



Using Sagebrush Conservation Networks to Enhance Sagebrush Communication

SageWest Workshop
March 3, 2021

Presenter: R. Patrick Bixler^{1*}

Project Contributors: Samer Atshan^{1#}, Samuel Bennet^{1#}, Tyler Creech^{2#},
Maureen Essen^{4#}, Shawn Johnson^{3#}, and Jennifer Thomsen^{3#}

1. LBJ School of Public Affairs, University of Texas at Austin
2. Center for Large Landscape Conservation
3. University of Montana
4. U.S. Forest Service

*Corresponding contact: rpbixler@utexas.edu

#Alphabetical order

Who am I?

Sociologist by training

- University of Montana
- Colorado State University

Now based at the LBJ
School of Public Affairs

Research Environmental
Governance

- Networks
- Communication patterns

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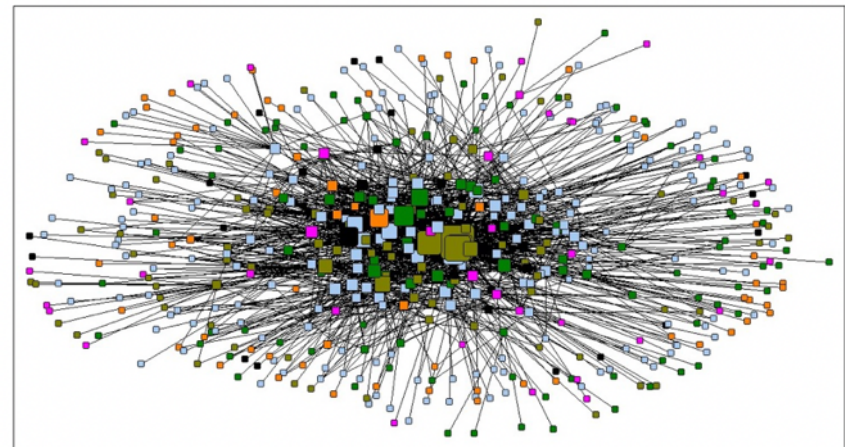
Research Environmental Governance

- Networks
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WAFWA-funded social science

Why am I here?

**Toward a Network Governance Strategy of the Sagebrush Landscape:
An empirical assessment of stakeholders and networks to inform multi-scale
governance and implementation of the Sagebrush Conservation Strategy**



December 2019

R. Patrick Bixler^{1*}, Samer Atshan¹, Samuel Bennet¹, Regina M. Buono¹, Maureen Essen², Shawn Johnson³, Alex Ocanas³, Jennifer Thomsen³

1. LBJ School of Public Affairs, University of Texas at Austin

2. USDA Forest Service Rocky Mountain Research Station

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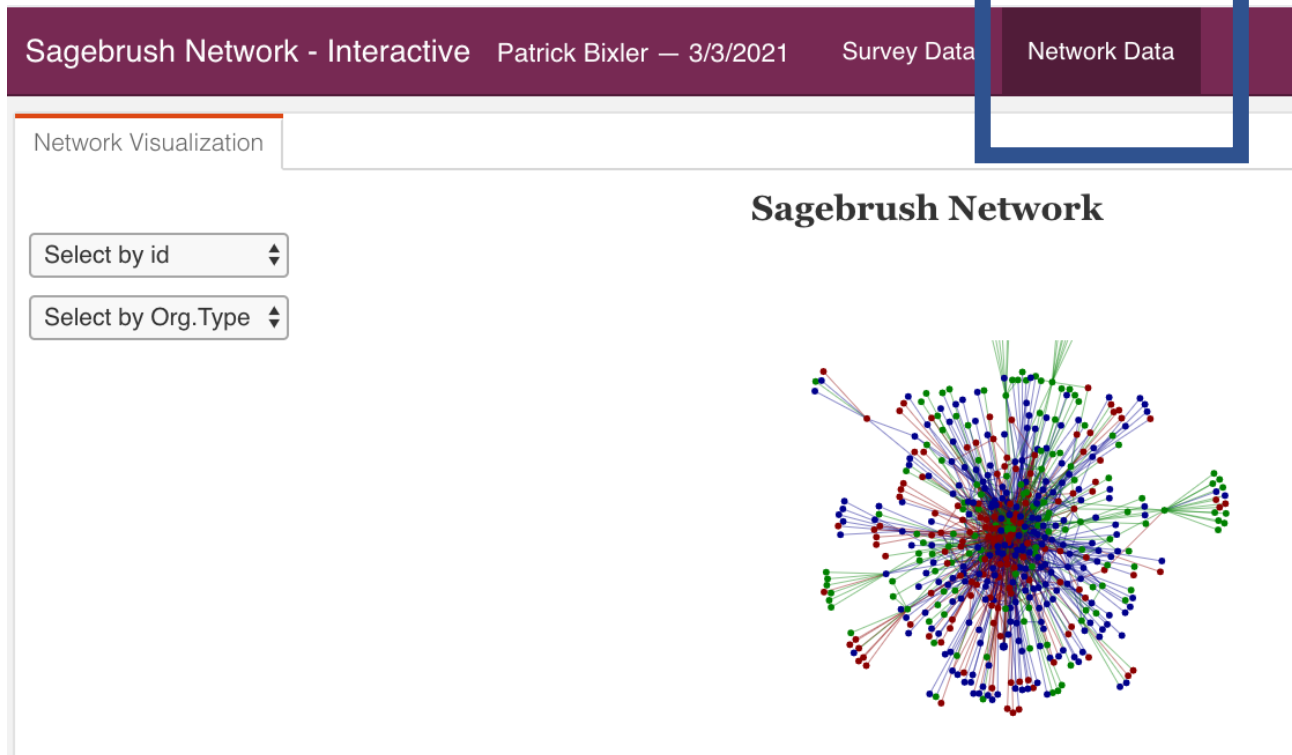
**Authors after corresponding in alphabetical order

Resources to Share – Links in Chat

For “Sagebrush Interactive”:

1. Download and save file on local drive
2. Open in browser (double click)
3. Click on “Network data” file

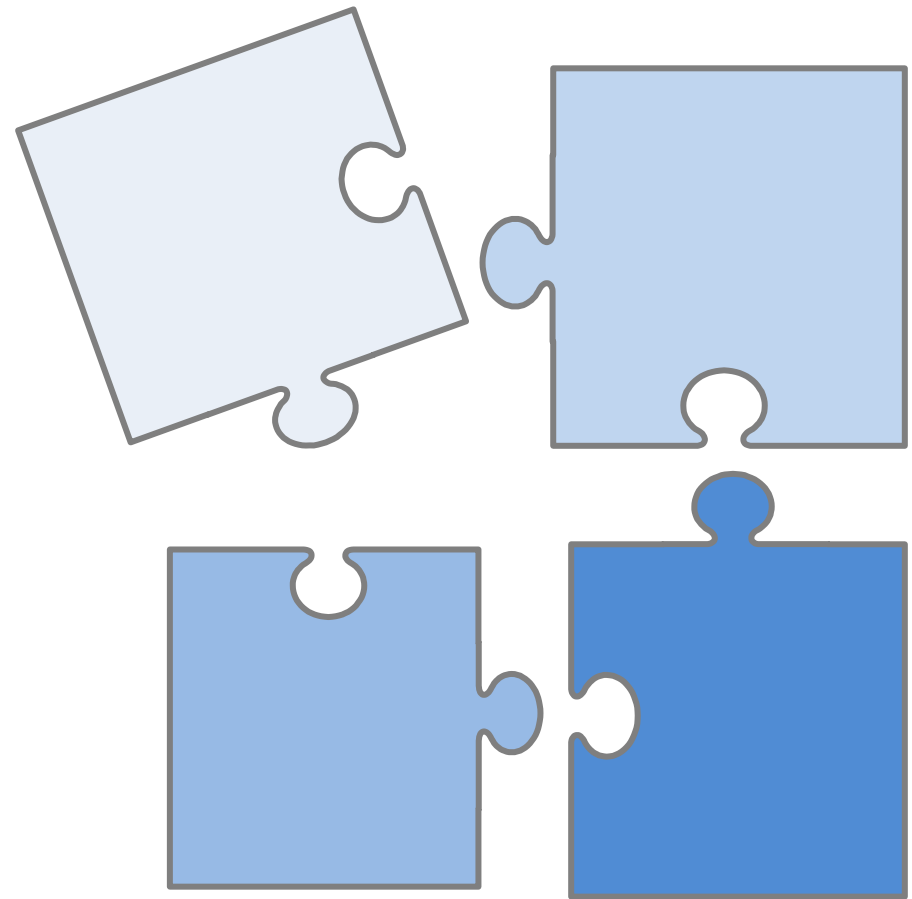
Click on this tab!



The screenshot displays the Sagebrush Network Interactive web application. At the top, a dark purple navigation bar contains the text "Sagebrush Network - Interactive Patrick Bixler — 3/3/2021 Survey Data Network Data". The "Network Data" tab is highlighted with a blue box, and a blue arrow points to it from the text "Click on this tab!". Below the navigation bar, the main content area is titled "Sagebrush Network" and features a "Network Visualization" section. This section includes two dropdown menus: "Select by id" and "Select by Org.Type". The central part of the interface shows a complex network graph with numerous nodes (colored in red, blue, and green) and edges, representing the network structure.

Presentation Outline

1. Communication and social networks
2. Survey and sample
3. Insights from our study results
4. Thoughts moving forward



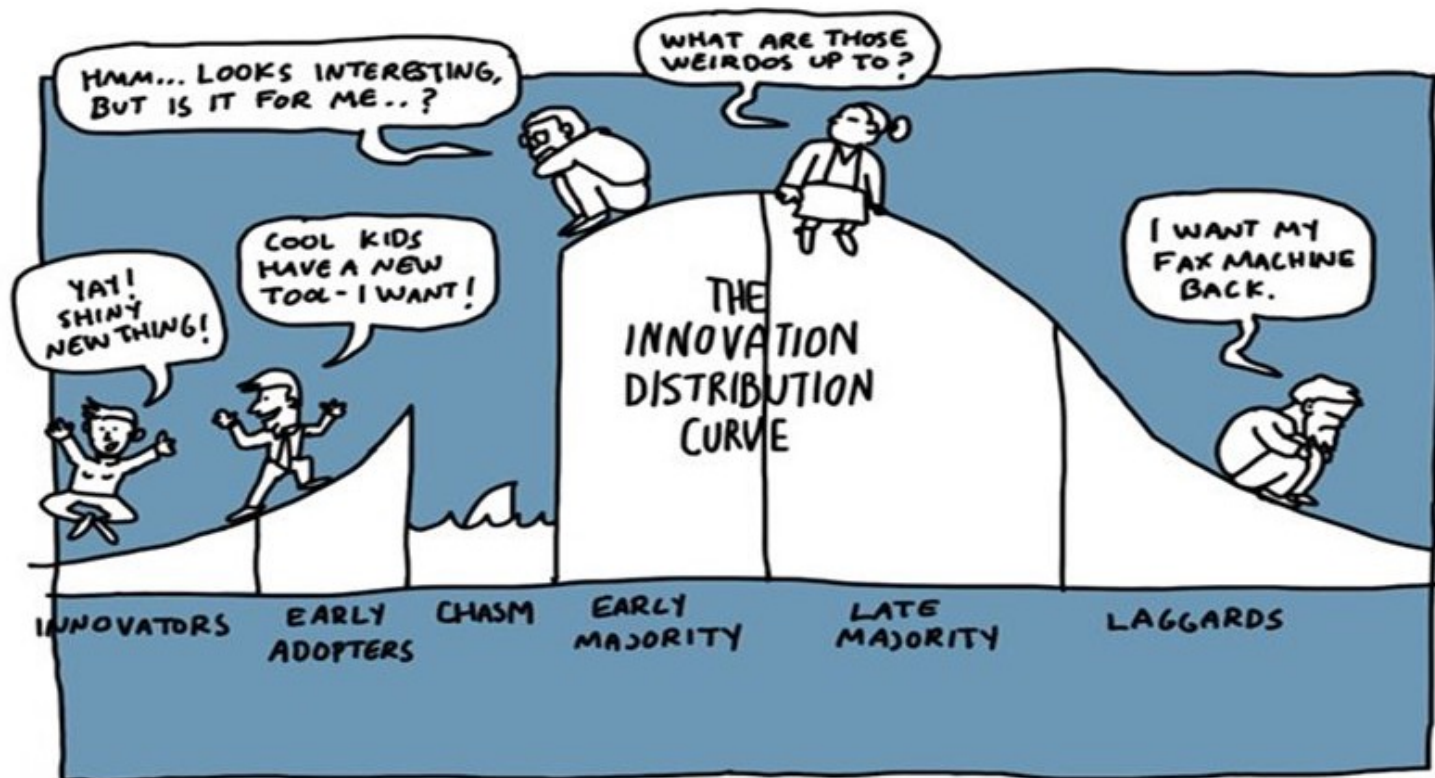
How do ideas and influence propagate?

How do ideas and influence propagate?

How can we be strategic about ideas and influence propagating?

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Hidden, implicit, and informal networks

- Many social or information networks are implicit or hard to observe:
 - Informal connections and partnerships across large spatial areas
 - Implicit connections

Hidden, implicit, and informal networks

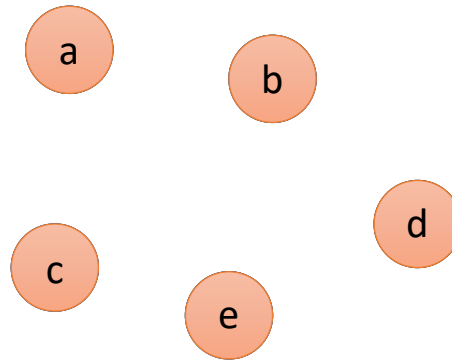
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- But we can observe results of the processes taking place on such (informal) networks:
 - Communication networks:
 - We observe when language or discourse around a topic changes
 - Collaboration networks:
 - We observe when policies, practices, or landscapes change

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 - Communication networks:
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 - Collaboration networks:
 - We observe when policies, practices, or landscapes change
- Question: Can we infer the hidden networks?

Inferring the Network

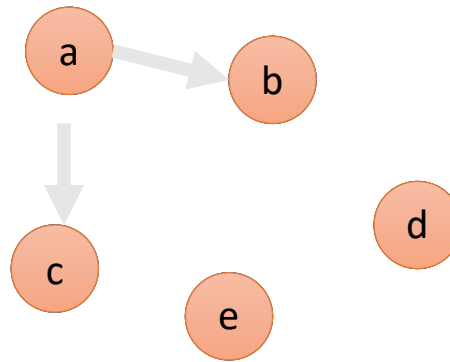
- There is a directed social network over which diffusions of information and practices take place:



(Even if we are not aware of the connections in the network)

Inferring the Network

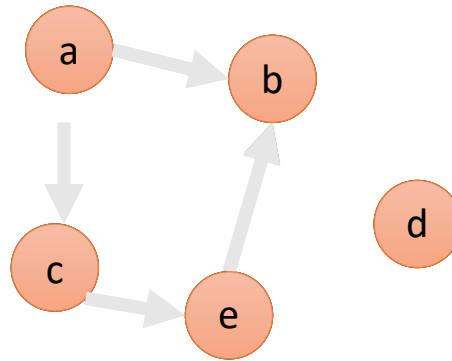
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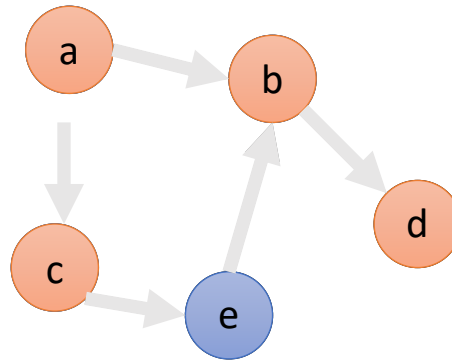
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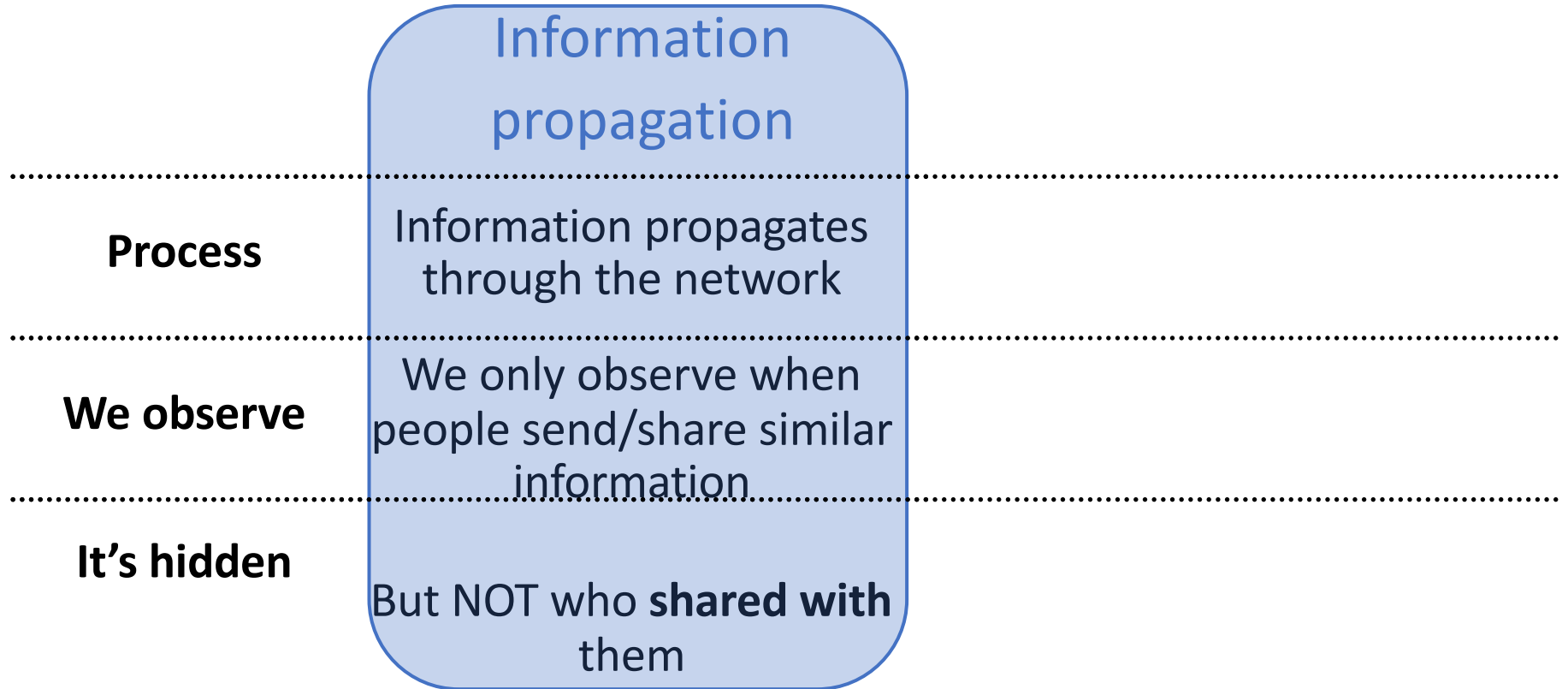
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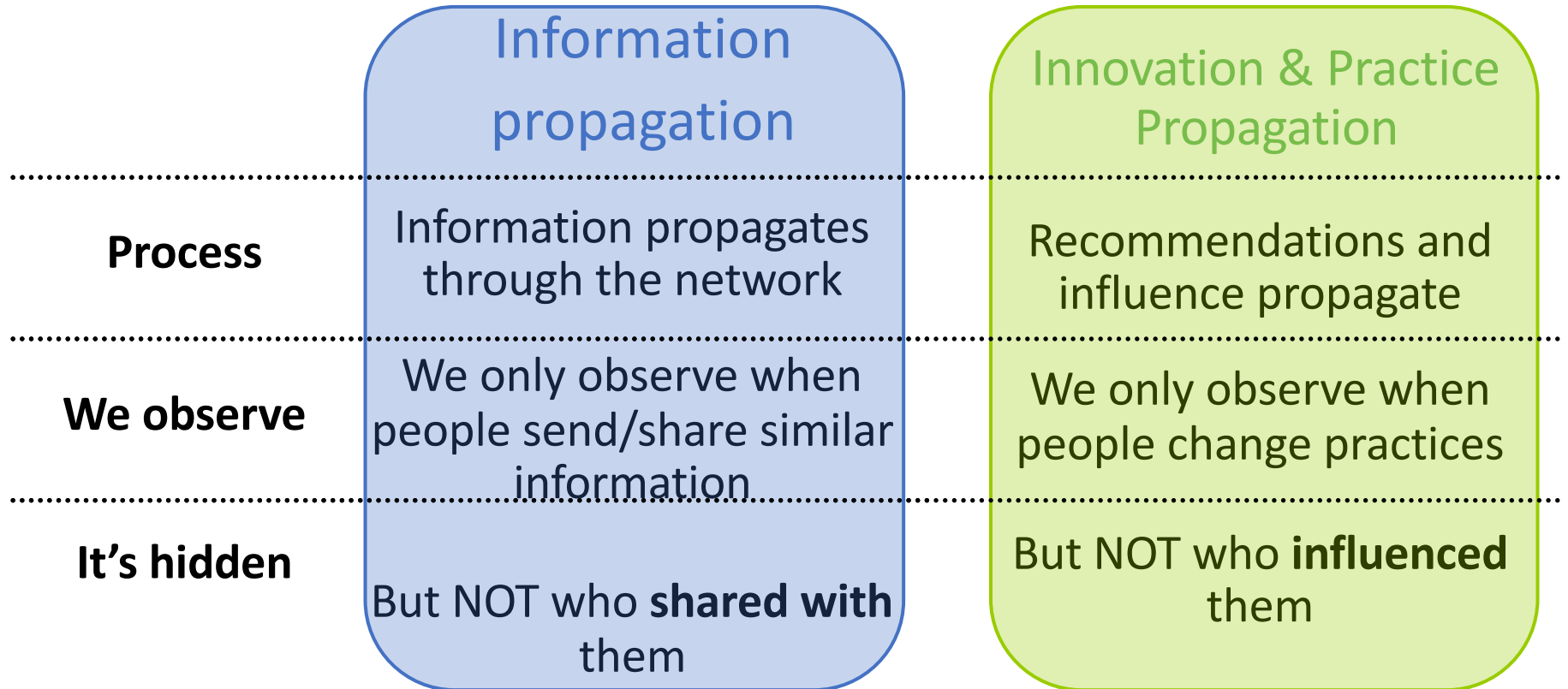


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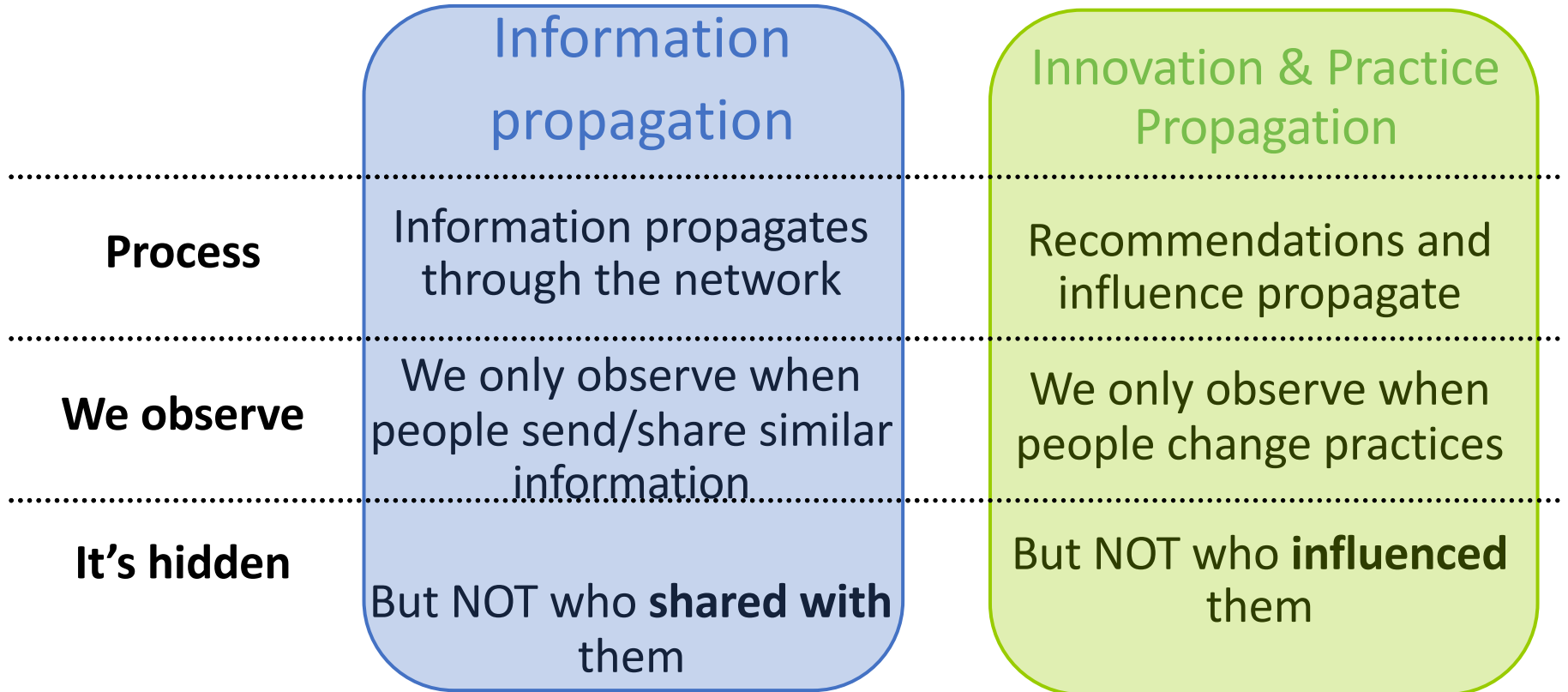
Examples and Applications



Examples and Applications



Examples and Applications



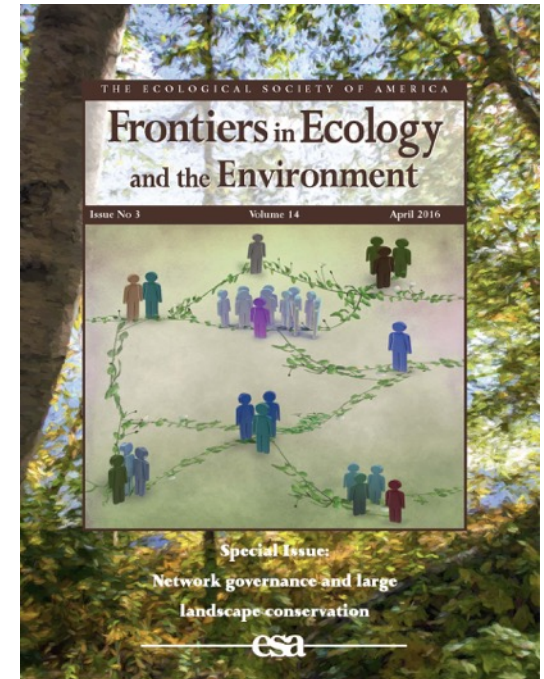
Can we infer the underlying network?

Background:

Landscapes as a context for communication and collaboration³

We **conceptualize** an approach to natural resource management and conservation where:

1. People are working together across large geographies,
2. regardless of political and administrative boundaries,
3. to conserve natural and cultural heritage and
4. ensure a sustainable future for both people and nature.



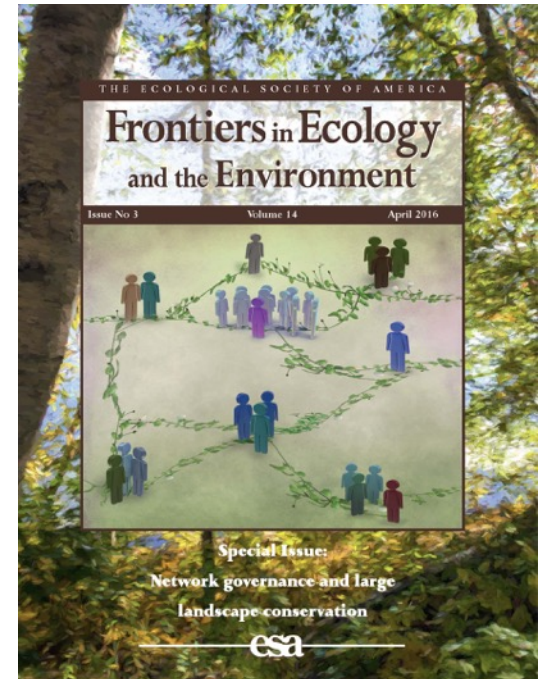
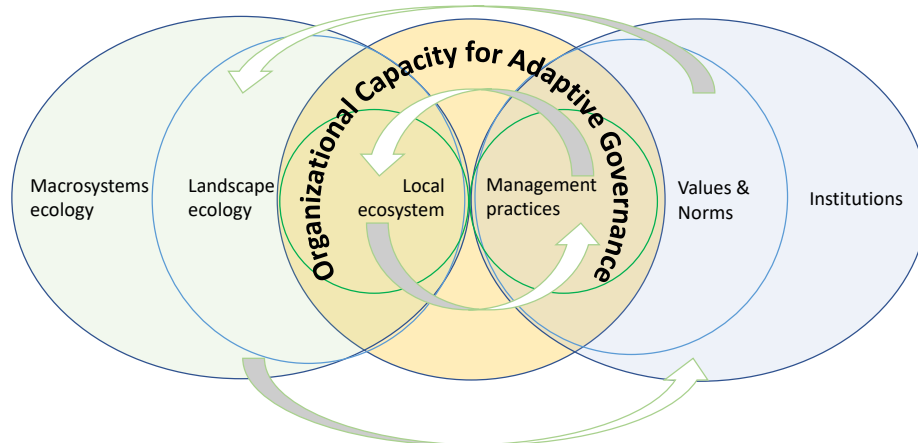
³R. Patrick Bixler, Matthew McKinney, Lynn Scarlett. 2016. "Forging New Models of Natural Resource Governance." *Frontiers in Ecology and Environment*, 14(3): 115.

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Research Approach

- Sample
 - Snowball approach (three rounds, saturated list)
 - Unknown population of organizations (local, state, federal agencies & Non-governmental organizations, private sector (large-landowner ranch, cattle, and energy firms))
 - Generated a Master List of 698 unique individuals (shared with other social science project)
- Survey
 - Online (using Qualtrics)
 - Response rate = 28%
 - (42% partial response)
 - Data collected
 - Understanding and perception of social and ecological Sagebrush threats and issues
 - Learning organization scale
 - Network data

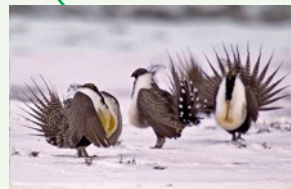
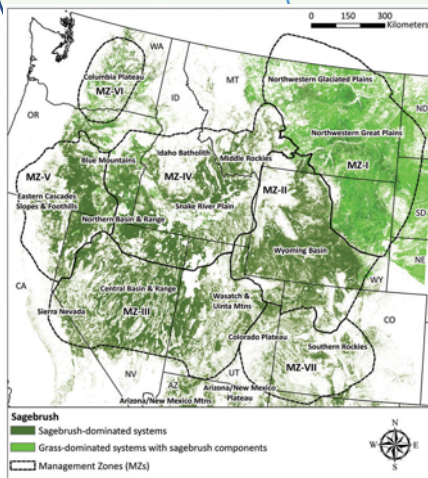
The Sagebrush Social-Ecological System



Macrosystems ecology

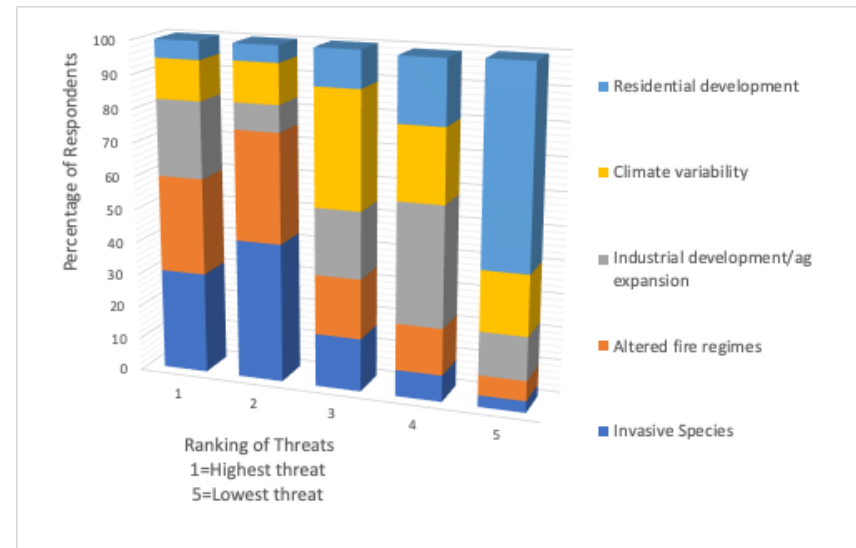
Landscape ecology

Local ecosystem



Key threats

- Altered fire regimes
- Climate variability
- Industrial development and/or agricultural expansion
- Invasive species (flora and fauna)
- Residential development



The Sagebrush Social-Ecological System

Key Challenges

- Lack of funding
- Legal/regulatory
- Lack of range-wide goals
- Maintaining livelihoods
- Inter-generational change

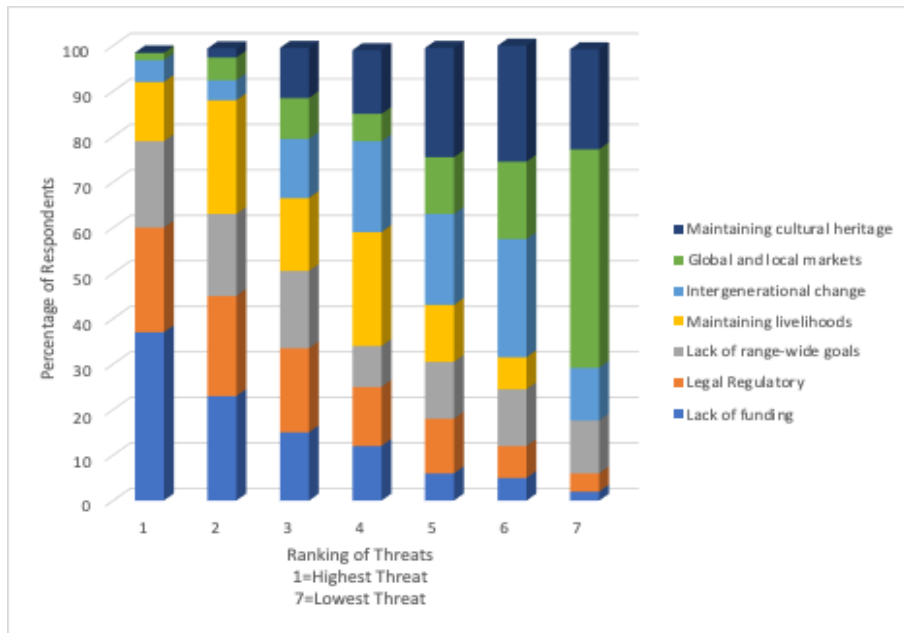


Management practices

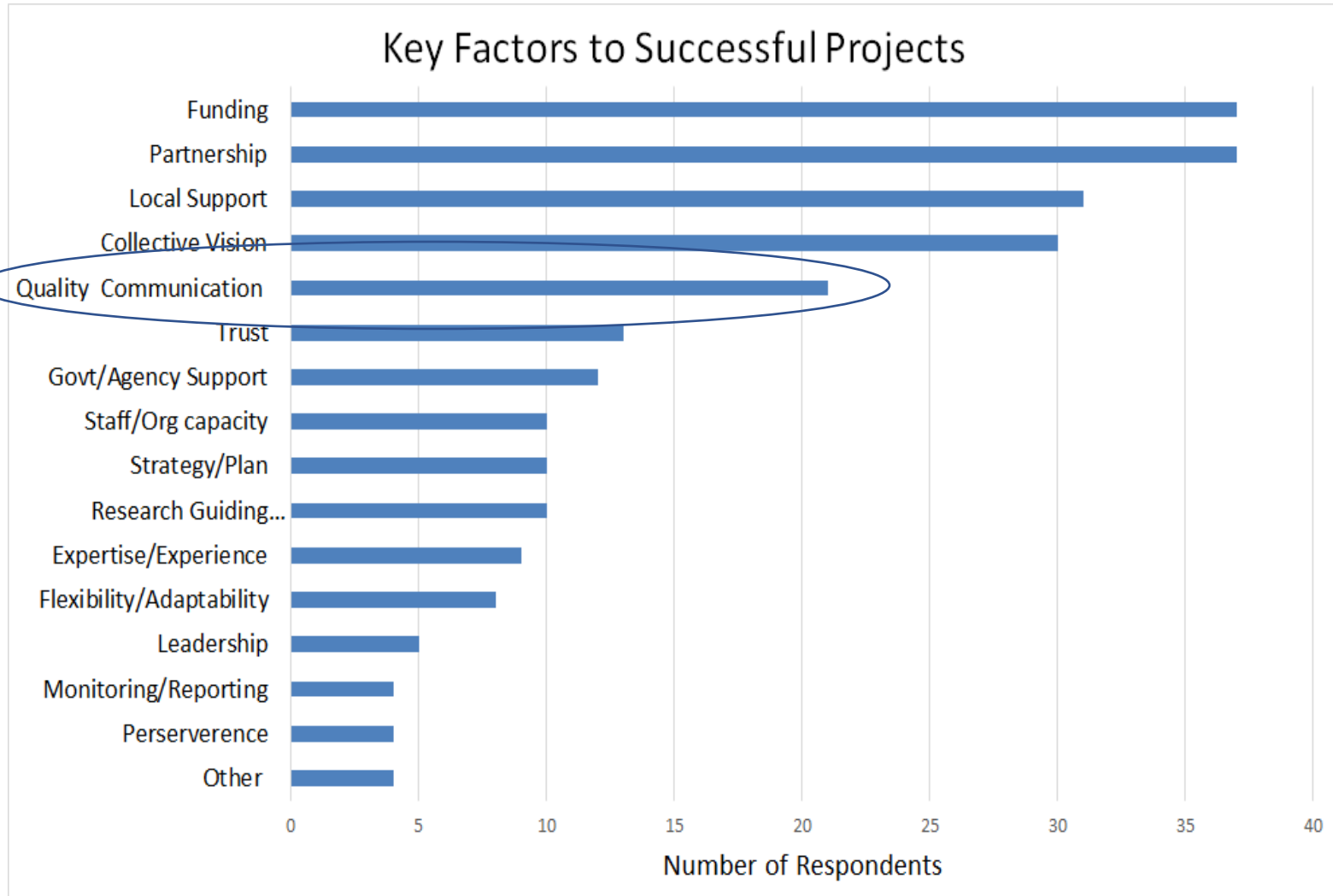


Knowledge, norms, & values

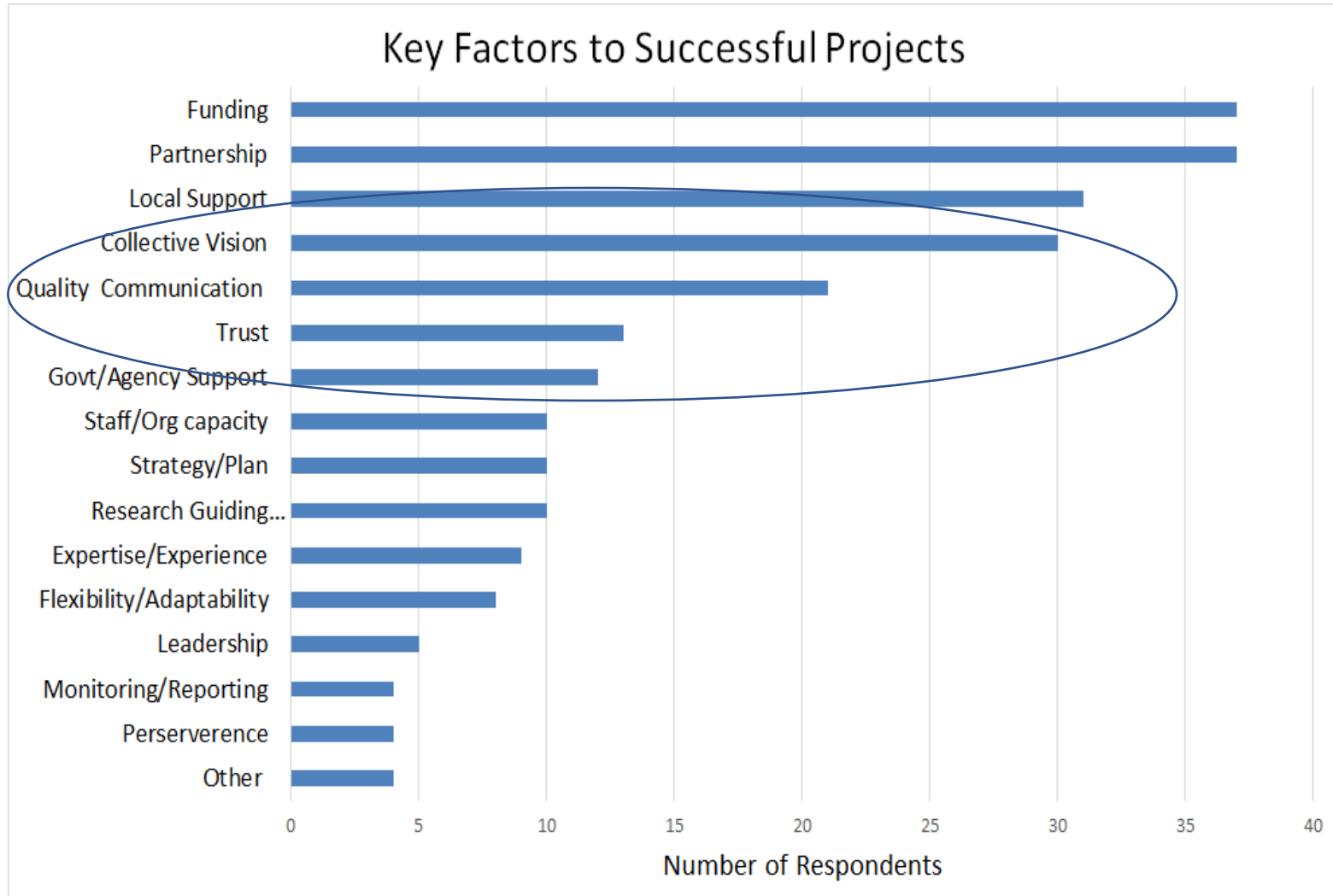
Institutions



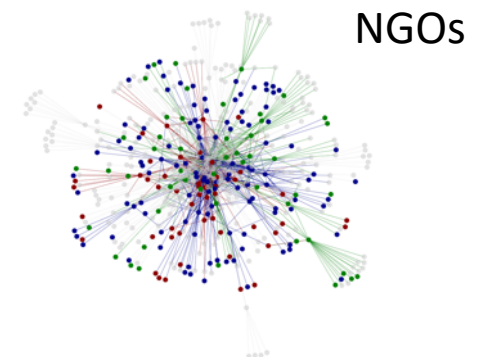
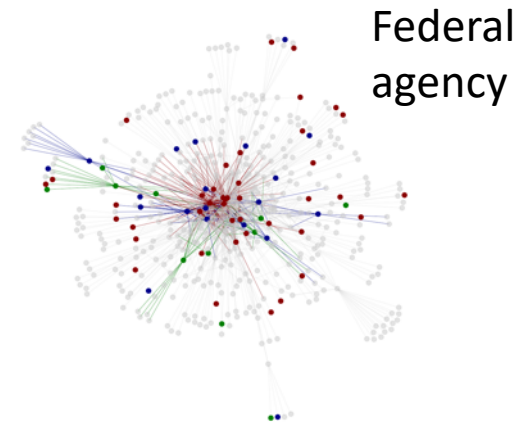
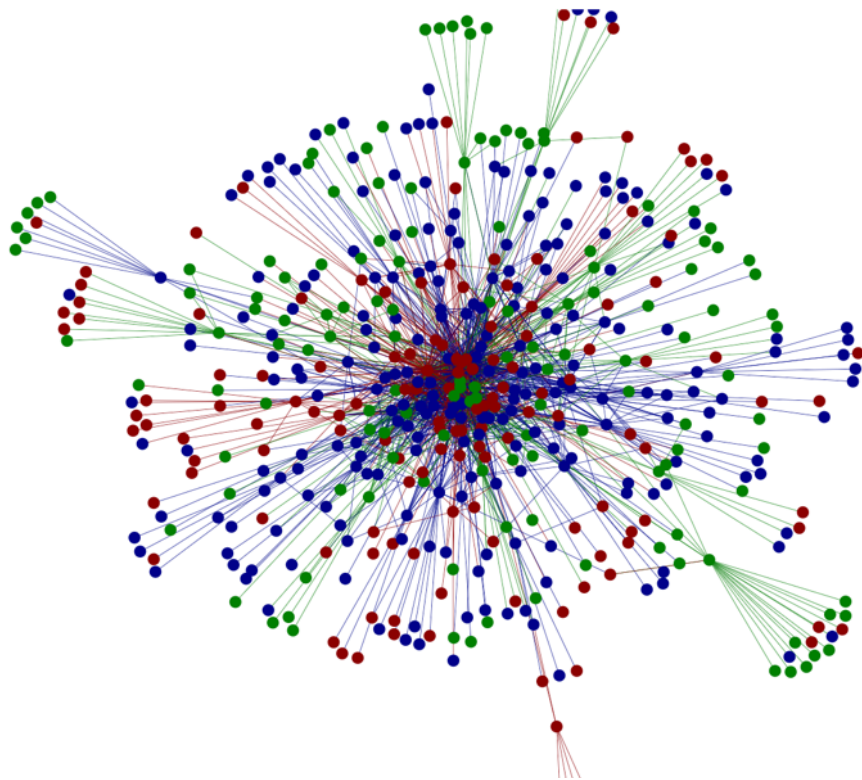
Relevant Survey Results



Relevant Survey Results

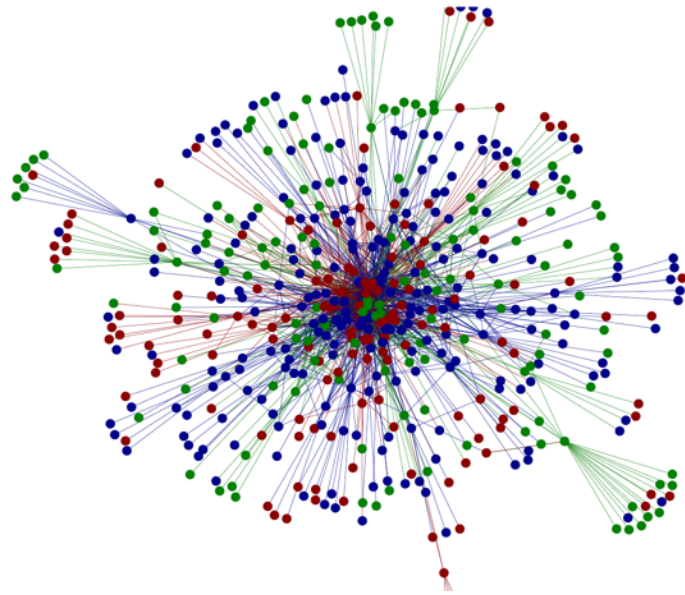


The “Implicit Network”



Network Statistic	Value
Total Node	509.000
Total Ties	2014.000
Average Ties per Org	3.957
Mutual Nodes (Pairs of vertices with two directed edges)	122.000

Know the Organizational Audience: Types, Scales, Geography



Organization Type (%)

Academia 7.47

Federal Agency 14.34

Local Agency 11.59

NGO 41.65

Private Sector 4.91

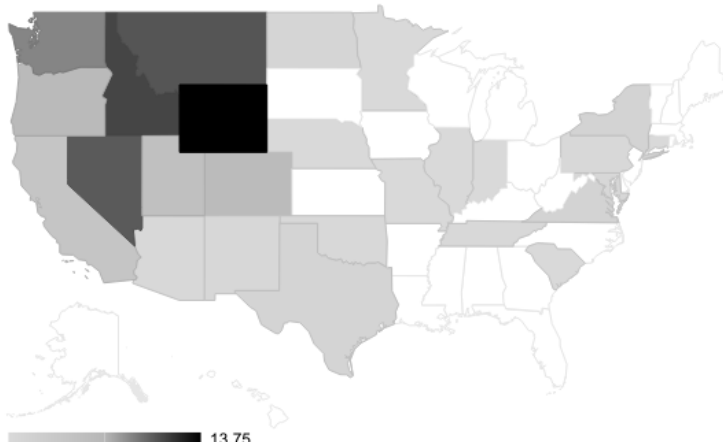
State Agency 20.04

Scale (%)

Local 27.31

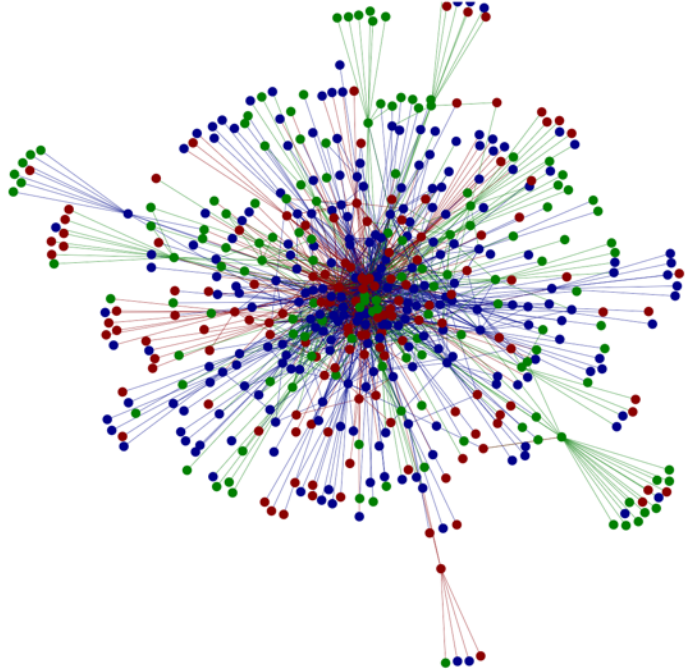
National 27.31

Regional 45.38



0.2 13.75

Know how they connect: types, effectiveness and frequency



Partnership (%)

None	11.67
Ad Hoc	5.91
Emerging effort	1.59
Formal	17.28
Network	17.48
Other	1.49
Partnership	44.5

Effectiveness of tie	%
No information	12
Never effective	0
Rarely effective	3
Occasionally effective	17
Moderately effective	33
Greatly effective	35

Frequency	%
None	12
At least once a year	15
More than once a quarter	22
At least once a month	14
More than once a month	21
At least once a week	17

Communication, education, outreach network

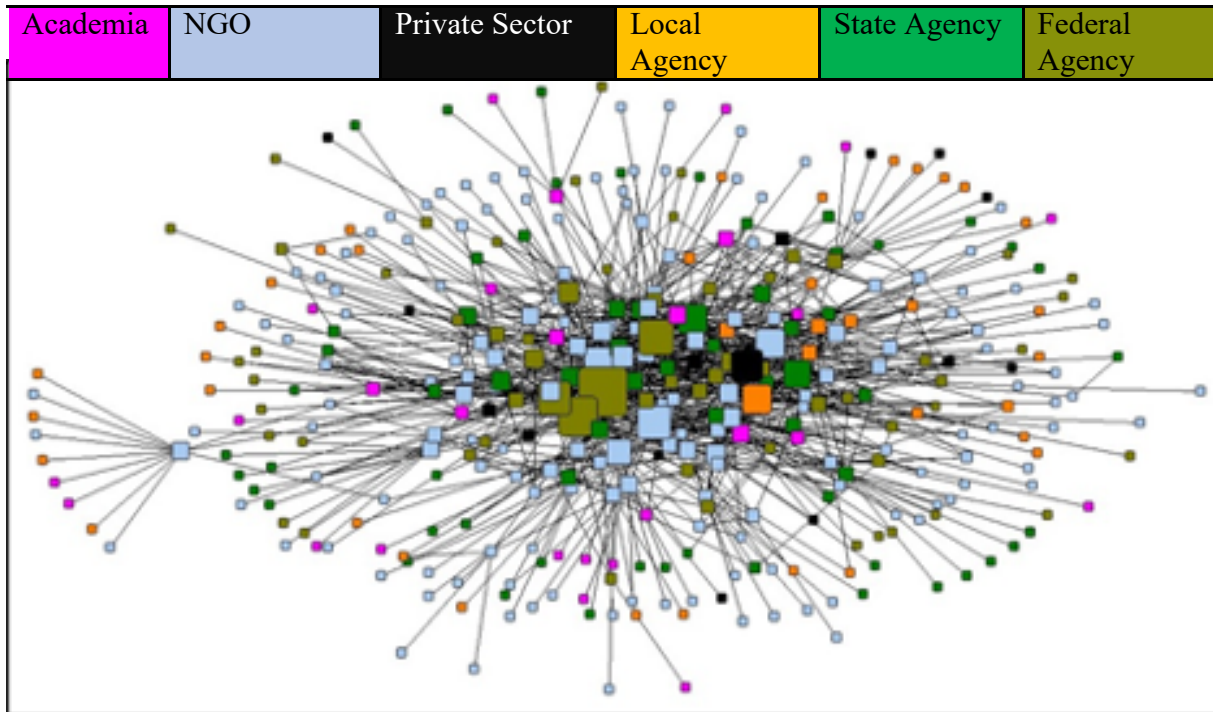
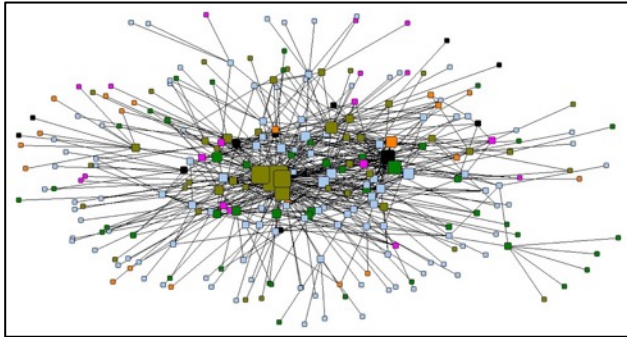


Figure 3 in Appendix

Table 9

		Communication, Education
Whole Network Measure	Size	376
	Density	0.007
	Modularity	0.4880
	Transitivity	0.151
Composition (%)	Academia	7.2
	NGO	44.1
	Private Sec	4.0
	Local Agcy	10.4
	State Agcy	17.6
	Fed Agcy	16.8
Scale (%)	Local	26.9
	Regional	45.7
	National	26.1
	Unspecified	1.3
Frequency (%)	At least 1/ yr	15.1
	> 1 / quarter	25.0
	At least 1/mo	16.2
	> 1 / mo	22.6
	At least 1/wk	21.2
Type of Partnership (%)	Formal	16.8
	Partnership	53.3
	Ad Hoc	5.5
	Network	21.7
	Emerging	2.0
Effectiveness of Tie (%)	Other	0.8
	Never	0.0
	Rarely	2.5
	Occasionally	16.6
	Moderately	38.4
	Greatly	42.5

Not just one network....



Livestock and grazing

Not just one network....

Academia

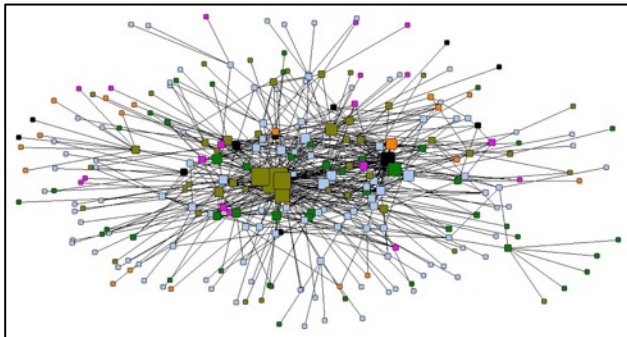
NGO

Private Sector

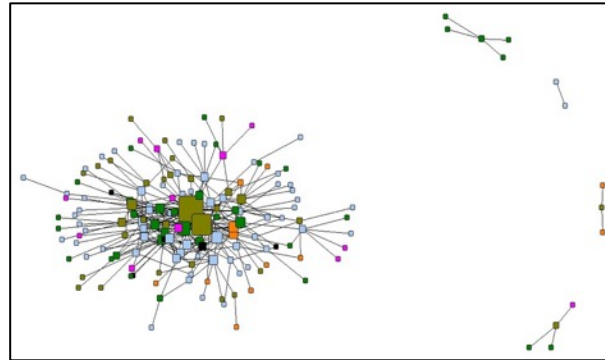
Local
Agency

State Agency

Federal
Agency



Livestock and grazing



Recreation

Not just one network....

Academia

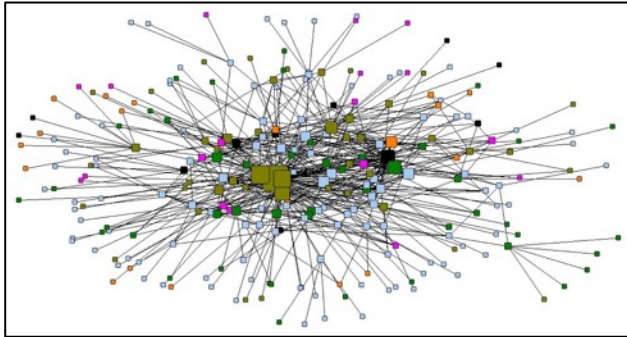
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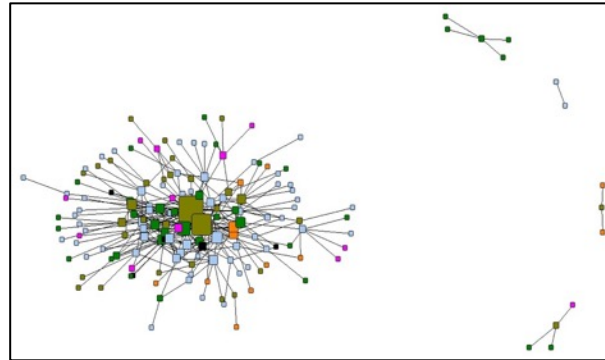
Local
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State Agency

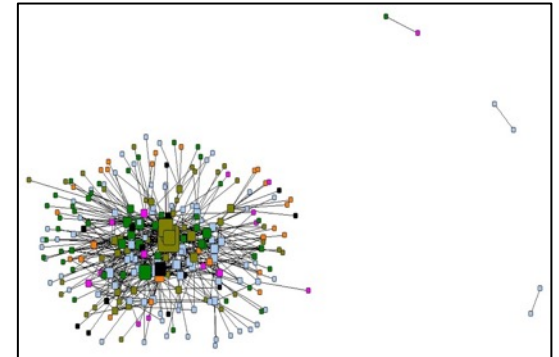
Federal
Agency



Livestock and grazing



Recreation

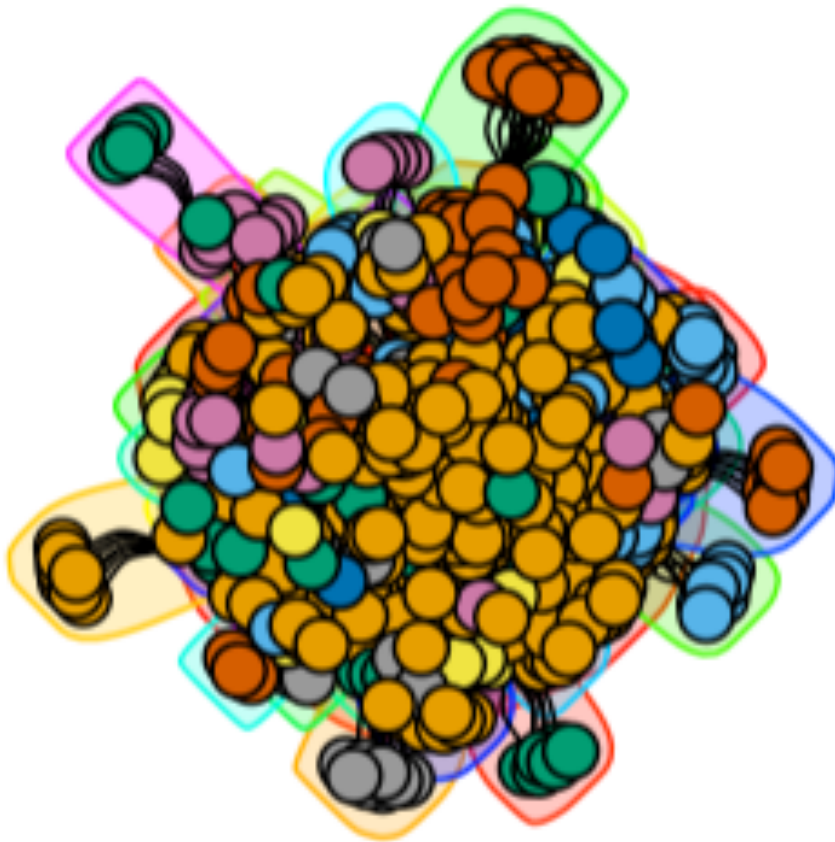


Wildfire and fuels management

Not just one network....

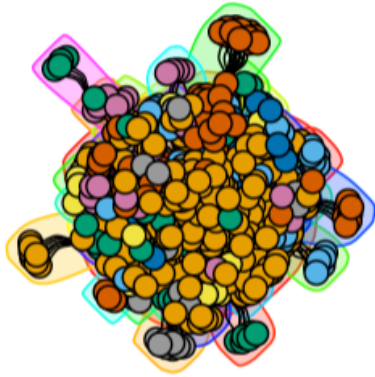
#	Issue Network	Size (# of orgs)	Density
1	Sagebrush Network (All)	509	0.008
2	Capacity Building	268	0.008
3	Climate Change	181	0.009
4	Communication, Outreach, Education	376	0.007
5	Conifer Expansion	185	0.011
6	Cropland Conversion	122	0.011
7	Energy Development	175	0.013
8	Financial Support	173	0.012
9	Habitat Degradation	310	0.01
10	Land Conservation	234	0.011
11	Land Use Planning	234	0.01
12	Livestock management	259	0.010
13	Mining	99	0.018
14	Nonnative invasive species	302	0.010
15	Recreation	167	0.011
16	Roads, Infrastructure	167	0.011
17	Urban development	89	0.015
18	Wild horse, burro mgmt.	88	0.019
19	Wildfire, fuels management	251	0.011

Breakthrough to subgroups



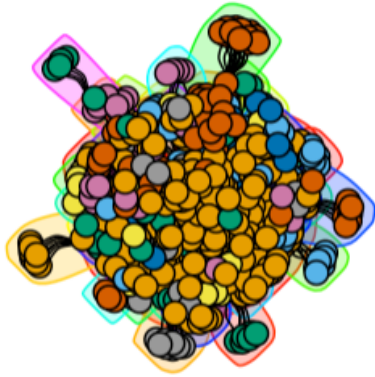
53 Network “communities”
throughout the 509 organizations

Breakthrough to subgroups



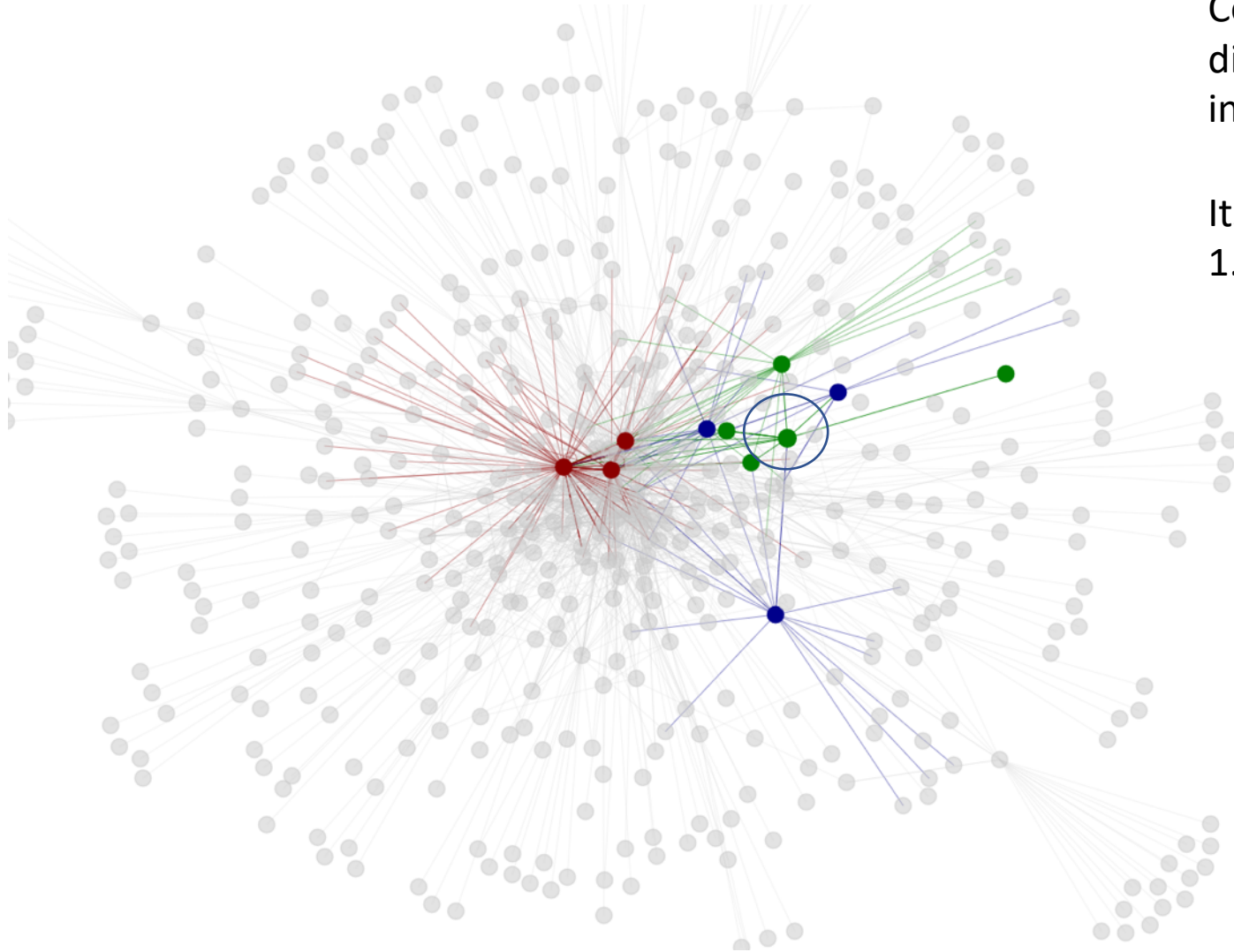
Issue Network	Number of Communities (Newman-Girvan Method)
<i>Biophysical Threats</i>	
Invasive Species	60
Wildfire	24
Climate	22
<i>Social, Political, Regulatory</i>	
Capacity Building	27
Communication	33
Financial	24
Sagebrush Network	53

Breakthrough to subgroups



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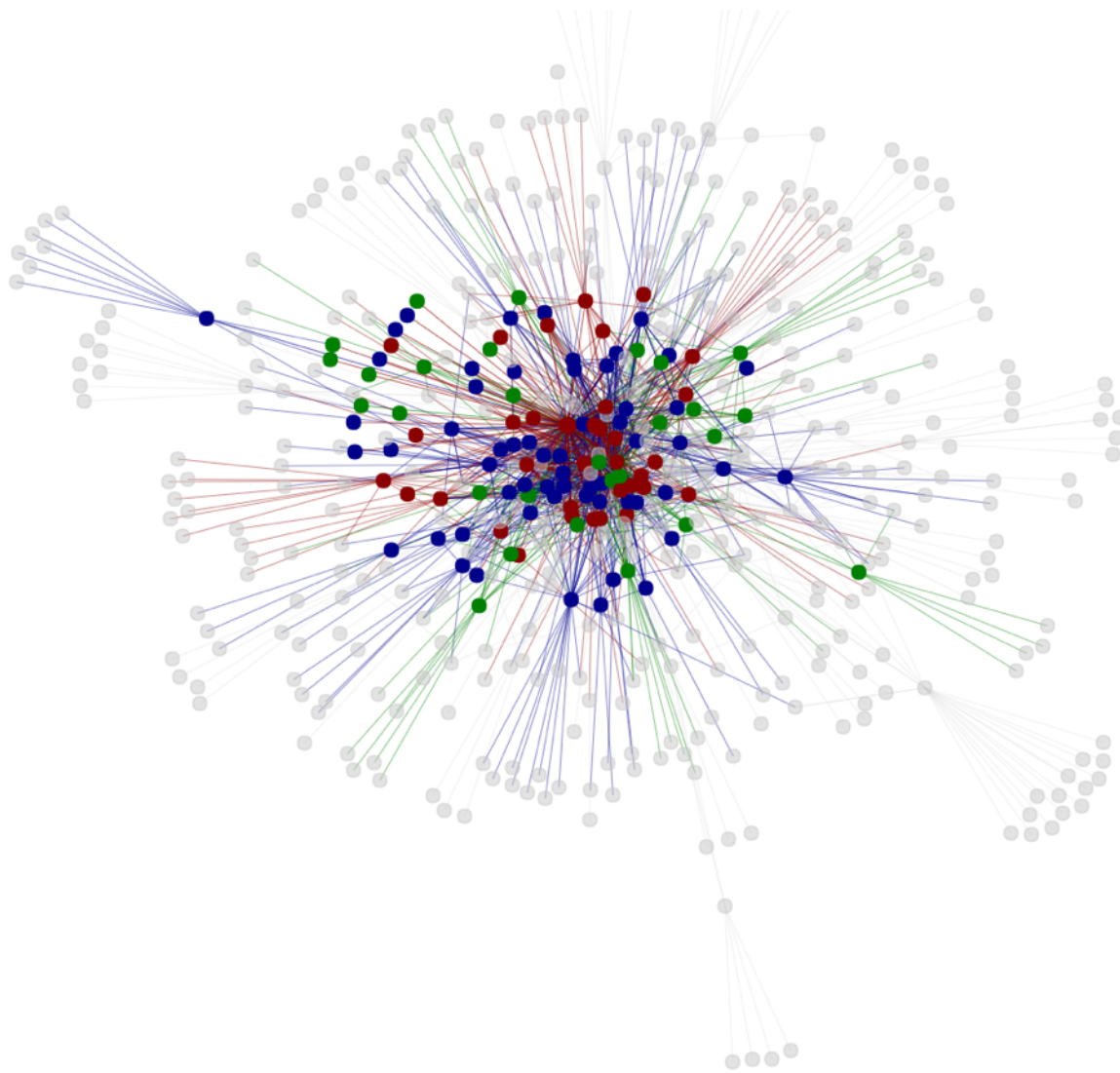
Diffusion through the network



Communicator:
disseminator of
information

Its message reaches
1.9% of the network

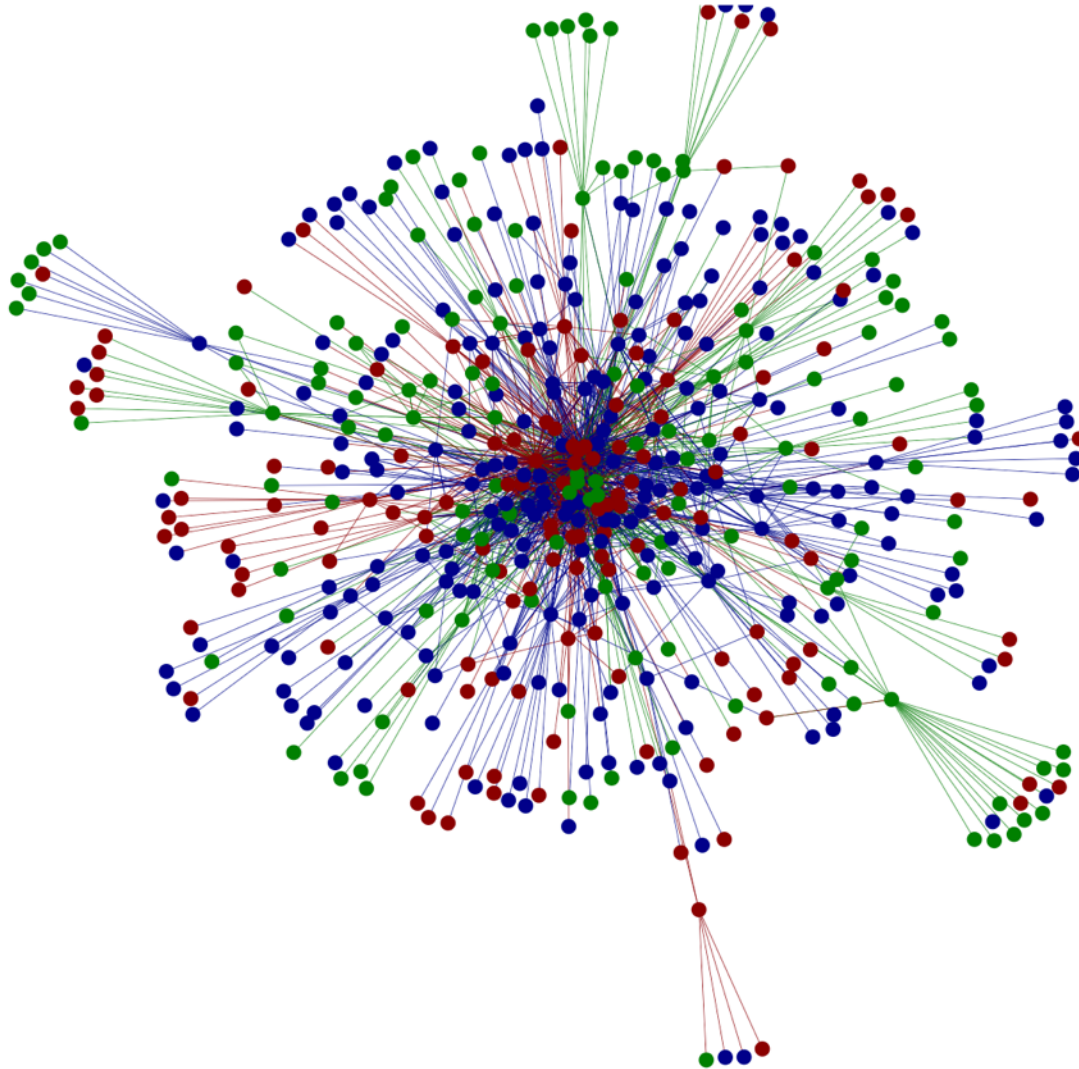
Diffusion through the network



Communicator:
disseminator of
information

2nd step: message
reaches 55% of the
network

Diffusion through the network



Communicator:
disseminator of
information

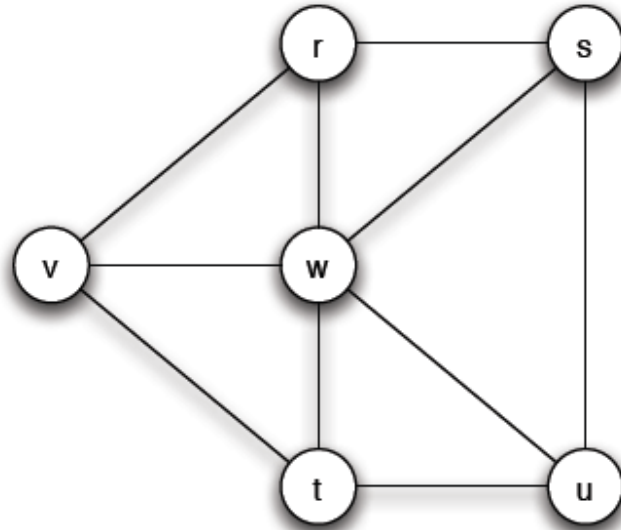
3rd step: message
reaches 100% of the
network

Some take-aways

- The influence of a node in a complex network largely depends on its structural position in the network.
- Identifying the right stakeholders that are optimally positioned to diffuse conservation information, knowledge, and practices can therefore be fundamental to successful conservation efforts in social-ecological systems.

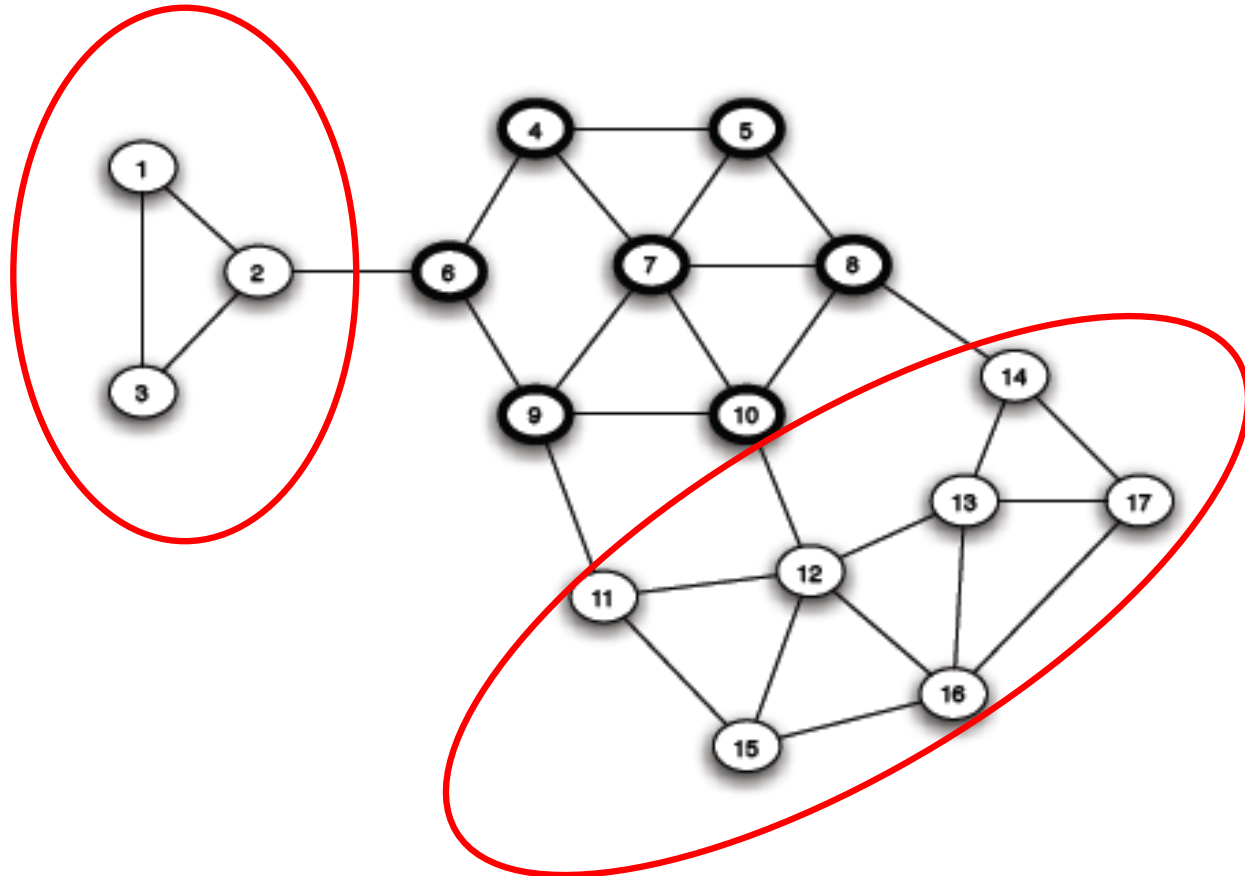
Some take-aways

- Selecting 'key players' better positioned to rapidly diffuse of conservation information



Some take-aways

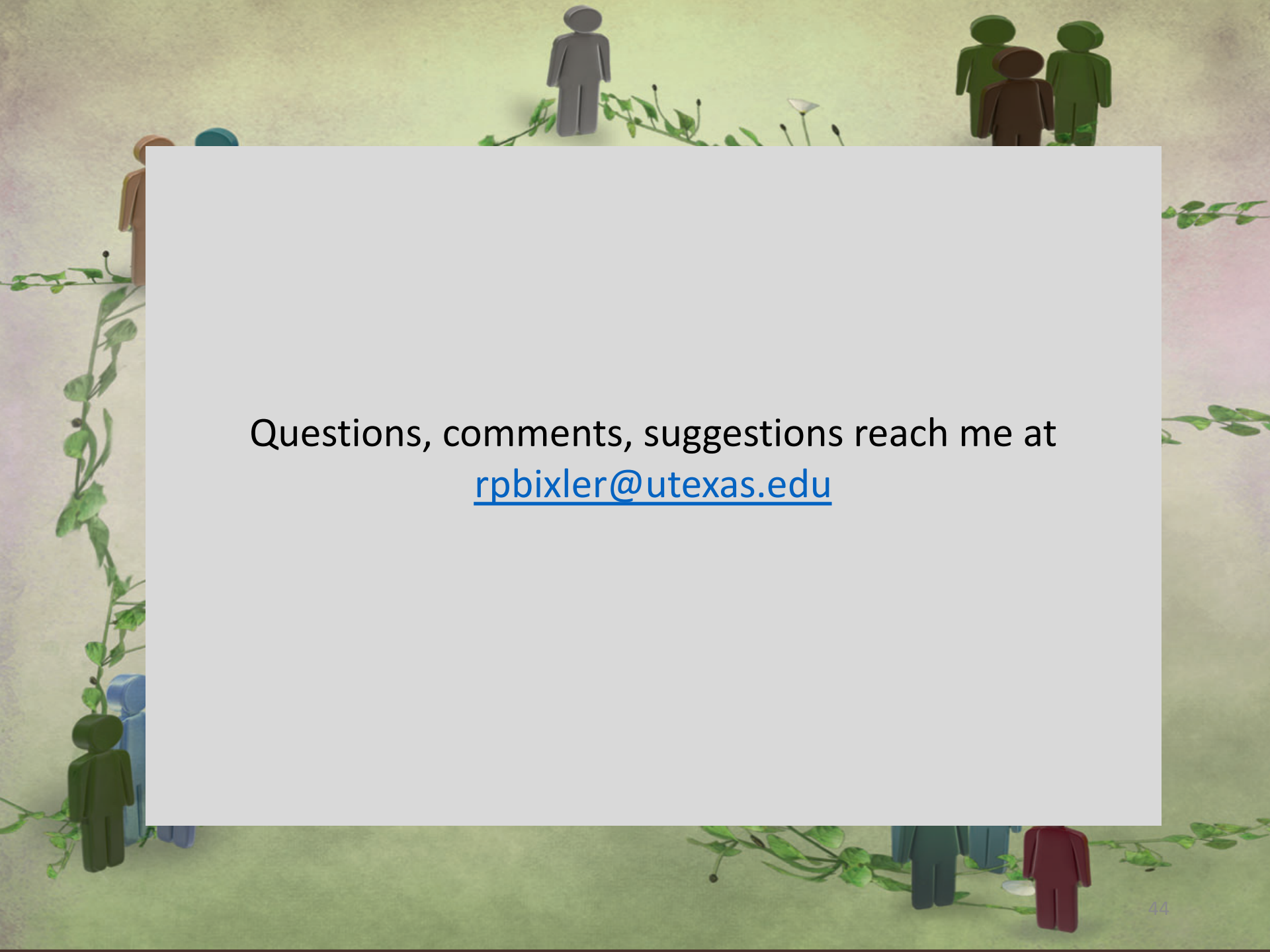
- Selecting 'key players' to diffuse between disconnected groups



Conclusions

- 75% of organizations are connected through communication/outreach. People are doing it!
- SNA can be used to identify key individuals to act as critical injection points in the diffusion of different messages to achieve different goals.
 - These may differ by issue
- Different “network communities” may require different messages or different mediums

Questions, comments, suggestions reach me at
rpbixler@utexas.edu

The background features a textured, light green and yellowish surface. Scattered across the scene are several stylized human figures in various colors (grey, green, brown, blue, red) and green vines with leaves and small flowers. A large white rectangular box is centered on the page, containing text.

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