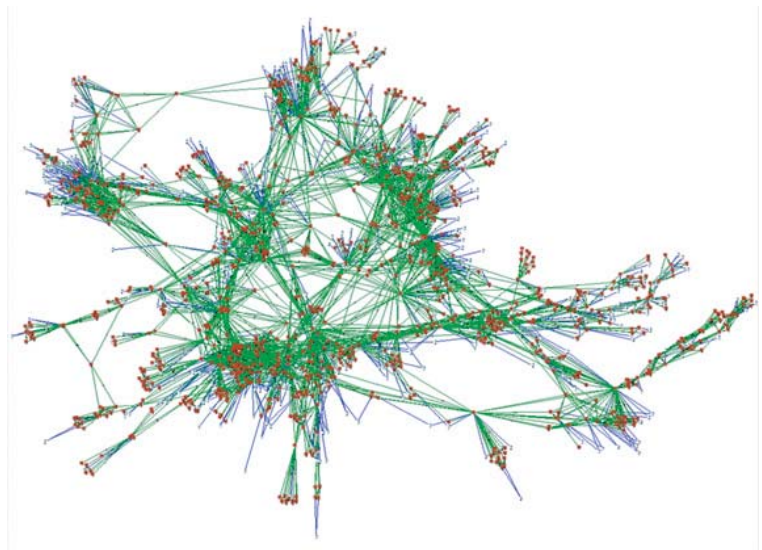


Finding Key Opinion Leaders

Using Social Network Analysis

A NEW PARADIGM IN OPINION LEADER IDENTIFICATION

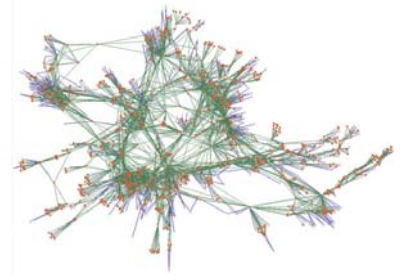


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Pharmaceutical companies spend on average 24% of their total marketing budgets on thought leader activities.¹ This expense is justified because creating and sustaining a new idea takes effort since people are resistant to change.² Introducing a better medical treatment means overcoming this ingrained resistance to change. Fortunately it's not necessary to convince everyone, since patients rely on "experts" to make good decisions on their behalf. However, a doctor cannot be an expert on all medical



conditions, so physicians will rely on health-industry peers with more specialized knowledge for advice. Hence it's extremely important for pharmaceutical companies to find the right key opinion leaders, or KOLs. Using the correct KOLs can increase revenue by as much as 18%.³ But the sheer size and diversity of an ever-changing medical landscape requires better techniques for finding these experts. This white paper introduces Social Network Analysis, SNA, as a robust technique for finding key opinion leaders. It also reveals some salient strategic insights about SNA's ability to find individuals within communities who would otherwise remain hidden with traditional tools such as lists.

KEY TERMS

Peer effects are seen when an individual's own behaviors rely on another's choices.

Asymmetric peer effects refer to one person's influence on a group. Research shows that a doctor's prescribing behaviors are directly influenced by other doctors.

Asymmetric peer effects help define OLs in the pharmaceutical industry.

Evidence from the literature suggests, that "the use of opinion leaders (generated via sociometric approach or via the key informant approach) seems to induce short-run behavioral change that is statistically significant relative to a control group."³

Two Current KOL Identification Methods:

Pharmaceutical companies grapple with finding the right opinion leaders and influencers.⁴ They generally use two methods for finding them: literature searches and influence surveys. Each of these methods has limitations when compared to the power of the Social Network Analysis method.

Literature searches, besides being time-consuming to perform, rely on a researcher's library science skills and domain expertise, as well as his or her ability to distill massive quantities of information. The researcher must pick the appropriate search terms and time period to get a sufficiently large sample size for the disease

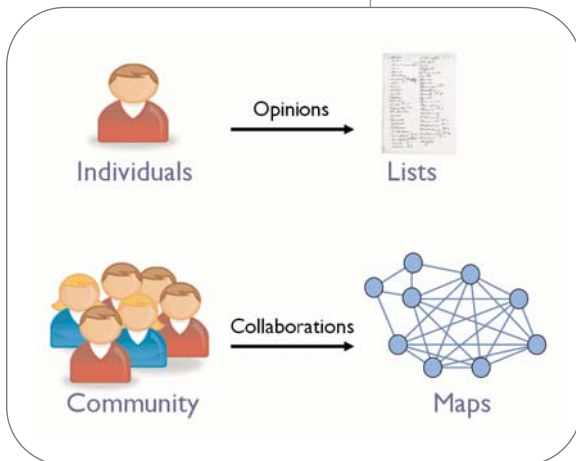
¹Cutting Edge Information. 2004. *Pharmaceutical Thought Leaders: Brand Strategies and Product Positioning*. Report PH64

²Knowles, Eric S., and Jay A. Linn. 2004. *Resistance and Persuasion*. Lawrence Erlbaum Associates.

³Nair, Harikesh, Puneet Manchanda, and Tulikaa Bhatia. 2006. *Asymmetric Peer Effects in Physician Prescription Behavior: The Role of Opinion Leaders*. <http://ssrn.com/abstract=937021>.

⁴ ibid.

area of interest without being so large as to be unmanageable. The researcher must also provide a good cross-section of relevant material. Although search engines make this easier, much more is needed than capturing the first thousand webpage references. Search engine page ranking results, although temptingly easy, should not be used to judge a person's importance. Automated page ranking systems are extremely biased.⁵ A researcher must also contend with search results for *homonyms*, different people with the same name, or *synonyms*, the same person with two dissimilar names.⁶ Hence significant desk research at the individual level is required to dig past the seemingly obvious and resolve data discrepancies. To some extent, a researcher with access to better tools may reduce bias further by using elaborate bibliometric measures, such as journal impact factor or citation analysis, to identify a candidate pool. However, these methods must be further supplemented with desk research to infer importance.



Surveys are often used to overcome the limitations of literature searches, as either a replacement for or supplement to them. The main advantage of surveys is they attempt to evaluate asymmetric peer effects - see sidebar

page 1- by answering the question "Who influences whom?" Surveys are questions sent to medical researchers or physicians that ask questions such as "Who you recommend for..." or "Who do you think is a leading researcher for..." This approach relies on the collective knowledge of the survey responders. Yet collective wisdom can be wrong.⁷ Also survey results will not include non-responders and will be skewed by opinions from only those who respond. To be statistically significant, a large random sample must be used. But the sample must be carefully picked to ensure that the potential responders are sufficiently knowledgeable about the subject area. The responders recommend people that they know or are visible to the responder. Obviously the unknown people are not included, yet a community includes both.

EXPERT COMMUNITIES

As Malcolm Gladwell in the *Tipping Point* popularized, communities are networks of people each with different skills. He talks about **Mavens**, **Connectors** and **Salesmen**. The Salesmen are "persuaders" and charismatic people with powerful negotiation skills - and thus very visible. The other two types are less visible or hidden. The Mavens are "information specialists," where as Connectors are the people who "link us up with the world ... people with a special gift for bringing the world together." These three types of expert skills are necessary to ensure that new ideas are created, sustained and spread throughout a community. Surveys do a good job of finding the most visible experts and are not good for finding the connectors and mavens. Desk research can find some hidden connectors and mavens; but only SNA naturally organizes people based on their social connections.

⁵ Cho, Junghoo, Sourashis Roy, and Robert E. Adams. 2005. *Page quality: in search of an unbiased web ranking*. In *Proceedings of the 2005 ACM SIGMOD international conference on Management of data*, 551-562, Baltimore, Maryland: ACM.

⁶ On, Byung-Won. *Data Cleaning Techniques by Means of Entity Resolution*. A Thesis in Computer Science and Engineering. <http://pike.psu.edu/publications/byungwon-dissertation.pdf> (Accessed January 9, 2008).

⁷ Surowiecki, James. 2005. *The Wisdom of Crowds*. Anchor.

Social Network Analysis:

Although many SNA methods have been in use for more than 30 years to evaluate communities and identify important people⁸, only recent advances in technology have allowed large⁹ communities to be analyzed. People working a lifetime in a scientific area might recognize the top 10, 20 or even 50 leading researchers for their community. But ask different people and its doubtful their top 10 lists will match. The fast pace of new research is forcing changes in collaboration patterns and creating new communities. The top people will be changing all the time; the evolution of communities continues¹⁰. SNA not only allows a researcher to identify people, but compare and rank them over time.

Social Network Analysis of expert networks eschews the problems of literature searches and surveys by analyzing large quantities of accurate objective data. SNA relies on social principals; among them is the finding that people mainly prefer to work with other experts.¹¹ By graphing actual collaborations among an expert community, a social network map provides rich contextual information.¹² For example, suppose Dr. Jones and Dr. Adams collaborated

on a grant, or coauthored a paper together. By graphing these relationships for 5 or 10 years across an entire disease area, such as brain cancer or autistic spectrum disorders, a very clear picture of the research community emerges.

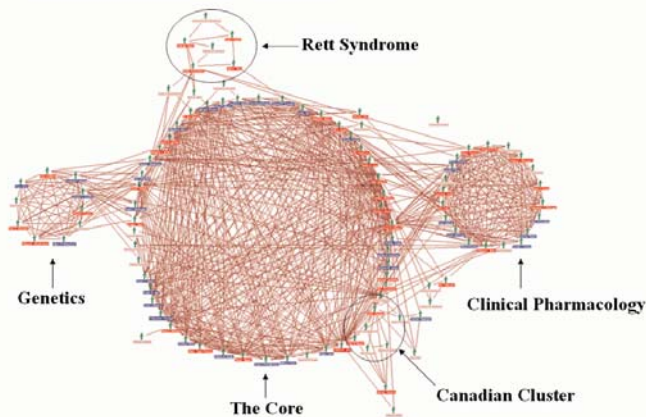
Many communities across a variety of fields have been studied using Social Network Analysis¹³. They each follow a small-world pattern, in which everyone is connected to everyone else in a small number of steps.¹⁴ In short, this occurs because people prefer to work with certain people over other people. The reasons can be varied: the person wants to work with a Nobel laureate, or with colleges researching a particular disease state. But the key is that people make active choices rather than completely random choicess. These individual choices, when aggregated, create a social network pattern which can be analyzed and utilized.

A social network map describes itself. Communities can be tight-knit, or loosely formed; they can be open or closed. Communities can have sub-groups (also called work-group clusters) that work within or across geopolitical boundaries. Important people, for example, often have more connections.

Centrality Measures and Importance

SNA uses several mathematical measures to analyze importance, including degree centrality, betweenness centrality, closeness centrality and eigenvector centrality.¹⁵ For example, a person with 100 connections to people with 2 connections would

Autistic spectrum disorders Key Opinion Leaders
Coauthor collaboration network – 10 years, 1997 – 2007



⁸ Scott, John P. 2000. *Social Network Analysis: A Handbook*. Second Edition. Sage Publications Ltd.

⁹ Newman, M. E. J. 2001. *Who is the best connected scientist? A study of scientific coauthorship networks*. *Physical Review E* 64:016132.

¹⁰ Barabási, Albert-László et al. 2002. *Evolution of the social network of scientific collaborations*. *Physica A* 311:590-614.

¹¹ Newman, M. E. J., and Juyong Park. 2003. *Why social networks are different from other types of networks*. *Physical Review E* 68:036122.

¹² Newman, M E J. 2004. *Coauthorship networks and patterns of scientific collaboration*. *Proceedings of the National Academy of Sciences of the United States of America* 101 Suppl 1:5200-5.

¹³ Degenne, Alain, and Michel Forse. 1999. *Introducing Social Networks*. 1st ed. Sage Publications Ltd.

¹⁴ Barabási, Albert-László, Z. Néda, and Hawoong Jeong. 2003. *Measuring preferential attachment in evolving networks*. *Europhysics Letters* 61, no. 4:567-572.

¹⁵ Newman, M. (in press). *Mathematics of networks*. In L. E. Blume & S. N. Durlauf (Eds.), *The new Palgrave dictionary of economics*. Basingstoke: Palgrave

probably be less important than someone with 20 connections but all of them to people with 100 connections each. In other words, having more connections does not necessarily mean a person is more important but is a factor for consideration when compared to everyone else in the community. (See sidebar Pg. 3)

CENTRALITY MEASURES

- Degree** - a person's immediate connections.
- Betweenness** - how often a person is between two other people.
- Closeness** - how easy is it for a person to reach every other person; their closeness to everyone.
- Eigenvector** - similar to degree centrality but considers the importance of each first degree connection.

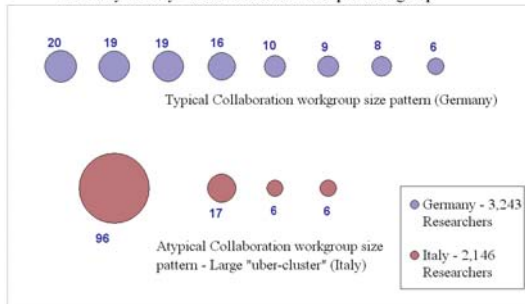
Work group analysis

The centrality measures find important people, but SNA provides rich contextual information. SNA provides information about how and with whom people work.

SNA algorithms can find workgroup patterns. But rather than focus on the theory, consider a practical example. The European rheumatoid arthritis research community, ~2150 researchers, was examined and mapped. Cluster analysis was done by country: Germany, England, Spain, France and Italy. The results were startling; when each country was compared, Italy had a very different pattern. Typically networks have one or two larger clusters with others trailing off in size, but Italy has one huge *über*-cluster, some six (6) times larger than the next nearest workgroup cluster (See chart Pg. 3).

This discovery, about the Italian scientific community's work style, has significant implications for sustaining and creating new ideas within the community. This workgroup could be considered the community center with connections to the entire community. Targeting communication efforts to just this one *über*-cluster is clearly best compared to efforts targeting smaller clusters, peripheral people or random individuals.

Rheumatoid Arthritis coauthorship collaborative network workgroup cluster comparison
Germany vs. Italy - Research collaborators per Workgroup



Conclusion

Having key opinion leaders is necessary to create and sustain ideas in a scientific community. Finding the right leaders requires a thorough analysis of the entire community. Social Network Analysis is unique among the many marketing tools, for its ability to evaluate entire communities, collaborative patterns, individuals and their importance in the community. SNA allows one to map the entire forest, not just the trees. SNA provides rich contextual data about individual KOLs that neither surveys nor literature searches reveal. SNA is the only comprehensive way to ensure the entire KOL panel represents a good cross-section of the entire community.



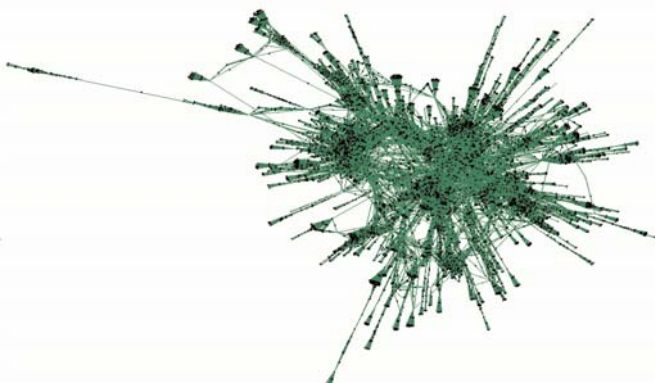
LnX Research, LLC, applies social network analysis [SNA] techniques to provide insights into scientific communities. For the Pharmaceutical Industry, Lnx Research uses social network analysis to quickly locate Key Opinion Leaders' and characterize their local and extended communities. Mapping provides insights into relationships that would otherwise remain hidden in lists and tables.

A community can be "fairly open" or "tightly knit." By mapping the community you can easily see how regions, institutions or leaders are related. A marketing team can then adjust KOL programs to reflect these differences. For example, you might use a very different approach to work with a single tightly-knit cluster compared to five loosely connected clusters

SNA techniques can be tailored to a particular "slice" of a community or Product Lifecycle phase -- pre Clinical, Clinical, Launched, and Mature products.

Besides mapping a community to find its leaders; the reverse is possible, mapping the leaders to find their communities. With this approach you can characterize and quantify an individual KOL's reach and influence within a domain. This is particularly useful for distinguishing between "well-published" individuals and those with extensive relevant clinical trial experience. Adding affiliations (such as "disclosures") adds another layer of understanding that is highly relevant to selecting partners.

For further information on how Lnx Research finds thought leaders through social network analysis, *contact Philip Topham, Director 714-784-7936.*



LnX Research, established in early 2006, is a privately funded company based in California.