhere in the world is generally short. The concept gave rise to the famous phrase six degrees of separation after a 1967 *small world experiment* by psychologist Stanley Milgram which found that, if two random US citizens could be connected, then they were connected by at most, six acquaintances at any given time (the vast majority of pairs in this study could *not* actually be connected). Current internet experiments continue to explore this phenomenon, including the Ohio State Electronic Small World Project and Columbia's Small World Project. As of 2005, these experiments confirm that about five to seven degrees of separation are sufficient for connecting any two people through the internet.

[edit] Internet social networks

Main article: Social network service

See also: List of social networking websites, Motivations for contributing to online communities

The first social networking website was Classmates.com, which began in 1995. Company of Friends, the online network of Fast Company, the pre-eminent "new economy" business magazine, launched shortly after, in 1997 and introduced business networking to the internet. Other sites followed, including SixDegrees.com, which began in 1997, Epinions which introduced the circle of trust in 1999, followed by European equivalents Ciao.com, Dooyoo and ToLuna. It was not until 2001 that websites using the *Circle of Friends* online social networks started appearing. This form of social networking, widely used in virtual communities, became particularly popular in 2002 and flourished with the advent of a website called Friendster. There are over 200 social networking sites. The popularity of these sites rapidly grew, and by 2005 MySpace was getting more page views than Google. [3] Google has a social network called orkut, launched in 2004. Social networking began to be seen as a component of internet strategy at around the same time: in March 2005 Yahoo launched Yahoo! 360°, their entry into the field, and in July 2005 News Corporation bought MySpace. [4] .

In these communities, an initial set of founders sends out messages inviting members of their own personal networks to join the site. New members repeat the process, growing the total number of members and links in the network. Sites then offer features such as automatic address book updates, viewable profiles, the ability to form new links through "introduction services," and other forms of online social connections. Social networks can also be organized around business connections, as in the case of LinkedIn.

Blended networking is an approach to social networking that combines both offline elements (face-to-face events) and online elements. MySpace, for example, builds on independent music and party scenes, and Facebook mirrors a college community. The newest social networks on the Internet are becoming more focused on niches such as art, tennis, football (soccer), golf, cars, dog owners, and even cosmetic surgery. *See also Social computing.*

Most of the social networks on the internet are public, allowing anyone to join. Organizations, such as large companies, also have access to private social networking applications, known as Enterprise

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Relationship Management. They install these applications on their own servers and enable employees to share their networks of contacts and relationships to outside people and companies.

A recent development of social network is the integration of marketplace element in it, known as the Social Marketplace

[edit] Quantities in Social Network Analysis

Betweenness

- Degree an individual lies between other individuals in the network; the extent to which a node is directly connected only to those other nodes that are not directly connected to each other; an intermediary; liaisons; bridges. Therefore, it's the number of people who a person is connected to indirectly through their direct links. See also Betweenness

Centrality Closeness

- The degree an individual is near all other individuals in a network (directly or indirectly). It reflects the ability to access information through the "grapevine" of network members. Thus, closeness is the inverse of the sum of the shortest distances between each individual and every other person in the network. See also Closeness

Centrality Degree

- The count of the number of ties to other actors in the network. See also degree (graph theory)

Centrality Eigenvector

- Eigenvector centrality is a measure of the importance of a node in a network. It assigns relative scores to all nodes in the network based on the principle that connections to nodes having a high score contribute more to the score of the node in question.

Centralization

- The difference between the n of links for each node divided by maximum possible sum of differences. A centralized network will have much of its links dispersed around one or a few nodes, while a decentralized network is one in which there is little variation between the n of links each node possesses

Clustering Coefficient

- The clustering coefficient is a measure of the likelihood that two associates of a node are associates themselves. A higher clustering coefficient indicates a greater 'cliquishness'.

Cohesion

- Refers to the degree to which actors are connected directly to each other by cohesive bonds. Groups are identified as ‘cliques’ if every actor is directly tied to every other actor, ‘social circles’ if there is less stringency of direct contact, which is imprecise, or as structurally cohesive blocks if precision is wanted.

Constraint

Contagion

Density

- Individual-level density is the degree a respondent's ties know one another/ proportion of ties among an individual's nominees. Network or global-level density is the proportion of ties in a network relative to the total number possible (sparse versus dense networks).

Integration

Path Length

- The distances between pairs of nodes in the network. Average path-length is the average of these

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distances between all pairs of nodes.

Radiality

- Degree an individual's network reaches out into the network and provides novel information and influence

Reach

- The degree any member of a network can reach other members of the network. See also reach.

Structural Equivalence

- Refers to the extent to which actors have a common set of linkages to other actors in the system. The actors don't need to have any ties to each other to be structurally equivalent.

Structural Hole

- Static holes that can be strategically filled by connecting one or more links to link together other points. Linked to ideas of social capital: if you link to two people who are not linked you can control their communication.

[edit] See also

- Augmented Social Network (Links people, organizations and concepts)
  - Actor Network Theory
  - Knowledge management
  - Value network
  - Community of Practice
  - Social Web
  - Network analysis
  - Six degrees of separation
  - Small world phenomenon
  - Social networking service
  - Social Networking Software (SNS)
  - Mobile social network
  - INSNA
  - Social Pyramid
  - Motivations for Contributing to Online Communities
  - Sexual network
  - Social contract
  - Social safety net
  - Socio-technical systems
  - Virtual community
  - Global brain (An emerging intelligent network)
  - MoSoSo (Mobile Social Software)
  - YASNS (Yet Another Social Networking Service)
  - FOAF (Friend of a Friend)
- Mathematical Sociology
- Virtual organization

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