



Social network analysis: Finding new insights and opportunities

David Meyer (david.meyer.email@gmail.com) BSU

Have you ever heard the 1972 hit “Lean on Me” with the lyrics “You just call on me brother/When you need a hand/We all need somebody to lean on”? REACCH is a complex project with many potential, necessary, and desirable connections among our team members and stakeholders. The song reminds us to call on friends and family when times are tough—or when we need a sympathetic ear to work through a problem. Our social network can help us in times of need.

IMPACT

Identifying and improving upon collaborations among the 200+ REACCH team members will improve our insights, our opportunities, and the quality and scope of our outcomes. Given this diversity, size, and scope, the coordination of our efforts might be just as important as the individual actors involved. Collaboration will improve both our science and overall management of this complex project.

In this sense, a social network refers not just to relationships on social media such as Facebook or Twitter, but also to the important personal, professional, and community relationships we all enjoy. Being connected with others can have a big impact on our sense of well being and keep us open to new insights, opportunities, and outcomes.

One integration activity used by REACCH this year was a social network analysis to make our social network more visible. The results help us see who connects to whom and can help REACCH collaborators find the right person to “lean on” when needed. In a collaborative effort such as REACCH—one that includes research, extension, and kindergarten through graduate school education—there are more than 200 possible collaborators. Given this diversity, size, and scope, the coordination of our efforts might be just as important as the individual actors involved.

One way to understand the power of social network analysis is to imagine trying to coordinate 200 Facebook “friends” to do some task in which every person has some knowledge, ability, or resource required for success. The relationship between these 200 people would vary; some would be close professional colleagues, while others wouldn’t know each other at all. Holding a face-to-face meeting would help, but the team would still spend a lot of time figuring out what contribution each person brought to the task. This kind of team coordination challenge is common to many “team science” efforts, in which a scientific challenge requires the collaboration of investigators with diverse skills and knowledge, such as cancer research and prevention, biomedical technologies, or climate change. Social network analysis gives us a powerful tool to help coordinate our efforts.

Our social network analysis started in the winter of 2013, when everyone participating on the project (including researchers, graduate students, stakeholder advisory committee members, scientific advisory panel members, and others) was asked about his or her collaborations on the project during the previous year. Response choices ranged across five levels of collaboration from “I don’t know this person” to “a strong integration of ideas, merging of perspectives, and growth of common understanding...a new understanding based on what we both brought to the task.” The survey feedback gives a sense of how 212 people across the entire range of REACCH activities are working together.

But simply having a graph of who is collaborating with whom does not tell us much about how to improve the project. Social network analysis software gives us the ability to combine these survey results with other information such as the individual’s discipline, REACCH activity area, role in the REACCH project, and other grouping characteristics. Rather than a web of individual actors, we can map the interactions among disciplines, activities, or institutions and better see the “big picture” of REACCH collaboration.

The results illustrate two important social network concepts: degree centrality and brokerage. Degree centrality is the count of the number of strong collaborations among individuals (Figure 1). Degree centrality is like a popularity ranking; people with high degree centrality scores are more likely to be key conduits of information, opinion leaders, and early adopters of new knowledge or practices active in the network. Degree centrality of REACCH collaborations helps show the individuals, disciplines, or activities that have the highest number of strong collaborations. This information can be used to help manage workload and identify people, activity areas, or roles that need more support.

Brokerage or “betweenness centrality” measures the shortest path between people. The “brokerage” term fits our real-world use of the word too; just like a real estate, mortgage, or pawn broker, these people help connect individuals and groups who otherwise would have a very limited relationship. Betweenness centrality measures an actor’s position within a network in terms of his or her ability to make connections to other pairs or groups in a network.

One way to understand betweenness centrality is to imagine a highway map of the United States. Cities with high degree centrality would include New York and Los Angeles, which have many roads to nearby communities. A city in the middle of the country, such as St. Louis, would have lower degree centrality (fewer roads going in and out of town), but high betweenness centrality because it lies on the shortest path between many cit-

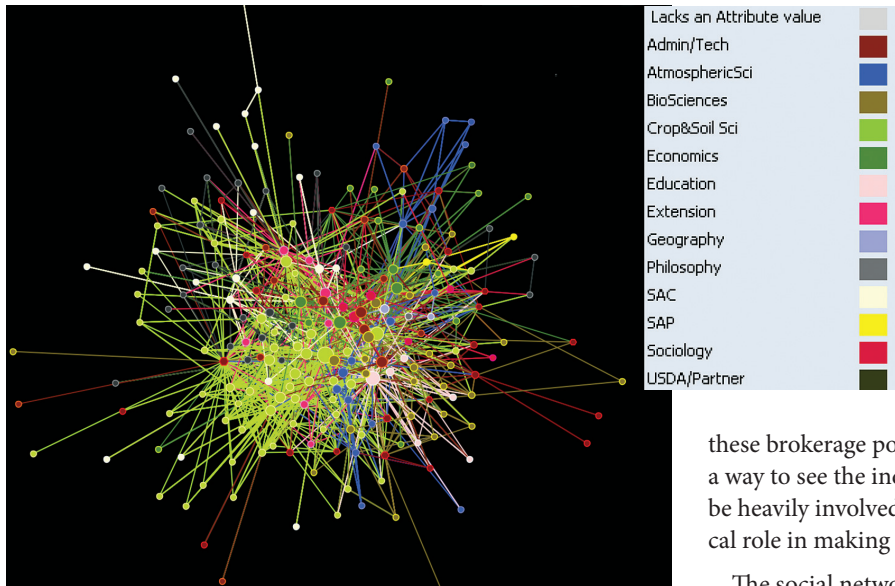


Figure 1. This social network graph shows the individuals who report high levels of collaboration with others on the REACCH project. Larger circles that are closer to the center of the graph are people with higher “degree centrality” and indicate people who have a higher number of collaborative relationships across the project. The circle and line colors show the primary academic discipline of each person. REACCH team members can use graphs like these to illustrate collaboration across individuals, disciplines, institutions, or activity areas. (Names have been removed from this graph for privacy.)

ies on the east and west coasts. St. Louis may not be “popular” like the large, well connected east coast cities, but its position in the middle of the country makes it very important if you want to connect the east and west coast.

In the REACCH collaboration survey, individuals with high betweenness centrality may or may not be the most “popular” collaborators (as measured by degree centrality) but they play a vital project role because they collaborate with other people or groups who are less connected with each other. Making

these brokerage positions more visible gives the REACCH team a way to see the individuals, disciplines, or activities that may not be heavily involved in the project as a whole, yet may play a critical role in making the right connections across the team.

The social network analysis effort started this year is just one way the REACCH team has improved collaboration across researchers, students, activity areas, and stakeholder groups. Combined with other efforts this year, including our annual improvement survey, an inventory of graduate students’ philosophical commonalities and differences, outreach workshops, biweekly project integration meetings, and more, the REACCH team continues to find better ways to manage collaborative team science projects (Figure 2).



Figure 2. REACCH team members mix it up with each other, members of our Scientific Advisory Panel and Stakeholder Advisory Committee, members of the Corn CAP and PINEMAP, and the REACCH band at the 2012 annual meeting. Photos by Laurie Houston.