



# PINEMAP

## WHOLE NETWORK Team Science Report

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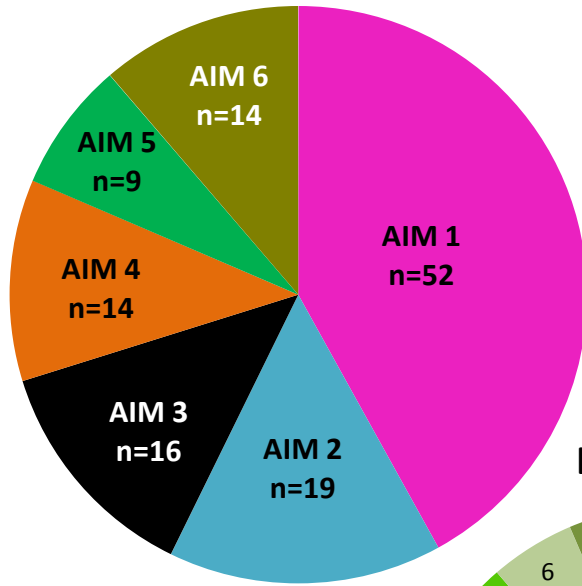
This report illustrates interactions among participants and network structure for the WHOLE PINEMAP network. This should be read with the complementary “Team Science in PINEMAP Report” and your Aim’s team science report.

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).

# General characteristics of the Whole PINEMAP Network in 2013

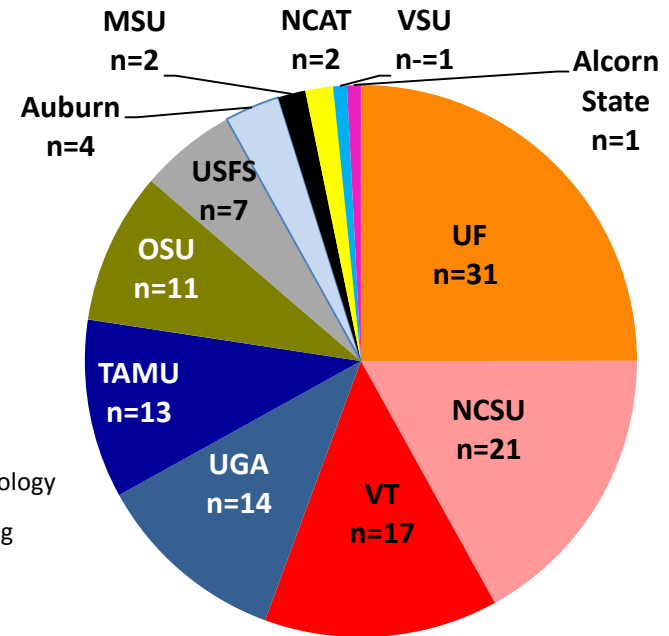
The whole PINEMAP network consists of 124 participants from 17 disciplines and 12 institutions. Participants are divided into Six Aim groups that serve as functional units to achieve specific project goals.

**Aim**

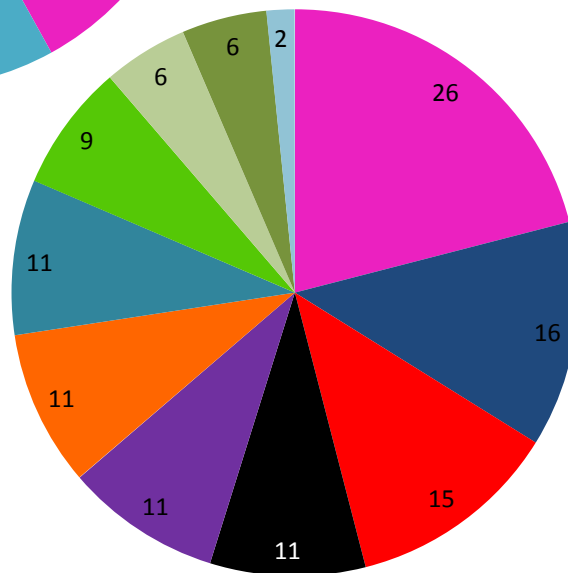


- Aim 1: Silviculture & Ecophysiology**
- Aim 2: Modeling**
- Aim 3: Genetics**
- Aim 4: Economics & Policy**
- Aim 5: Education**
- Aim 6: Extension**

**Institution**



**Discipline**



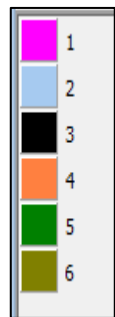
- Biology/Ecophysiology
- Genetics/Breeding
- Silviculture
- Ecology
- Modeling
- Economics/Policy
- Other
- Education
- Soils
- Extension
- Climatology

"Other" includes: Statistics, environmental science, data management, natural resources policy, forest entomology, fire science, anthropology

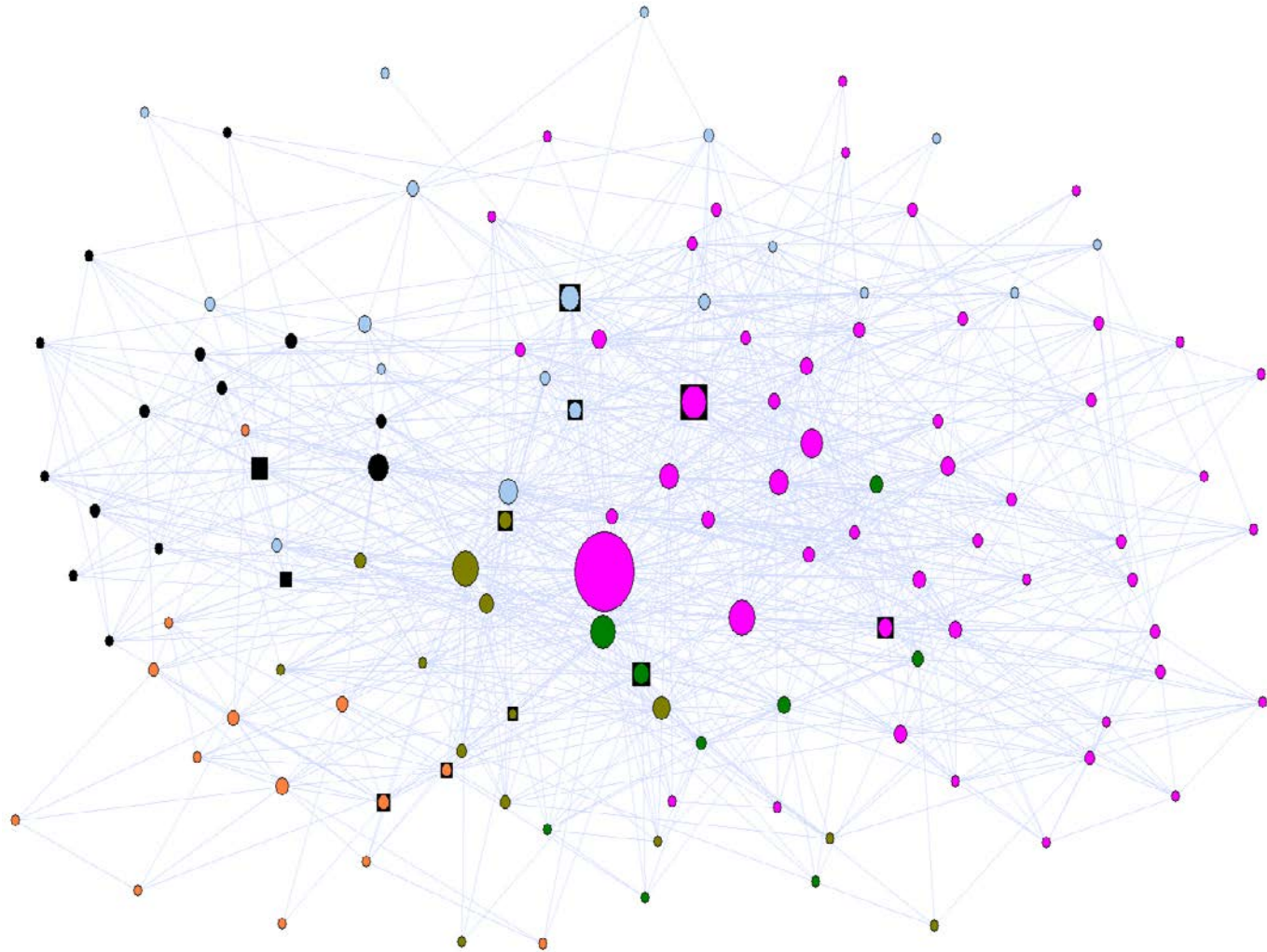
# WHOLE PINEMAP Network 2013: AIMS

Visualization is based on strong ties (3 & 4). Node Size is betweenness centrality for the whole PINEMAP network. Node color = **AIM**, Leaders = boxes

The whole PINEMAP network is relatively cohesive, i.e., there is no presence of isolate nodes, and everyone is connected. Aim 1 definitely occupies more space in the network than any other Aim. Furthermore, Aim 1 has several brokers (larger nodes) who are centrally located in the whole network. Compare this Aim with members from Aim 4, who appear to be of equally sized nodes and peripherally located in the network. Aim 6 (and to some extent Aim 5) is different from other Aims because members are spread throughout the whole network. One Aim 5 member, for instance, is centrally embedded in Aim 1. Notice that in some cases, leaders (boxes) are centrally located within their Aim group, but in other cases, they appear to be more peripheral to their own Aim, likely functioning as bridges to other Aims.



Aim 1	52	42%
Aim 2	19	15%
Aim 3	16	13%
Aim 4	14	11%
Alm 5	9	7%
Alm 6	14	11%

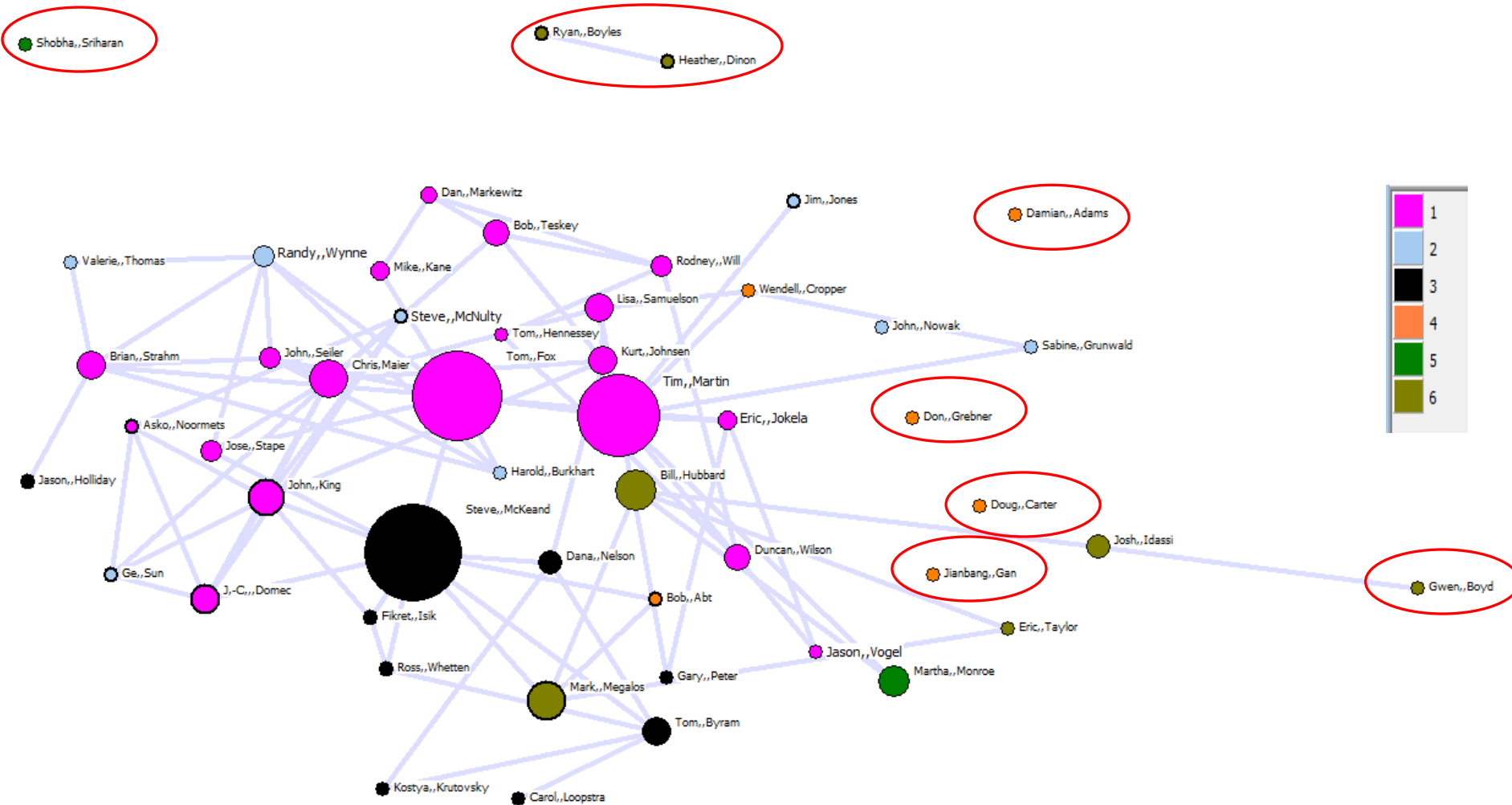


# As compared to what ...Where did we come from?

## Baseline Whole PINEMAP Network (2011) by Aim

Visualization is based on strongest ties (people who worked together closely prior to PINEMAP). Node Size is betweenness centrality for the whole PINEMAP network. Node color = **AIM**.

The baseline network shows far fewer participants (only 51 PIs) and fewer ties among nodes. Notice the presence of isolates, a dyad, and several peripheral members.

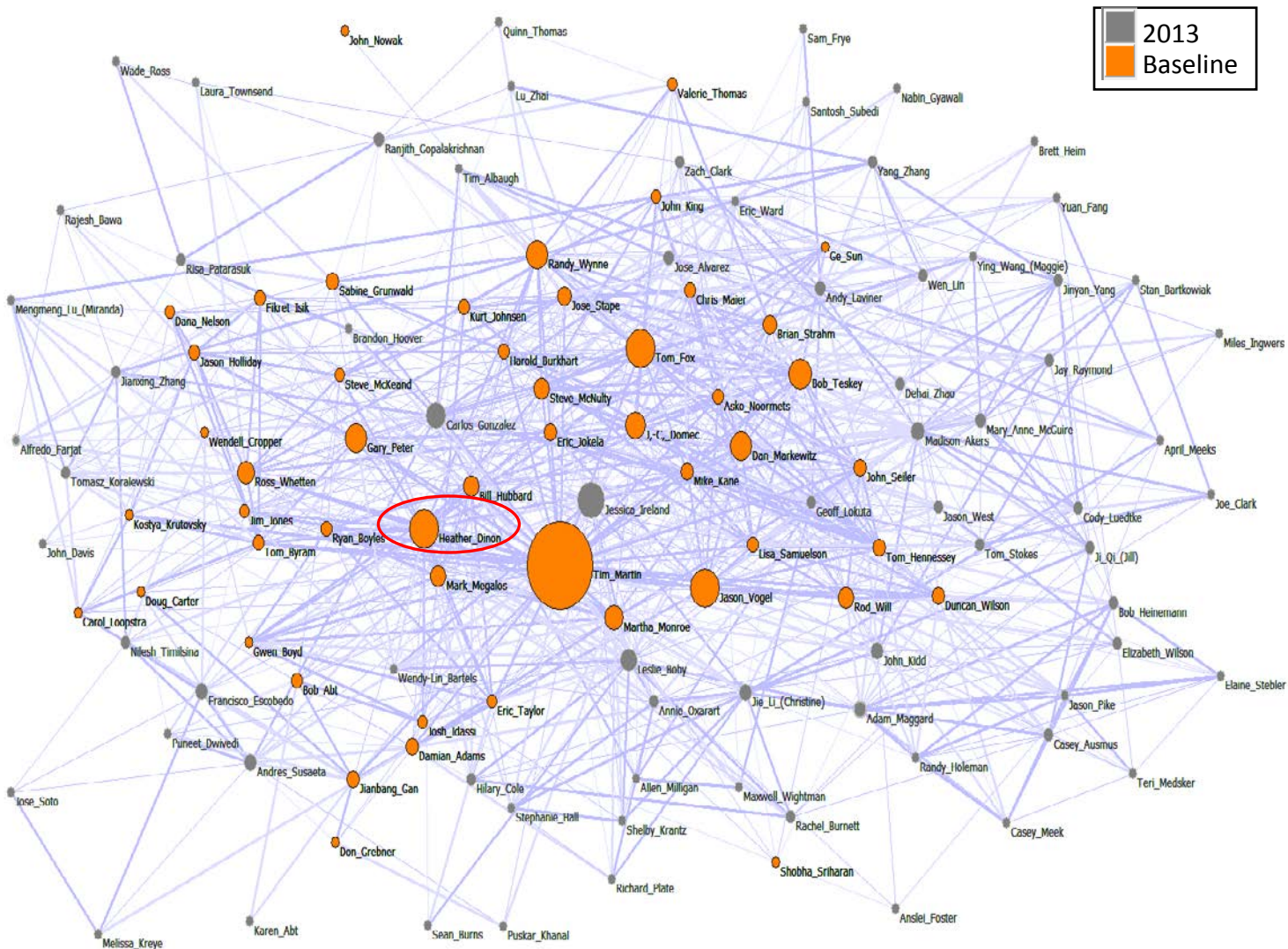


# How far have we come?

## Whole PINEMAP Network in 2013, highlighting 2011 participants

Visualization is based on strong ties (3&4). Node Size is betweenness centrality for the whole PINEMAP network.

Since the beginning of the project, the network increased by 73 participants and we see more ties. Notice that previous isolates have become part of the network and one, in particular, became centrally embedded. Also notice that the original 51 PIs still dominate the central part of the PINEMAP network. However, a few new participants have succeeded in occupying centrally located positions (e.g. Heather)

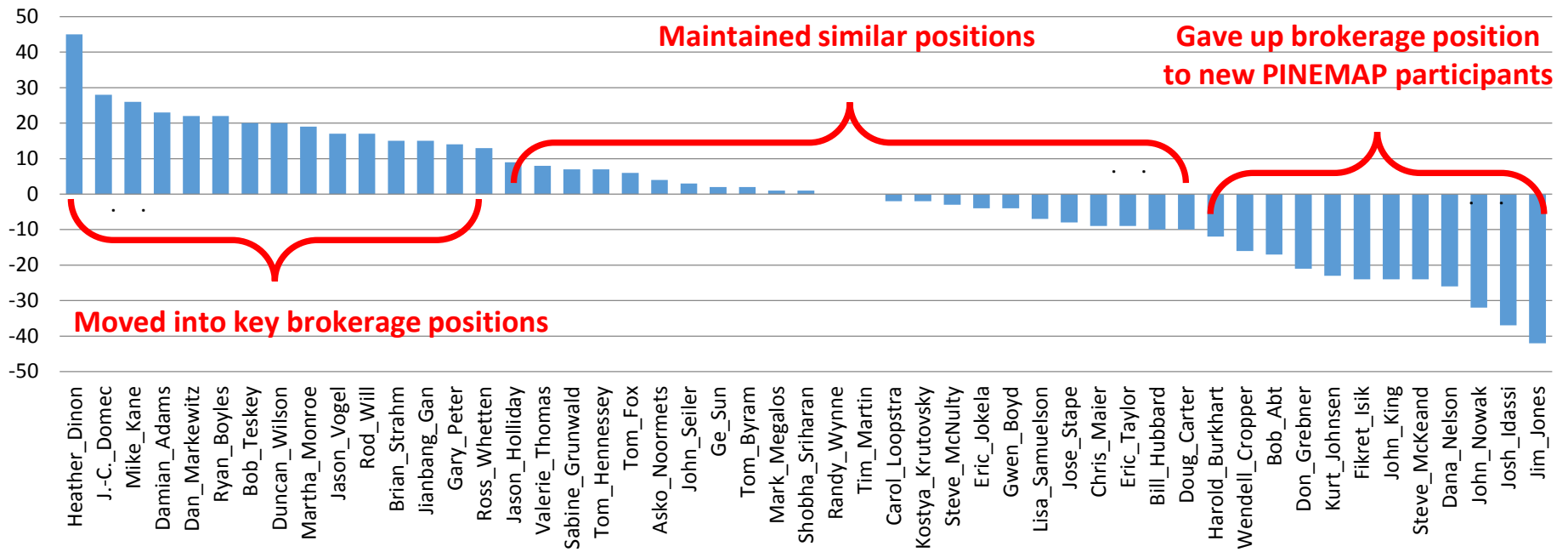


### Reflection Questions

- 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?

## Changes in Brokerage (2011 – 2013)

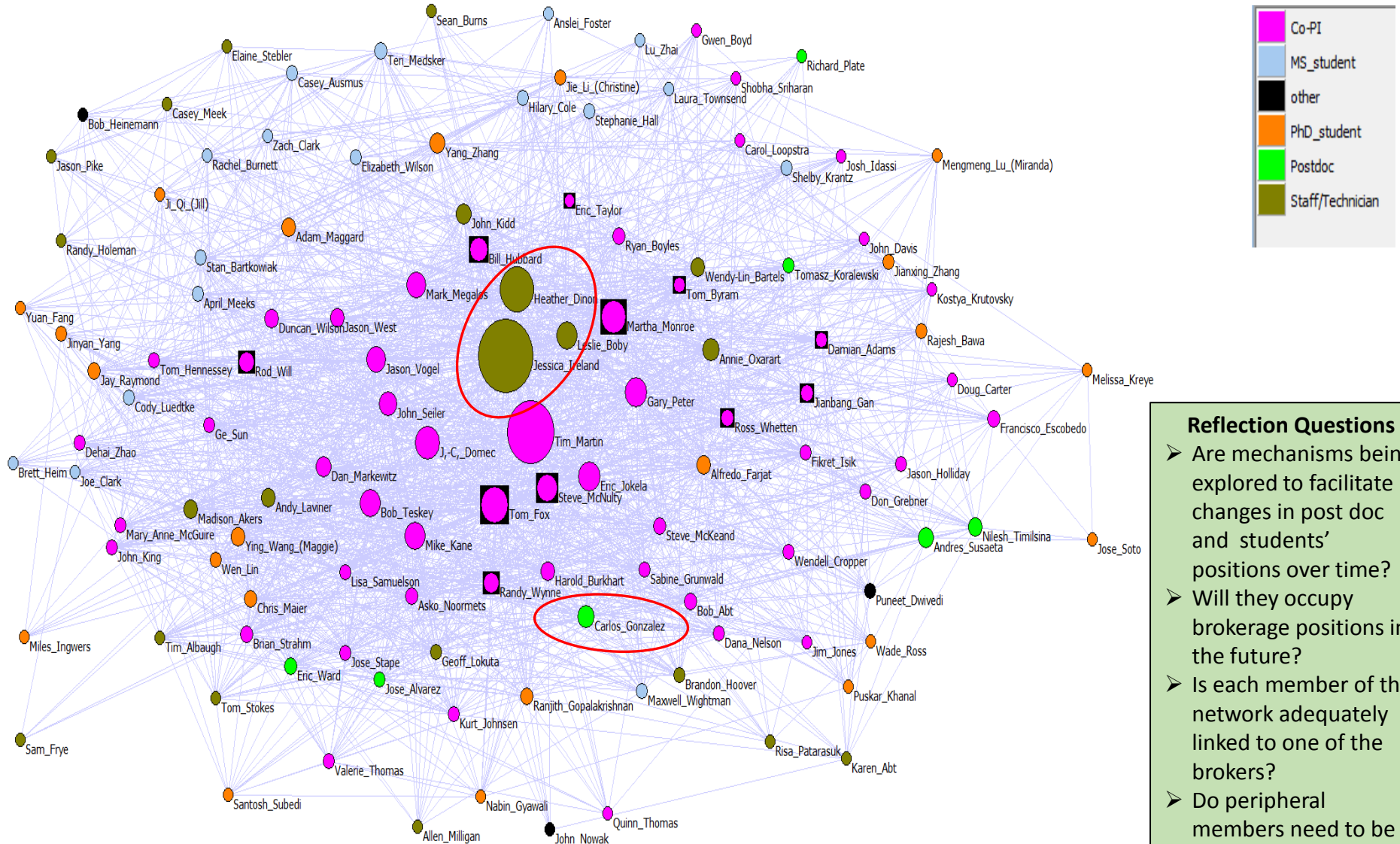
To compare the baseline network with the current PINEMAP network, we assessed the % change in position for the original 51 PINEMAP participants.



# 2013 Whole PINEMAP Network: ROLES

Visualization includes communication (2, 3, & 4). Node size indicates betweenness centrality. Node color = **ROLE**, Leaders = boxes

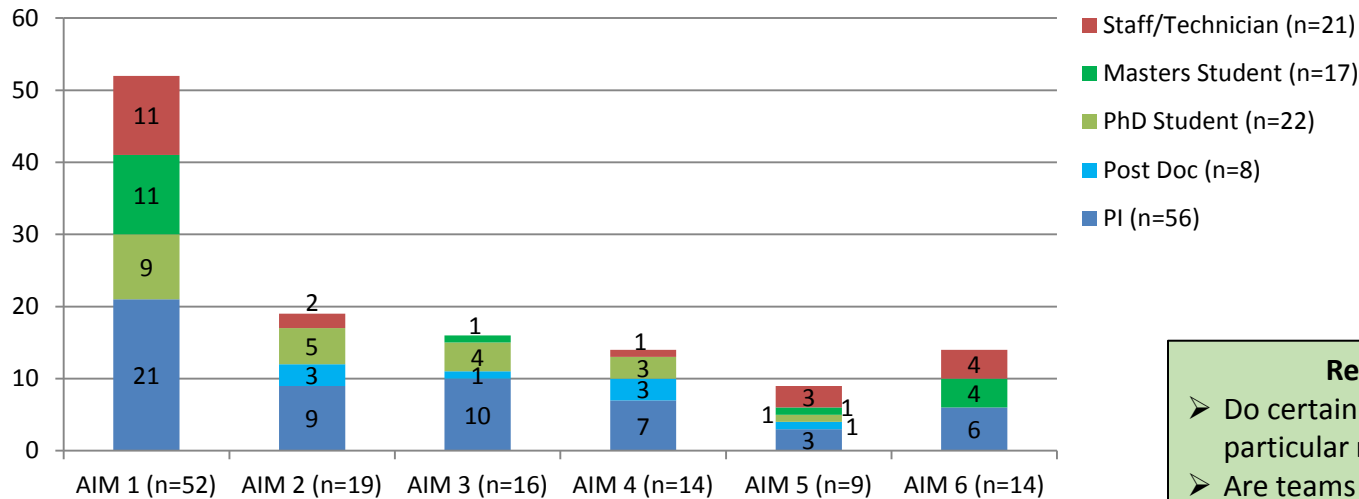
Because some of the original participants gave up their brokerage positions, these spaces became available for “new” PINEMAP participants to occupy. Interestingly, some of the “new” people who have become centrally embedded also represent particular roles (e.g., staff or post doc).



## Aim Groups and Roles in 2013

Aim groups differ in terms of the total number of participants as well the representation of specific roles. For instance, Aims 1, 5, and 6 have a high proportion of technicians or staff members. Aims 2 and 4 have the highest proportion of post docs and no master's students. Aim 6 has neither PhDs nor post docs. We might consider the importance of specific roles for achieving project outcomes.

**PINEMAP participants by Aim and Role**



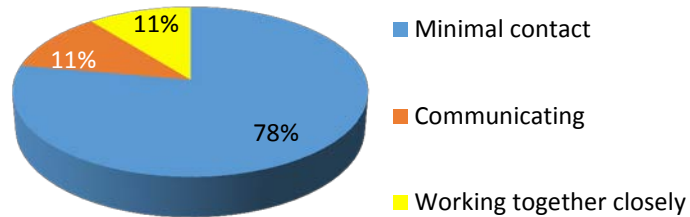
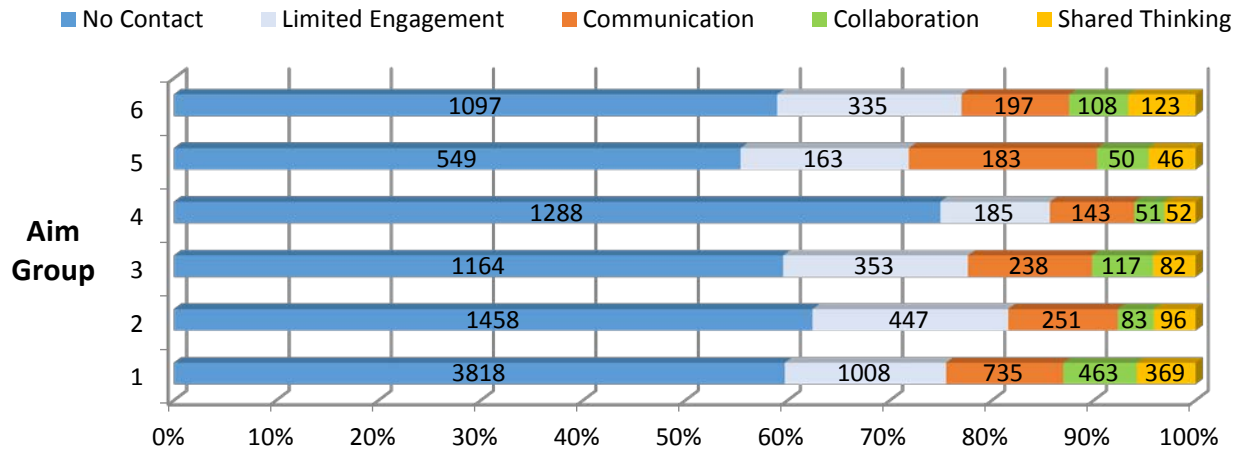
### Reflection Questions

- Do certain types of activities demand particular roles?
- Are teams appropriately constituted to ensure success?

# Is the PINEMAP Network Working?

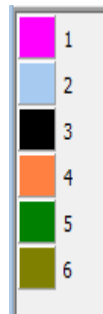
During the first two years of the project, the majority of PINEMAP participants did not interact with one another. The SNA data reveals that 78% of total number of ties represent minimal contact. However, it appears that *the network is working*: 22% of total ties represent communication, collaboration, and shared thinking!

### Number of ties for different kinds of interactions



# Whole PINEMAP Network visualized differently (Aims)

Figure 1 is based on strong ties (3&4).  
 Figure 2 also includes communication (2).  
 Node size = betweenness centrality for the whole PINEMAP network. Node color = AIM.



## Reflection Questions

- The whole PINEMAP network displays differently when we consider different types of interactions.
- Notice the greater number of ties when we include communication.
- Do you notice changes in the nodes that occupy brokerage positions? Remember, larger nodes are facilitating interactions across the whole PINEMAP network. **Collaboration and communication may require different types of brokers...**

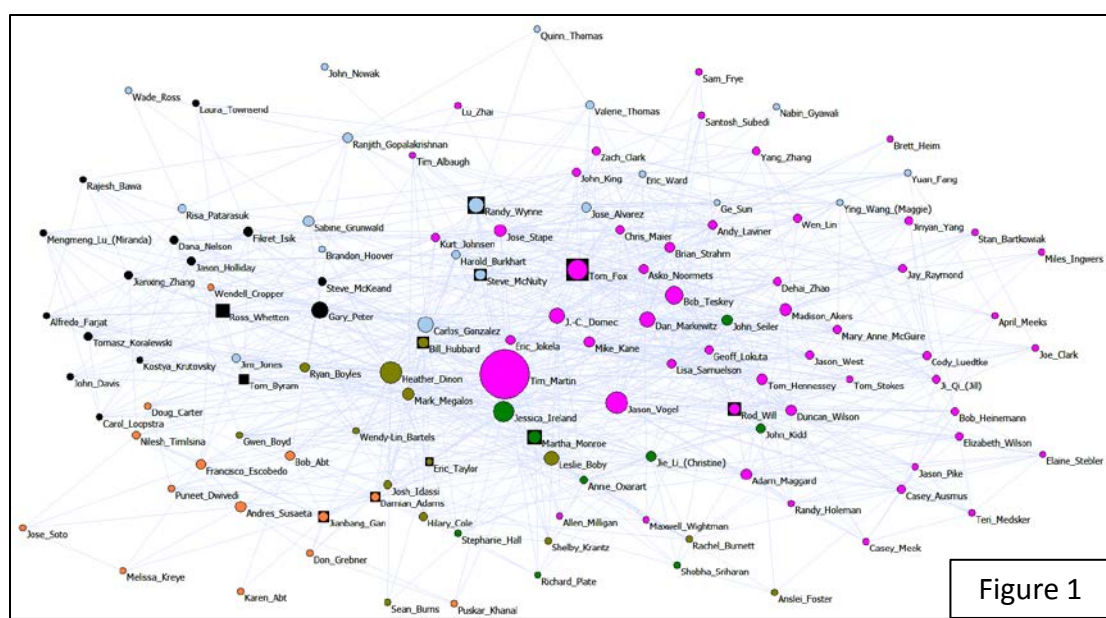


Figure 1

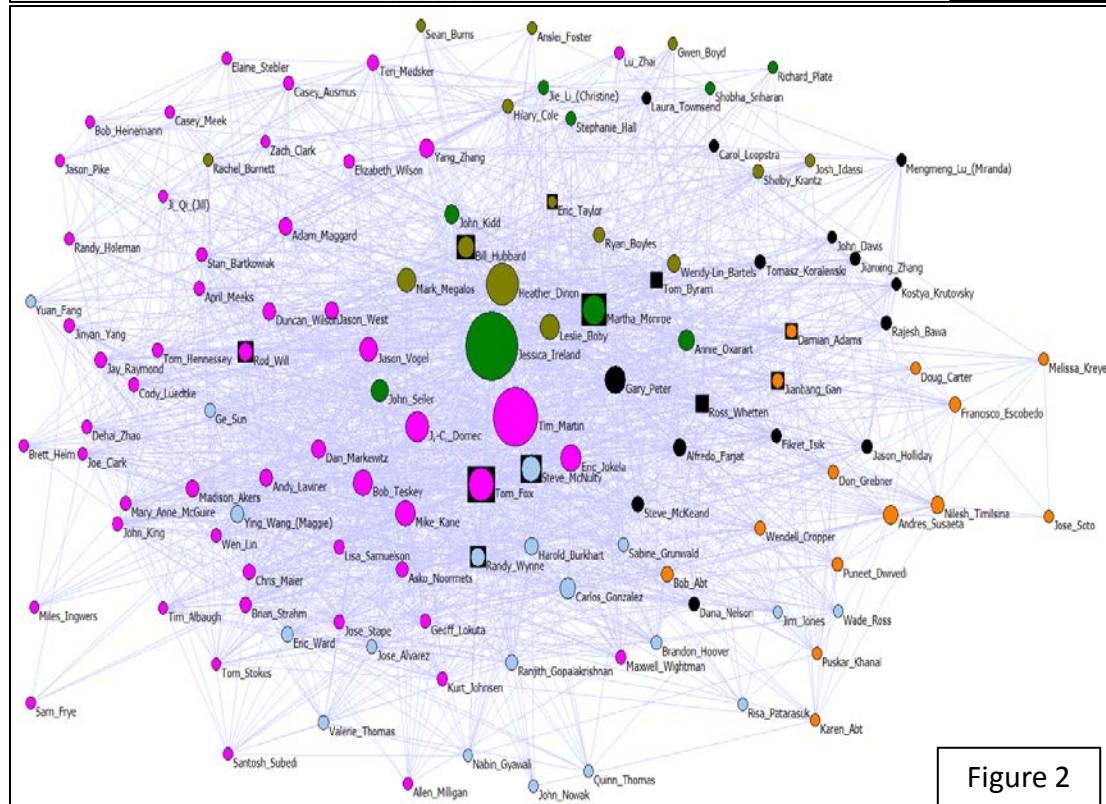
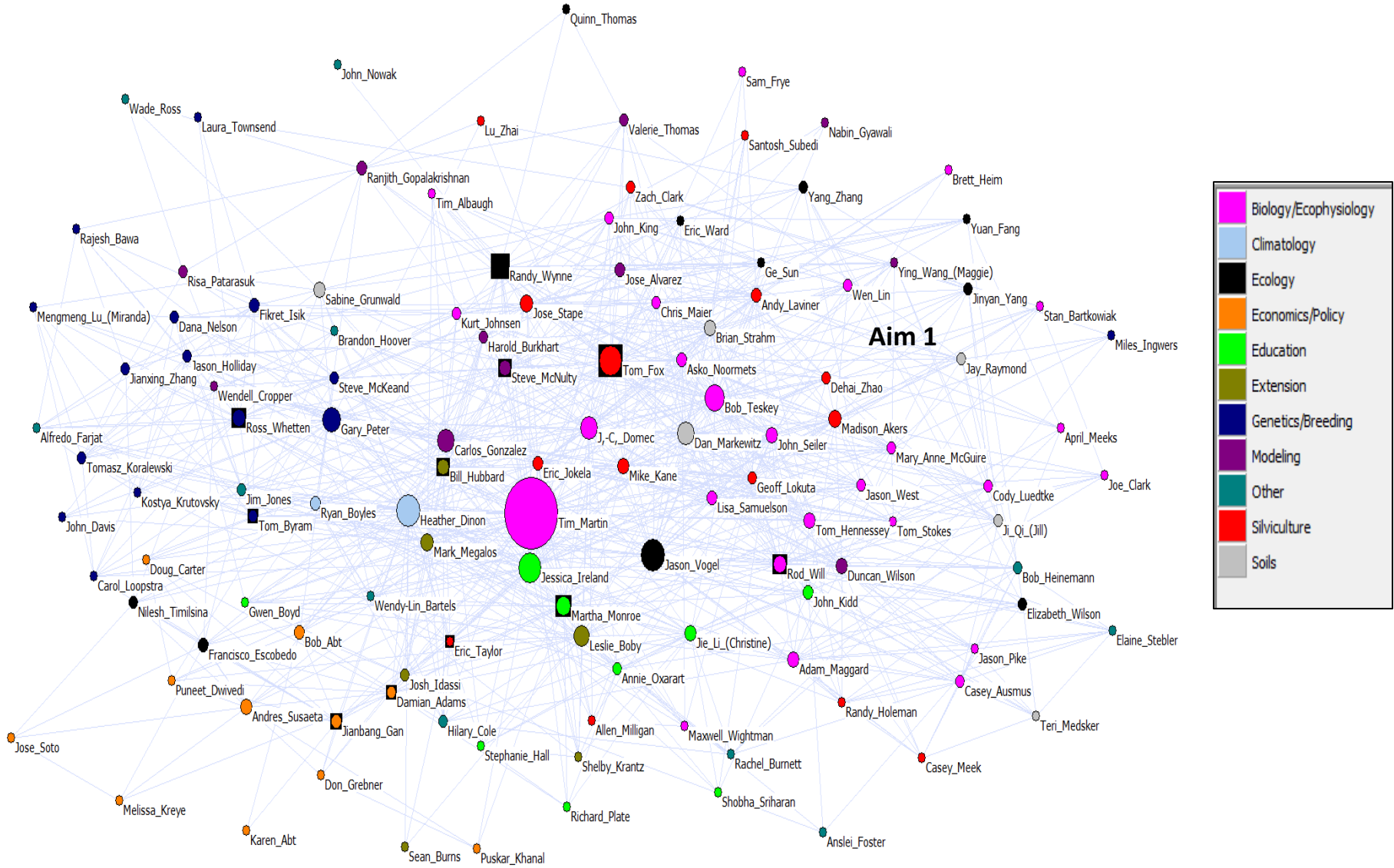


Figure 2

# WHOLE PINEMAP Network 2013: Disciplines

Visualization is based on strong ties (3 & 4). Node Size is betweenness centrality for the whole PINEMAP network. Node color = **DISCIPLINE**, Leaders = boxes

For the most part, the Aim groups are proxies for discipline-based activities, but some Aims convene multiple disciplines. Aim 1, for instance, brings together mainly ecophysiologicalists and silviculturalists (see the customized Aim reports for more details).

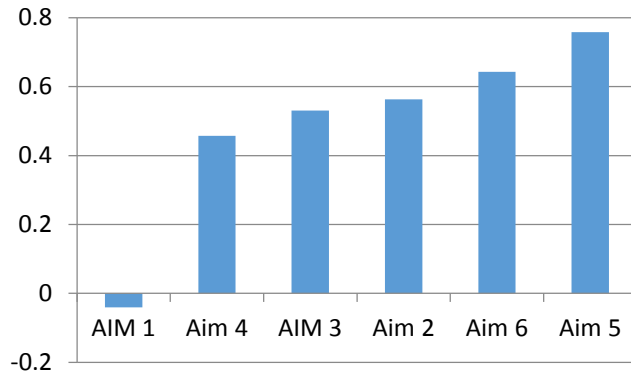


## External Internal (EI) Index

EI is a measure of network cohesion. We can calculate the extent to which macro-structures "cluster" the interaction patterns of individuals who fall within them. The network as a whole can be characterized and we can also examine variation across the sub-groups in their degree of closure. In these graphs, we calculate EI for sub-networks in PINEMAP (Aims and Disciplines)

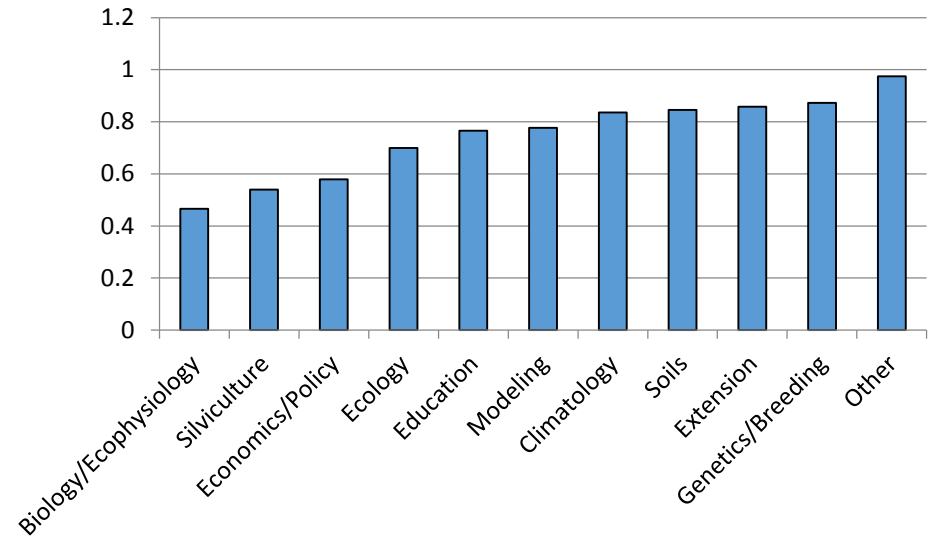
EI takes the number of ties of group members to outsiders, subtracts the number of within group ties, and divides by the total number of ties. The resulting index ranges from -1 (all ties are internal to the group) to +1 (all ties are external to the group). To calculate EI, we used 2, 3 and 4 ties (communication, collaboration, and shared thinking)

**Within & Across Aim Interaction  
External/Internal Index**



In our network, Aim 1 is the most "closed" and the 5 is the most "open" to other Aims based on the EI index. For disciplines, we see these patterns mirrored to some extent.

**Within & Across Discipline Interaction  
External/Internal Index**



# 2013 Whole PINEMAP Network: INSTITUTIONS

Visualization based on strong ties (3 & 4). Node size indicates betweenness centrality for the Aim 6 sub-network. Node color = **INSTITUTION**, Leaders = boxes

UF, NCSU, and VT have the highest number of participants in PINEMAP and several hold key brokerage positions. TAMU and UGA also have representatives in brokerage positions.



**Reflection Question**  
➤ Do peripheral universities need to occupy brokerage positions or be more centrally located?

## 2013 Whole PINEMAP Network: Final Reflection Questions

- To achieve PINEMAP outcomes, are we integrating effectively across disciplines, institutions, regions, and roles?
- Where is our network fragile, and how might connections be strengthened?
- 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?
- What will our next annual report say about our level of integration?
- Who needs to step up to the integration plate?

