Teams as Networks: Using Network Analysis for Team Development

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Bring together your all-stars and create a new team. Will they produce stellar performance? Probably not. The best string quartet isn't created by assembling the greatest violinists, cellist, and violist. In sports, the best teams aren't the all-star gatherings. And in business, a collection of the best individuals from marketing, finance, production, and research doesn't guarantee the best multifunctional team.

GREAT INDIVIDUALS DON'T MAKE GREAT TEAMS unless they build good working relationships. Having the right ingredients — the right mix of people, skills, resources — is essential but not enough. Without the right relationships, even all-stars can't win.

This article addresses the importance of good relationships for high-performance teams. In it, I present a new tool, called network analysis, for diagnosing team relationships. Why should you consider it? First, companies now depend on teams. In the past, teams weren't critical for organizational success. Today, however, teams are used more often, for more purposes, and with much higher expectations. "Teams will be the primary building blocks of company performance in the organization of the future," say Katzenbach and Smith in *The Wisdom of Teams*. Given the reliance on teams, it's critical that you do all you can to make sure teams function well. Second, the team trend means you'll encounter more dysfunctional teams. This problem stems from the sheer number of teams now created, but also from the much higher expectations people have for teams. More dysfunctional teams means you need new tools for systematic diagnosis. Third, mediocre teams aren't acceptable anymore. When teams were used for ad hoc and secondary purposes, mediocre performance was tolerable. It's not today. You must move more teams up the team-performance curve.

SOCIAL NETWORKS AND NETWORK ANALYSIS

As used here, a social network is the set of relationships among members of a team. ("Social" is used to distinguish people networks from computer networks.) Social

network is a generic term. It doesn't imply socializing or networking. A social network can represent any set of human relationships. A family, for example, is a type of social network. Network analysis is the toolbox used to understand a social network. Network analysis enjoys a rich tradition in sociology, anthropology, and communication studies, where it has been used to study many different types of social networks. Only recently, however, has network analysis been exported from the academic world and applied in organizational development. The potential is enormous. Network analysis is a powerful tool for diagnosing team networks and facilitating the evolution of a group of individuals into a real team. Network analysis provides clear, easy-to-understand, objective "X-rays" of the real social network. This objective information dispels misconceptions about the team's relationships. It initiates conscious consideration of the team's relationship problems and possible improvements. With the aid of network analysis, the team can self-diagnose problems, design a "target" team, and measure its progress toward that goal. Network analysis speeds the process of team development and helps to convert more working groups into real teams.

FINCO'S SENIOR MANAGEMENT TEAM

To illustrate the use of network analysis for team development, consider the case of FINCO, my pseudonym for a large, diversified financial services company headquartered in the Midwest. FINCO established a cross-functional team composed of senior managers from various departments and locations around the region. The team has two purposes. One is to promote professional development by creating a learning environment for members to share information, best practices, advice and counsel. The other is to integrate the company by coordinating activities across departments and locations.

FINCO sponsors periodic conferences as part of the company's program to aid team development. For one of these meetings, I was asked to facilitate a discussion of the team's structure and culture. Prior to our session, I administered a network survey designed to collect information about important types of relationships — workflow, communication, advice giving and getting, and so on. (Basic network concepts and measures are defined in *Table 1*.)

Table 1. Basic Network Concepts and Measures

Attribute	A characteristic of a person, such as age, education, gender, specialty, discipline, or other background or demographic characteristics.
Relationship	A connection between two people; also called a link, tie, or bond.

Type of Relationship	The content of a connection, such as verbal communication, advice, liking, respect antagonism, or informal socializing.
Strength of Relationship	The quantity or quality of a relationship, such as frequency of communication, quality of advice, or degree of friendship.
Direction of Relationship	The point toward which something flows or moves, such as advice giving, message sending, or input-output (often indicated by arrowheads in a network diagram).
Network	A set of relationships among a defined set of people.
Target Network	A desired future network; the object of efforts to change an existing network.
Size of Network Density	Number of people; often abbreviated as n. the number of actual relationships in a network, expressed as a percent of maximum number possible (for directed relationships, the maximum is calculated as n' — n); density varies between 0% and 100%.
Distance	The fewest number of links between two specified people in a network; also called path distance or geodesic.
Reachability	The extent to which all people are connected by direct or indirect paths.
Isolate	A person in a network that is not connected to at least one other person.
Dyad	A subset of two people connected by a relationship, usually without additional links to other people.
Clique	A subset of three or more people, with all possible relationships present (strict definition) or most relationships present (relaxed definition); a subset of densely interconnected people.
Outlier	A person connected to only one other person; a peripheral member of a network
Critical Person	A person in a network that, when removed, causes one or more people to become isolated, or breaks the network into two or more disconnected regions.

Using network analysis software, I analyzed and mapped the team's social network. One such map is reproduced in Figure 1. This map shows communication links among the 20 team members. The data behind this map were generated by the survey question, "How often do you talk with this person about work-related matters?" The response scale ranged from 0 (never) to 5 (almost daily). Because team members have an agreement to talk at least once a month, I dichotomized answers such that a response of 2 (once a month) or greater was defined as a relationship and less than 2 was not. Each relationship, thus defined, is indicated by a solid line between two people in *Figure 1*.

Figure 1. FINCO's Senior Manager Communication Network

The location of each person in Figure 1 is important. The technique used to draw this network map (called multidimensional scaling) analyzes the direct and indirect relationships between all people in a network. It places together people who are closely interconnected, and separates people who are not. Devin and Joe are far apart, for example, because they are not connected directly; they have at least two intermediaries between them (Eve and Abbie). For contrast, consider the "clique" composed of Jack, Margo, Bill, and Patrick (lower right). These four are completely interconnected. Bill and Patrick are placed the farthest from the rest of the team because they have no direct connections with anyone else.

Using network maps. Maps like Figure 1 enable team members to see — for the first time — their real network of relationships. It permits members to compare their

expectations with objective information. In every social setting, for example, a person develops and carries a "mental map" or cognitive picture of the network of relationships: who talks with whom, who is a friend of whom, who dislikes whom, who advises whom, and so forth. Without a mental map, it would be impossible to work, function, or even survive.

Most mental maps are incomplete and distorted pictures of the actual network. A big reason is that most mental maps are not based on active and systematic observation; rather, mental maps are usually drawn intuitively, based on personal interactions, inference, hearsay, and gossip. Research shows, however, that accurate, mental maps are essential for effectiveness.

Before I show a network map, I always ask team members about their expectations: What do they think their social network looks like? For example, using concepts and measures from Table 1, I may ask:

"Is everyone reachable? Are there any isolated people? Most teams, like FINCO's, do not expect to have isolates. Yet, as shown in the map, Jim is an isolate (placed in the upper right of Figure 1).

- What is the density of the network? Typically, people think density is much higher than it really is. FINCO's team, for example, thought that at least 50 percent of all possible relationships would exist. The density of Figure 1, however, is only 18 percent.
- Are there cliques? Teams like to think that cliques do not exist, but subgroups almost always form. Figure 1 reveals eight cliques (using the strict definition of clique in Table 1). For example, Sue, Abbie, Christie, Mary, and Eve form a clique located in the center of the network.
- Are there outliers? The map shows five people in the periphery: Bob, Louis, Kathy, Tom, and Fred. Most work in FINCO's satellite offices (denoted by an asterisk following a name in Figure 1), suggesting that physical and organizational separation is a relationship barrier.
- Are there "critical" people? A critical person in a social network is the only connection for one or more people. Sue, for example, is critical for both Bob and Louis; without her, they would be isolates. For effect, I call this the "bus test." If this person were hit by a bus, would someone become isolated? Would the network fall apart?

Causes of social networks. Why does FINCO's management network look like it does? What are the causes of network structure? In general, every network is a result of three factors: opportunity, constraint, and choice. Opportunity refers to the availability of contacts. Constraint refers to obstacles for contact. And, choice refers to deliberate decisions to build or not build relationships.

To get at these issues, I invited team members to reflect on the causes of their

relationships with each other. FINCO's team offered several typical explanations: "Our jobs force us to talk." "We were friends before." "We worked together on a committee." "I don't know her, so I don't call." "We're in different offices, so we never run into each other."

Such answers imply a passive approach to network-building. It's as if the social network "just happens" as a mere reflection of opportunity and constraint. Real teams are much more active, making choice a bigger determinant of network structure. The social network reflects deliberate choices to build relationships, create opportunities, and overcome constraints.

As FINCO's team reflected on their network, they came to realize that they were not a real team. Rather, they were really a *working group.* As defined in *The Wisdom of Teams*, this is "...a group for which there is no significant incremental performance need or opportunity that would require it to become a team... The members interact primarily to share information, best practices, or perspectives and to make decisions to help each individual perform within his or her area of responsibility." In other words, the FI NCO network exists solely to help individuals do their jobs better. It did not have any real work to do as a team. It lacked a team mission and team product.

What should the network be? Analysis of the observed social network spurred discussion about what the network should be: What relationships did they want to have? All members agreed they wanted to improve the existing network, even if they remained a working group instead of becoming a real team. For example, they wanted to strengthen communication and build a more integrated network. The target network, they decided, should be much denser, without isolates and outliers (especially people from satellite offices). And, the network should have few or no cliques. We devised several mechanisms, such as a systematic calling program, to achieve this target network.

Consideration of the target network led to a discussion of mission. Did they want to develop a true team mission? Did they want to evolve into a real team? At this time, they are considering a number of opportunities that would enable them to do so. Meanwhile, they are taking steps to ensure that they improve performance as a working group.

DOING NETWORK ANALYSIS

Using network analysis for team development involves these basic steps:

1. Approvals. Does the team consent to doing network analysis? Are approvals from higher up necessary?
2. Boundary specification. Who's on the team? This is not a trivial question. Members may come and go, and network analysis requires that you define precisely who is in the network and will be surveyed.
3. The network survey. What questions will you ask? What types of relationships

do you want to uncover? Generic network questions include frequency and importance of communication, workflow inputs and outputs, advice giving and getting, and informal socializing. You may also ask questions about projects or issues specific to the team you are studying (e.g., "How often do you talk with this person about the Brand X new-product release?). It is also important to collect basic background and demographic information.

4. Confidentiality. How will the network data be processed and used? Who will have access to the data? Network surveys cannot be anonymous, so you must ensure confidentiality. One way is to use an outside party to collect and analyze the data.
5. How will you display the results? For FINCO, I assigned a random code to each person, and displayed maps with these codes. Privately, I would tell each person what his or her code was.
6. Data analysis. How will you analyze the data? Special network analysis software is needed. I produced Figure 1 with KrackPlot, a drawing program by David Krackhardt and associates. Network analyses were performed with UCINET. (Both are available from Analytic Technologies.)
7. Follow up. How will the team know if it achieved its target network? It is important to conduct before/after studies to document progress or make mid-course corrections. FINCO, for example, invited me to return at a later date and do another network analysis of the group.

CONCLUSION

New times demand new ideas, skills, and tools. As companies rely more and more on teams, trainers and consultants need to employ new tools to promote team development. Network analysis, a well-accepted method in the social sciences, offers a scientific approach for helping teams help themselves. By analyzing the true network of relationships, team members can see their actual relationships, understand why their network looks like it does, design a target network for the future, and implement mechanisms for achieving it. Network analysis can be a powerful tool for facilitating the development of high-performance, high-functioning teams.

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