



# The Architecture of Collaboration:

## Defining Networks, Developing Methods

### From Silos to Networks

Science and education are team sports requiring interdisciplinary collaboration to advance knowledge and solve problems. However, the usual hierarchical interaction architecture of universities isolates potentially interactive units, creating silos that inhibit research and teaching collaboration.

We need to learn how collaborative interactions develop and are structured as networks, then engineer interactions to promote successful models.

Public universities need to consider alternative architectures to retain leadership in research and education.

### Project Goals

- ❖ Explore methods and develop tools for characterizing MU networks, using two examples:
  - ❖ Bond Life Sciences Center (LSC)
  - ❖ Center for Arts and Humanities (CAH)
- ❖ Begin to identify relationships between network characteristics and desired outcomes
- ❖ Infer means by which network can be optimized
- ❖ Understand how collaborative networks form and what factors determine success will allow us to find ways to optimize network development and reduce "silos"

### Collaborations Are Social Networks

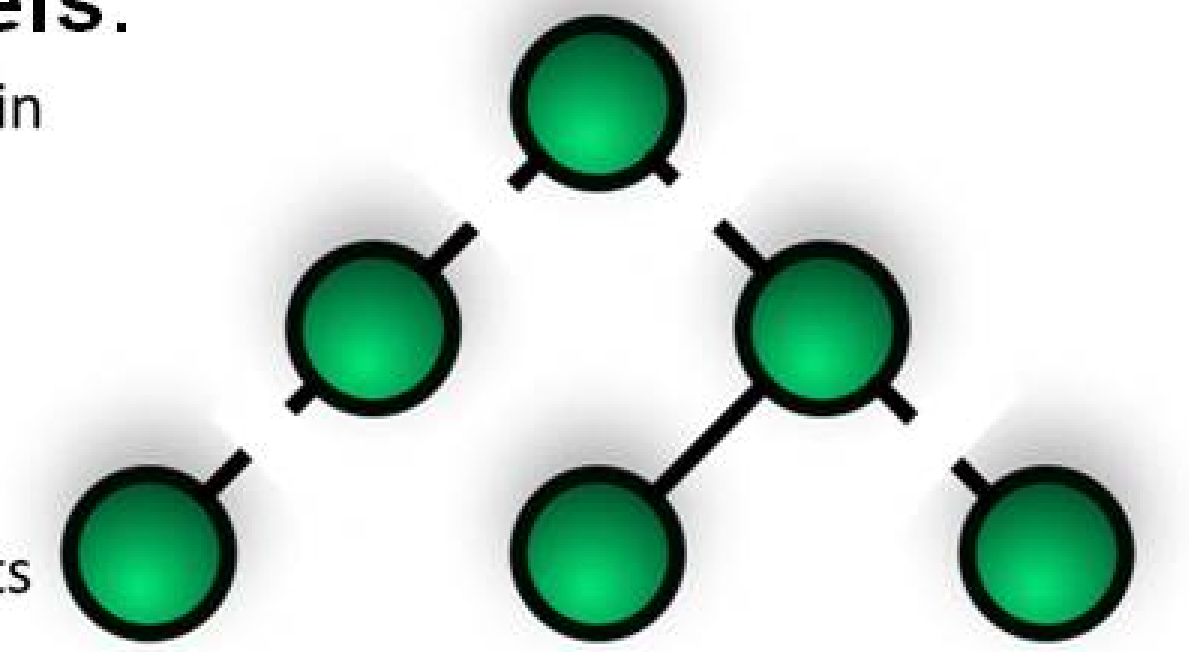
Collaborations in education and research follow the rules established for network function:

- ❖ Impact of physical proximity
- ❖ Role of topology (shape)
- ❖ Connectivity

For example, a hierarchical topology usually contains broken connections that isolate lower levels.

The lower levels need unbroken links to create collaborations, and they need to be in close physical proximity

Higher admin  
Colleges  
Departments



### Methods

Interviews with faculty:

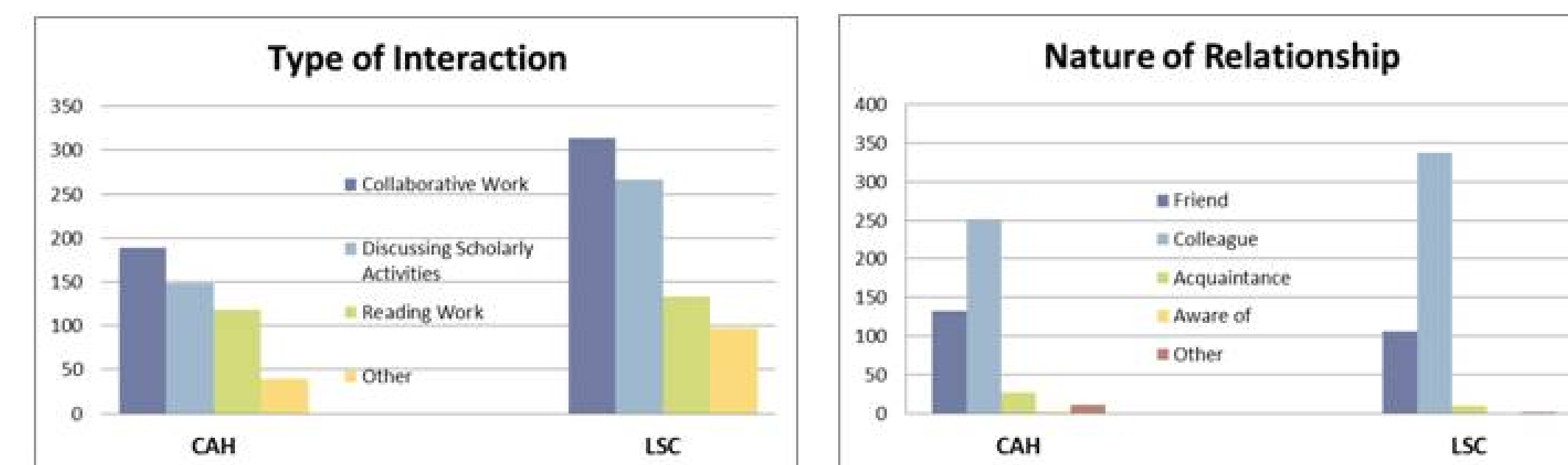
- 25 LSC Faculty
- 20 CAH Faculty

Mined publication data for study participants from several electronic sources

Developed Software to depict network

### Survey Findings

Types of interactions and relationships are similar for both LSC and CAH faculty:



Keys to collaboration:

- ❖ Student committees (LSC, CAH)
- ❖ Scholarly panels (CAH)
- ❖ Physical proximity (LSC, CAH)
- ❖ Reading each other's work (LSC, CAH)

### Database Findings

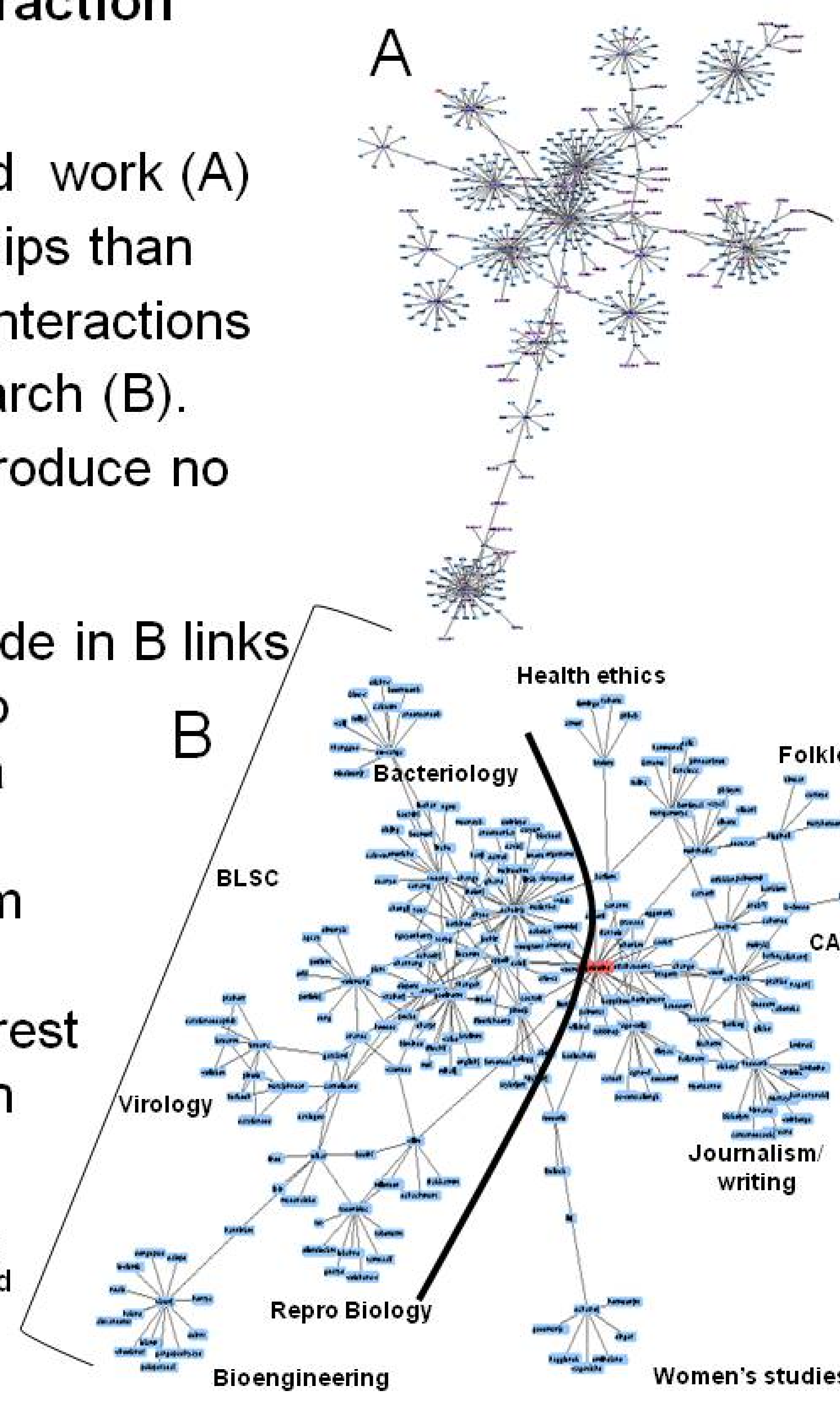
- ❖ No MU database contains needed information
- ❖ While more complete, publication data are only one kind of interaction

A map of coauthored work (A) has fewer relationships than a map of reported interactions contributing to research (B). Many interactions produce no coauthorship

Red "Engelstein" node in B links life scientists (left) to humanists (right) via The Life Sciences and Society Program

Several distinct interest clusters can be seen

KEY: People interviewed are BLUE; not interviewed PURPLE. Numbered nodes are publications. (A) based on coauthored publication data; (B) on interactions from interviews.



### Future Directions

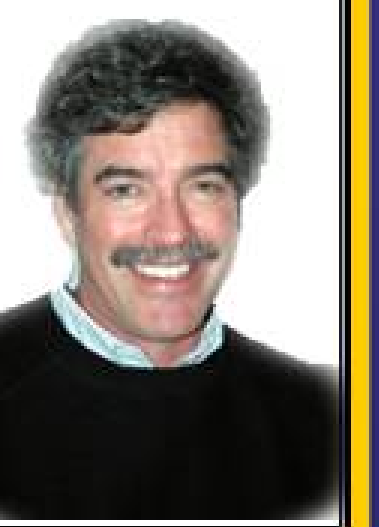
- ❖ A huge data entry job
- ❖ Refining the network software
- ❖ Interpretation, especially in relation to productivity

Two distinguished network analysts will visit to help:

**Noshir Contractor**  
Northwestern Univ



**Stanley Wasserman**  
Indiana University



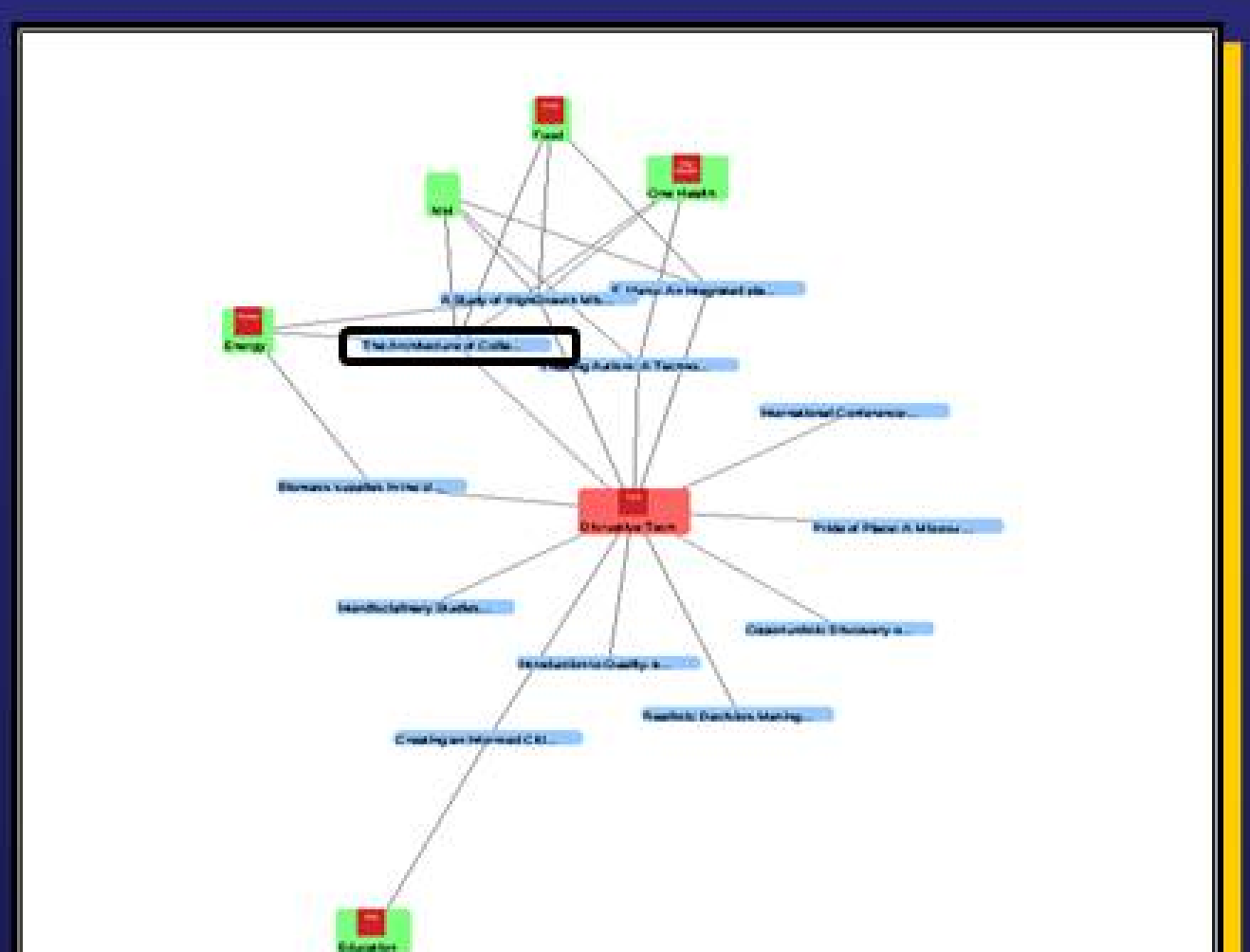
**THEN an NSF proposal**

### Barriers

- ❖ Disciplines differ in language about collaboration, requiring a lot of interpretation
- ❖ There is no central repository of data that could be mined to replace information from interviews
- ❖ Interviews are very time/person intensive and, hence, expensive

### Architecture of Collaboration Team

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