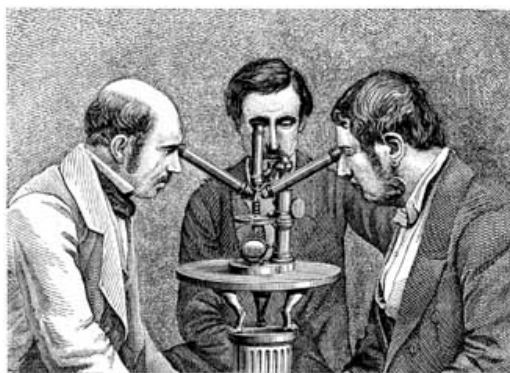




# PINEMAP

## Team Science in PINEMAP



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Wendy-Lin Bartels<sup>1</sup>, Ricardo Mello<sup>2</sup>, and Jessica Ireland<sup>3</sup>

This report provides background on the goals of the team science research and instructions on how to interpret the results and read the reports. We also developed customized reports for each Aim sub-network that illustrate interactions among participants and network structure. A complementary report shows interactions as well as changes over time for the whole PINEMAP network.

Your feedback on the usefulness and limitations of this research is welcomed and important. Please send any questions and input to [wendylin@ufl.edu](mailto:wendylin@ufl.edu).

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<sup>1</sup>Assistant Research Scientist, Florida Climate Institute, University of Florida

<sup>2</sup>Graduate Assistant and Social Network Analysis expert, University of Florida

<sup>3</sup>PINEMAP Project Coordinator

# Team Science in PINEMAP

## INTRODUCTION & RESEARCH GOALS

This research contributes to PINEMAP's proposed project outcome *"Building enhanced capacity for regional, interdisciplinary collaboration among climate and forest scientists and Extension and education professionals."* Participants will achieve this outcome by integrating expertise across

- Institutions
- Regions (geographies)
- Disciplines
- Research + Education + Outreach
- Academia and society

The broad goal of this research is to examine the factors that facilitate or constrain integration across boundaries. Over the course of this 5-year project, we aim to understand, evaluate, and manage circumstances that influence the effectiveness of large-scale team science in PINEMAP. We anticipate that research results will inform the creation and management of future collaborative research and training programs.

This report is part of PINEMAP's mid-term process evaluation. Its purpose is to describe and challenge your practice of "team science." The goal of sharing research findings with project participants is to foster reflections and elicit suggestions or actions for improving project implementation.

## METHODS

### ***Know the net, Knit the net***

see the map of how things really work  
and adjust the network for improvements  
--- Valdis Krebs

Data is being collected through surveys, ethnographic research methods, and social network analysis (SNA). SNA can help us to better understand and visualize the nature of team science within the project's research networks. Through SNA, we can assess the nature of ties among researchers, the types of collaborations they represent, and changes in network structure over time.

During the first PINEMAP annual meeting held in May 2011, we collected baseline SNA data through a paper survey that was distributed to the 51 original PIs. The survey assessed the extent to which participants had worked together in a professional context in the past, according to the following scale:

- 0 = Never
- 1 = on 1 or 2 projects
- 2 = on several projects (more than 3)
- 3 = work together regularly

In April 2013, we distributed an online survey using Qualtrics. The SNA portion of the survey asked respondents to describe their interactions with all other PINEMAP members according to the following scale:

- **0. No awareness:** You do not know who this person is.
- **1. Limited contact:** You know who this person is, but did not have direct or continued contact with them. (You might have met them or seen them at a meeting but have not continued to engage with them.)
- **2. Communication:** You have shared information with this person related to the project. (You may have attended a presentation or webinar they gave, emailed one another about an idea, or exchanged information.)
- **3. Collaboration:** You have actively worked together with this person to set common goals, realize a shared goal, or develop a shared knowledge base. (Category 4 is inclusive of category 3 – assumes communication.)
- **4. Shared thinking:** You think there has been a strong integration of ideas, merging of perspectives, and growth of common understanding. (You have collaborated with this person to the extent that it has changed both of your perspectives. The collaboration has been so strong that you perceive a new understanding based on what you both brought to the task.) (Category 5 is inclusive category 4 and 3 – assumes communication & collaboration.)

We received 50 responses to the baseline survey conducted in May 2011 (96% response rate). To develop network visualizations, we assumed reciprocity for the missing 2 participants. In other words, we used the scores that they received from others in the network. We received 119 responses from the 124 participants in the whole PINEMAP network survey conducted in April 2011(96% response rate). To develop network visualizations, we assumed reciprocity for the missing 5 participants.

To analyze the data, we used the UCINET software package and recoded a portion of the data to develop the network visualizations. For example, in the 2013 data, 0 and 1 ties became 0 (no tie). In most visualizations, we display 3 and 4 ties to illustrate only the strongest connections (collaboration and shared thinking). A few networks also include ties that reflect communication (2). For the baseline data, we recoded all responses except for 0 (no tie) as 1. In other words, the network represents ties among people who worked together prior to PINEMAP.

## SNA 101 and HOW TO INTERPRET RESULTS

- **Visualizing Network Structure:** The network diagrams consist of participants represented by nodes. Ties between nodes represent relationships. We use network visualization software to see all the connections within a network simultaneously. Divisions and sub-groupings become visible when we display network members in different colors, according to specific characteristics.
- **Brokerage Positions:** In examining the structural positions of individuals within PINEMAP networks, we consider the node-level measure of betweenness centrality, which represents the number of shortest paths that a node lies on. In graph theory, information is believed to travel the shortest path. Being on the path along which information travels offers an individual a chance to become a broker (gatekeeper/ controller or synthesizer) of information. A higher betweenness centrality measure (indicated by a larger node in the network) indicates a greater capacity of the individual to act as a broker within the community.
- **Location & Importance:** Nodes on the periphery of a network are no less important than others, even though their betweenness centrality scores may be lower. They may be connected to key networks beyond PINEMAP and can offer new insights to challenge “group think” that may occur among members who occupy PINEMAP’s center. They may have different roles in project activities. The goal of observing these networks is not to “push everyone to the middle of the network.” Rather, we need to consider whether current interactions will bring about the degree of skill-set and expertise integration that is needed to achieve project goals (both within Aim groups and to reach broader PINEMAP outcomes). Where is our network fragile, and how might connections be strengthened?

## HOW TO READ THE REPORTS

We developed customized reports for each Aim sub-network that illustrate interactions among participants and network structure. A complementary report shows interactions as well as changes over time for the whole PINEMAP network. Results will be made available on the intranet site for all PINEMAP participants to read.

To “read” the network diagrams:

- locate yourself
- observe the size of your node (large / small)
- observe your position in the network (central / periphery)
- notice who surrounds you
- notice the position and size of others with whom you interact with closely as well as infrequently (or never)

Consider the following questions:

- To achieve PINEMAP outcomes are we integrating effectively across disciplines, institutions, regions, and roles?
- Is each member of this network adequately linked to one of the brokers?
- Do peripheral members need to be more integrated?
- Are these SNA results more valuable to participants in leadership or management roles or can they be used by all PINEMAP members? How can *you* use these SNA insights to improve your practice of team science?
- Is this how you expected the network would appear? How accurately does this network reflect reality? Where does it fall short and what surprises you?

## **NEXT STEPS**

We will continue to monitor changes in the network over time. Our next SNA data collection will assess how different kinds of integration platforms mediate interactions among participants. We will accompany SNA with ethnographic interviews to explore perceptions of team science in PINEMAP and barriers or opportunities for collaboration. We will use stratified sampling to select interview respondents based on key network characteristics (e.g., highly central or peripheral members, and according to role such as leaders, students, staff, co-PI). Finally, we will evaluate perceptions about the utility of SNA as a participatory monitoring tool for adaptively managing large-scale team science.

## **THANK YOU!**

Thank you for your contribution to this research. We appreciate your responses to the online survey and for facilitating discussions using SNA results within and across Aim groups. Importantly, the visualizations of these networks may not accurately reflect reality. We encourage discussion about how the networks offer insight, and where they fall short. Your feedback on the usefulness and limitations of this research is welcomed and important. Please send any questions and input to [wendylin@ufl.edu](mailto:wendylin@ufl.edu). To encourage a project-wide dialog about these networks, we plan to display these results on the PINEMAP intranet site. We will encourage you to use the comment boxes to provide input on the networks.