# Tools for Network Interventions

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## Simulation w/ 3 Initial Adopter Conditions

## Steps to Opinion Leader Interventions
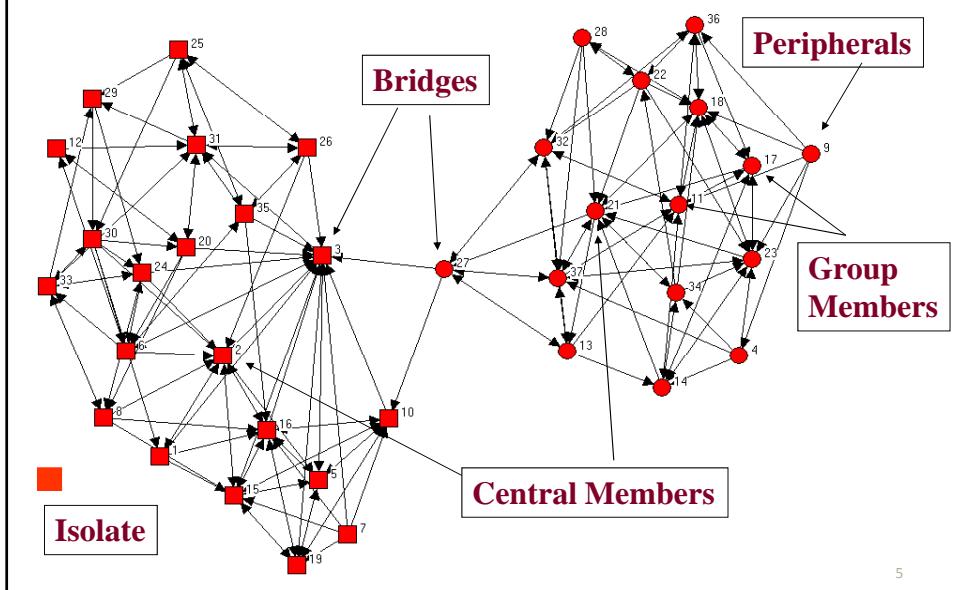
1) Collect/obtain network data
2) Identify opinion leaders
3) Recruit them as champions
4) Convert them (if need be)
5) Assist them in their behavior change promotions

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## There are Several Issues

1. Other Centrality Measures
2. Stage of Diffusion
3. Bridges
4. Marginals
5. Low Threshold

# Network Positions

- Bridges
- Peripherals
- Group Members
- Central Members
- Isolate

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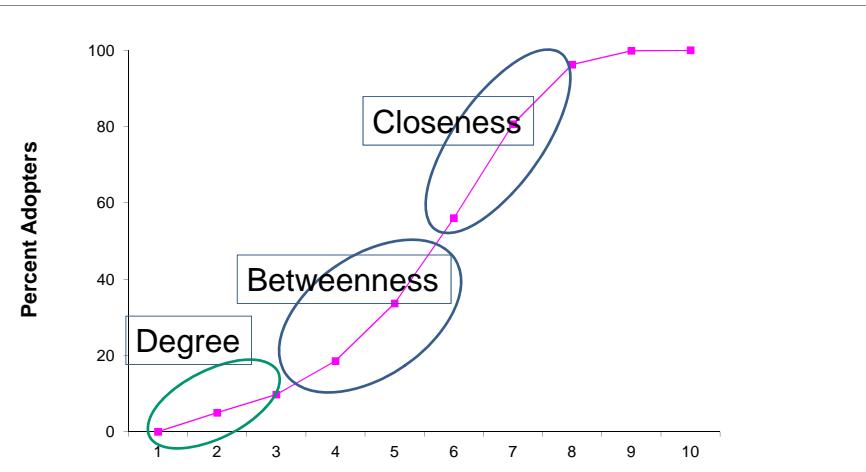
# 1. At least 10 Other Measures of Centrality & Multiple Algorithms
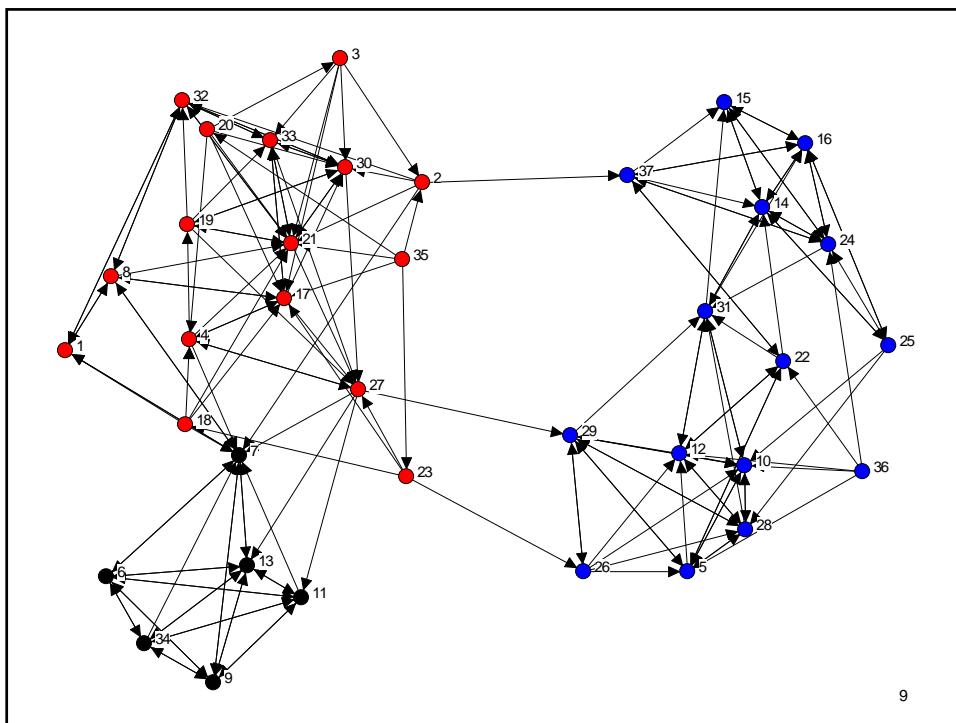
- Degree
- Closeness
- Betweenness
- Eigenvector
- Power
- Information

# 2. Different Leaders for Different Stages



# 3. Identify Bridging Nodes

- Leaders are important within groups
- Bridges may be critical to diffusion between groups
- Bridges may be less "burdened" than leaders.
- Bridges may be more amenable to change.

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# Two Kinds of Bridges

- Mediators/Brokers (Gould & Fernandez):
  - Coordinator
  - Consultant
  - Gatekeeper
  - Representative
  - Liaison
- Sociometric Bridges: Links, on average, are most critical in the network.

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# 4. Identify Isolates or Peripherals

- Individuals on the periphery of the network or isolates receive information late or not at all.
- In some settings, isolates may be at increased mental health risk.

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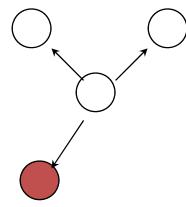
# 5. Identify Low Threshold adopters

- Individuals with low thresholds innovate early.
- They require fewer initial adoptersl
- They are experienced at persuading others.

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Network Thresholds

◯ = *Non-FP User*　⬤ = *FP User*

*PN Exposure=33%*

*PN Threshold=33%*
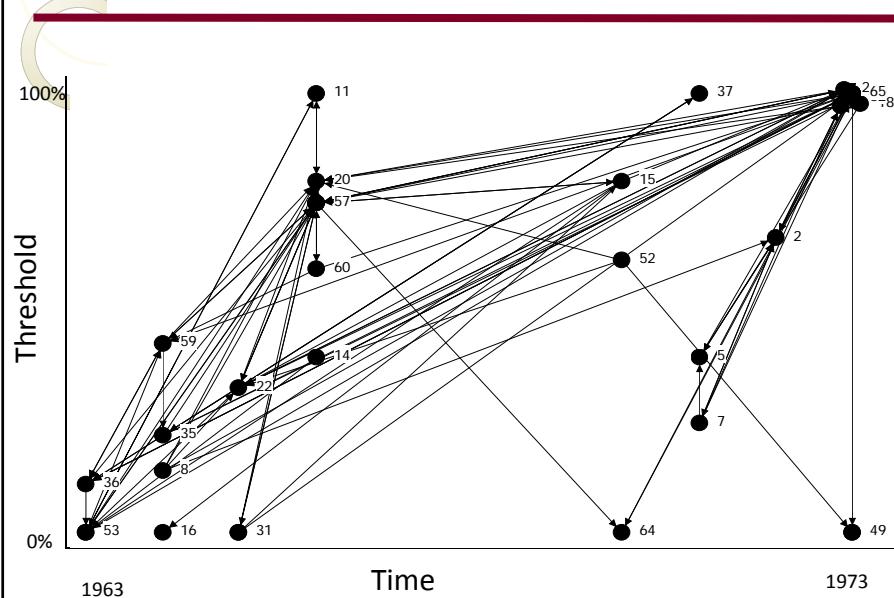
*Low Threshold Adopter*

*PN Threshold=66%*

*High Threshold Adopter*

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Graph of Time of Adoption by Network Threshold for One Korean Family Planning Community

## Sociometric v. Self Reported OL

- Correlated at approximately 0.43 (p<0.01)
- Self reported OLs less susceptible to peer influence
- Sociometric OLs no more or less susceptible

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## Additional Thoughts about Leaders

1. Many ways to define and identify
2. Most frequently used Network Intervention
3. Many studies of leaders and diffusion

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# Implementation Issues

- Do you just turn leaders loose?  How to structure interactions:
  - Schedule 1-1 between leaders & members
  - Have leaders give formal presentations
  - Have leaders call a meeting
  - Allow leaders to decide how to promote change
- Continuum of Passive to Active OL Involvement

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# A Taxonomy of Network Interventions
## Valente, Science, 2012

| Strategy | Tactic | Operationalization |
|---|---|---|
| Identification | Leaders<br>Bridges<br>Key Players<br>Peripherals<br>Low Thresholds | Degree, Closeness, etc.<br>Mediators,  Bridges<br>Positive, Negative<br><br>Proportions, Counts |
| Segmentation | Groups<br>Positions | Components, Cliques<br>Structural Equivalence,  Hierarchies |
| Induction | WOM<br>Snowball<br>Matching | Random Excitation<br>RDS, Outreach<br>Leaders 1st, Groups 1st |
| Alteration<br>(Manipulation) | Deleting/Adding Nodes<br>Deleting/Adding Links<br>Rewiring | Vitality<br>On Cohesion, Others<br>On Network, On Behavior |

# 2. Segmentation
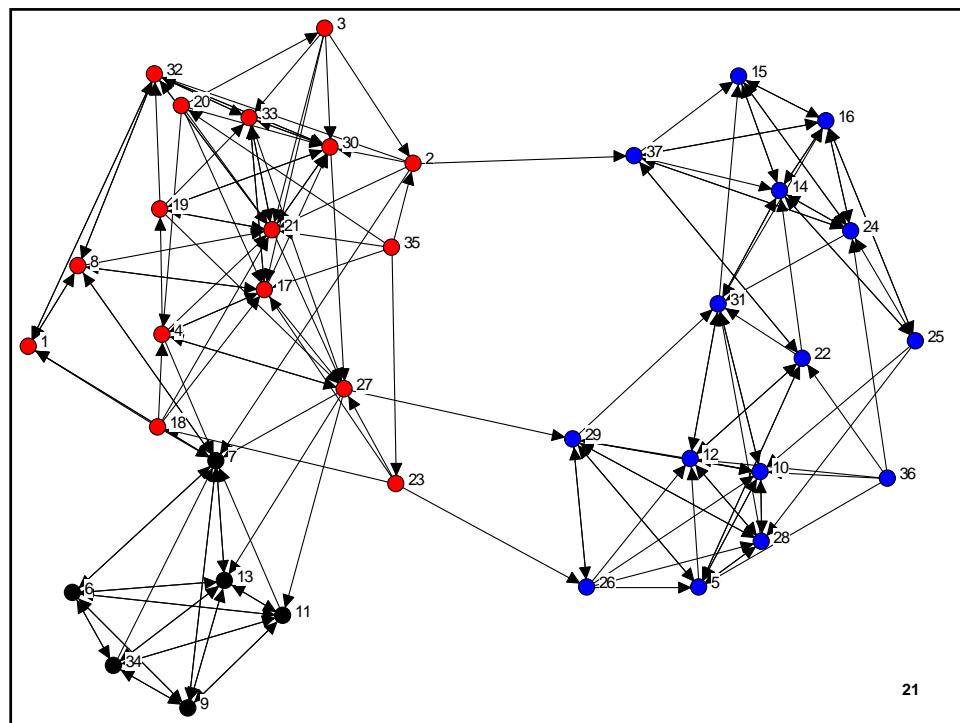
- Intervention is directed toward or includes a whole group of people
- Segmentation interventions identify and expect a whole group to adopt the innovation at the same time

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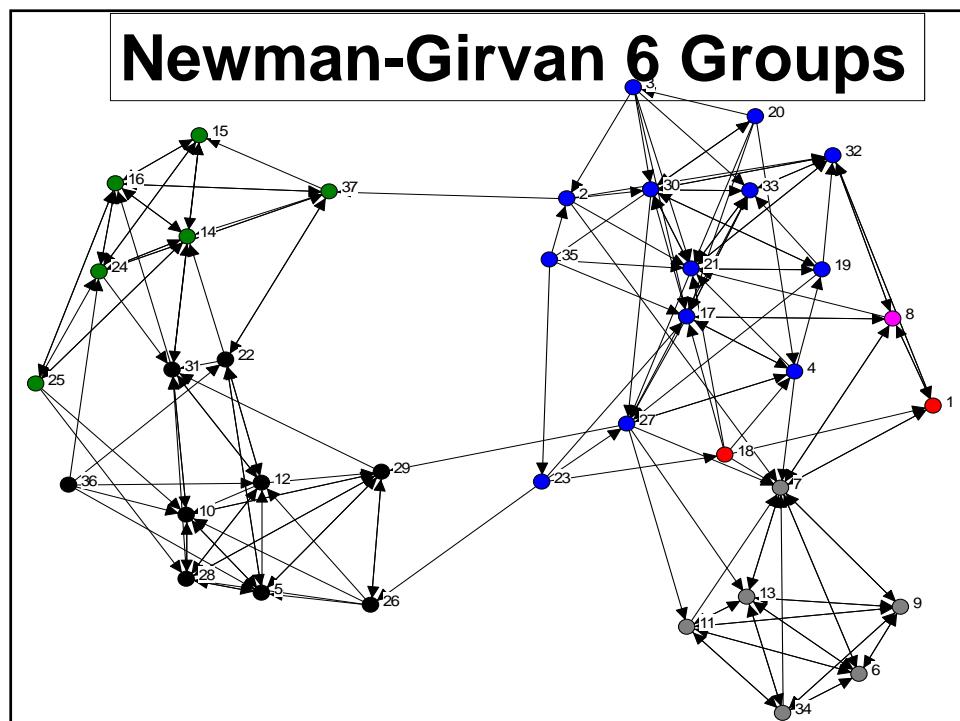
# 2.A. Groups

- Sets of people/nodes that are densely connected
- Groups can reinforce (or inhibit) the behavior change process
- Behavior change may be appropriate for groups
- There are many network methods used to find groups

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# Newman-Girvan 6 Groups
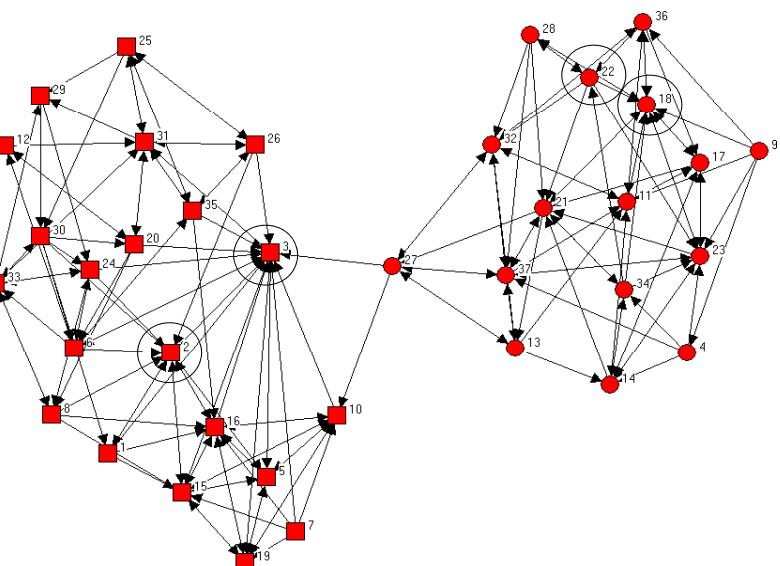
## 3.C. Match Leaders to Groups

- Rather than have leaders unattached, assign them to people who think they are leaders
- Leadership is local
- Emphasizes homophily between leaders and members
- Builds on naturally occurring networks
- Leaders can be more effective if assigned to those who nominate them

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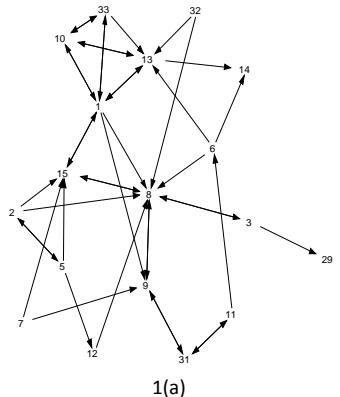
# Network Influence is Proximal



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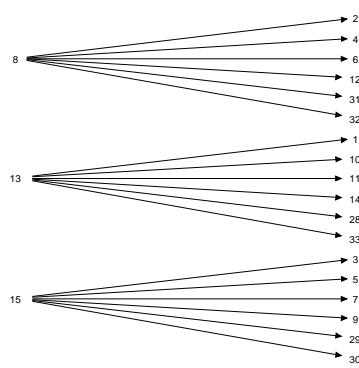
# Matching Leaders to Groups

Sociogram based on ties
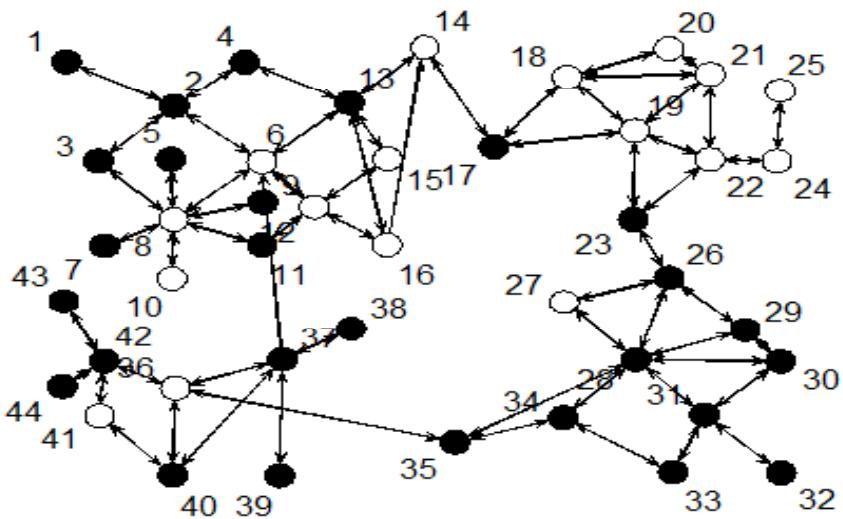
Optimal leader/learner matching

1(a)
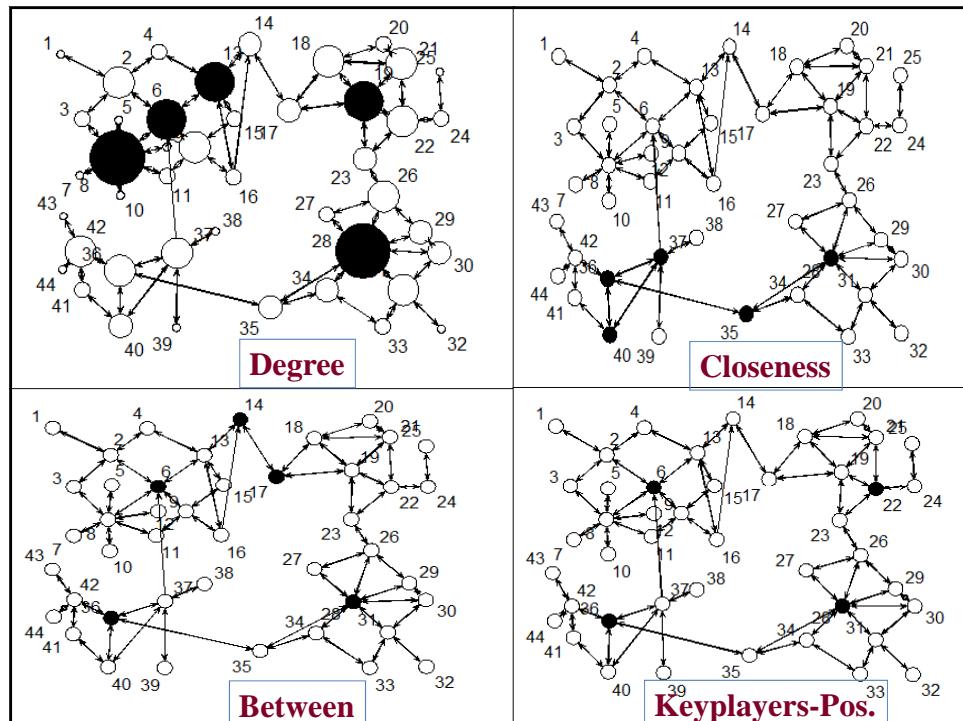
1(b)
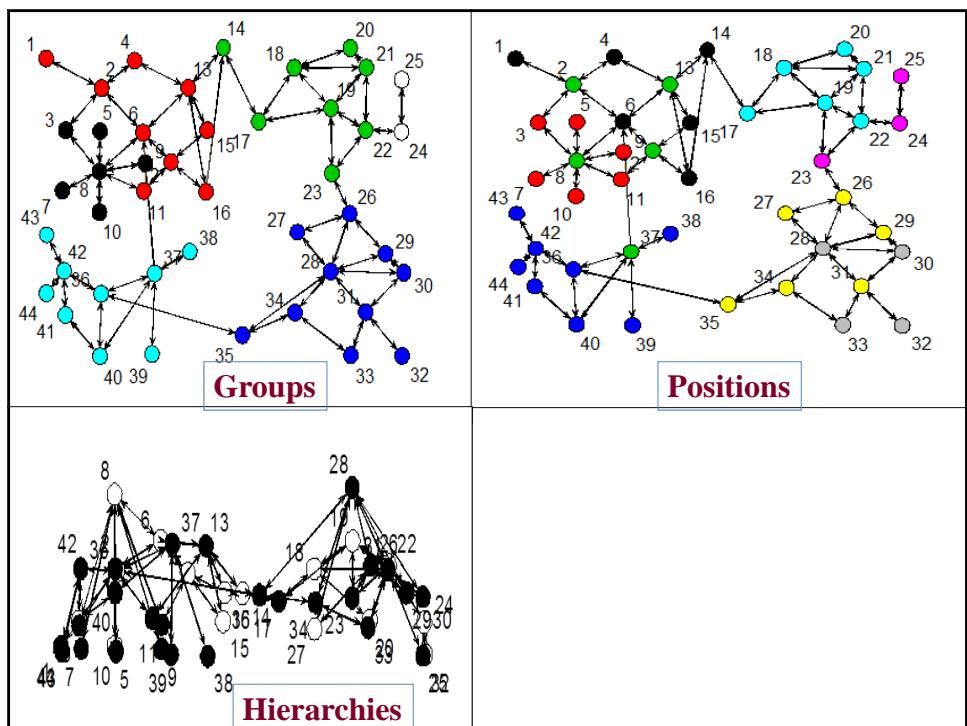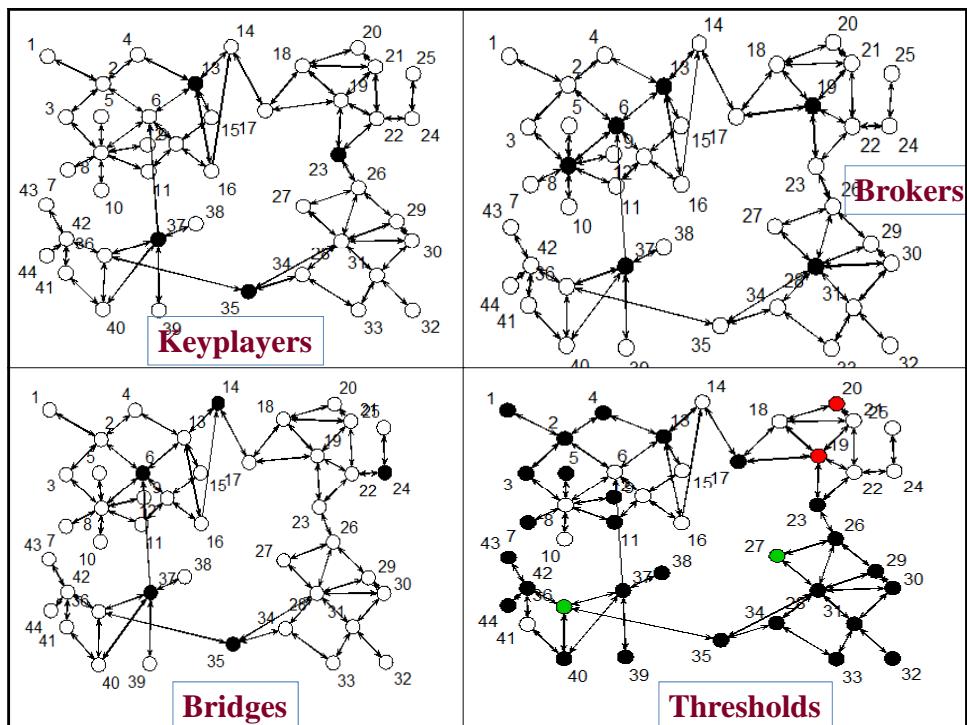
# Graphical Displays of Intervention Choices
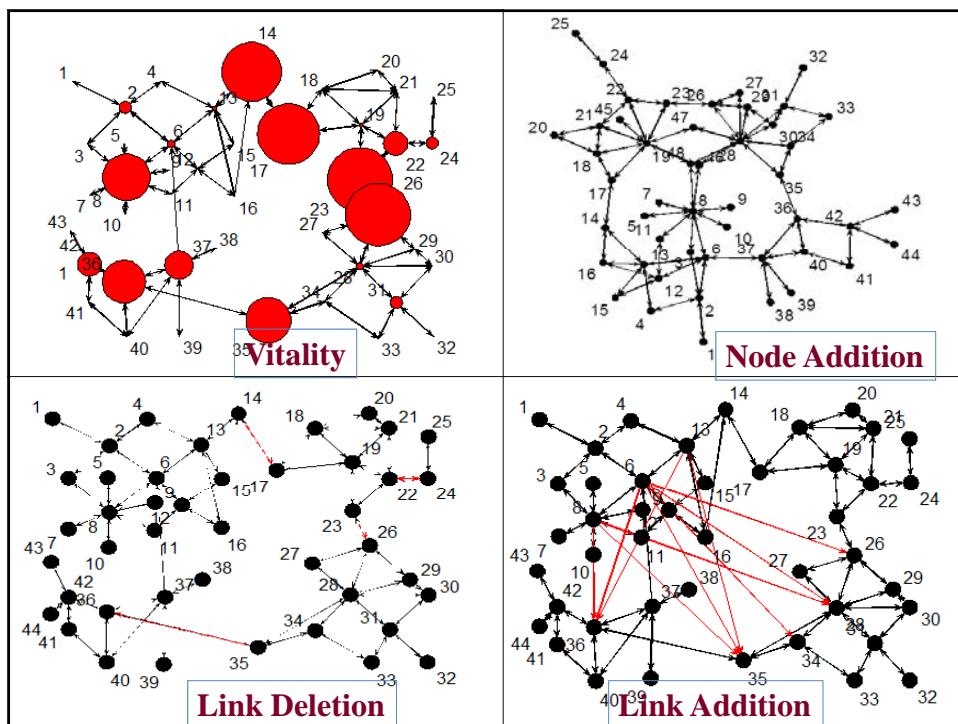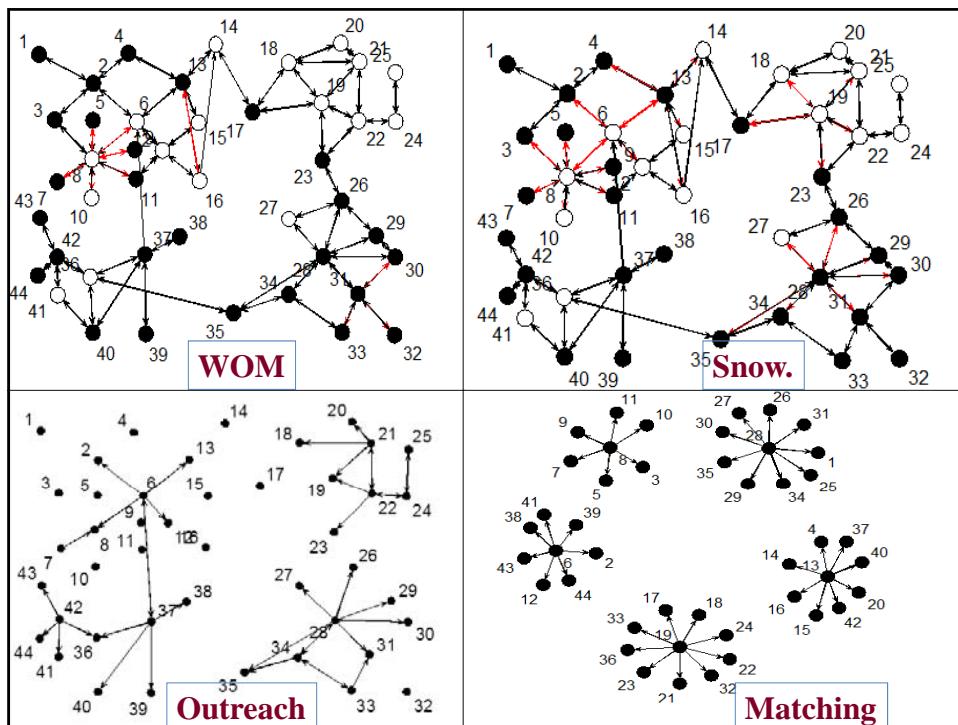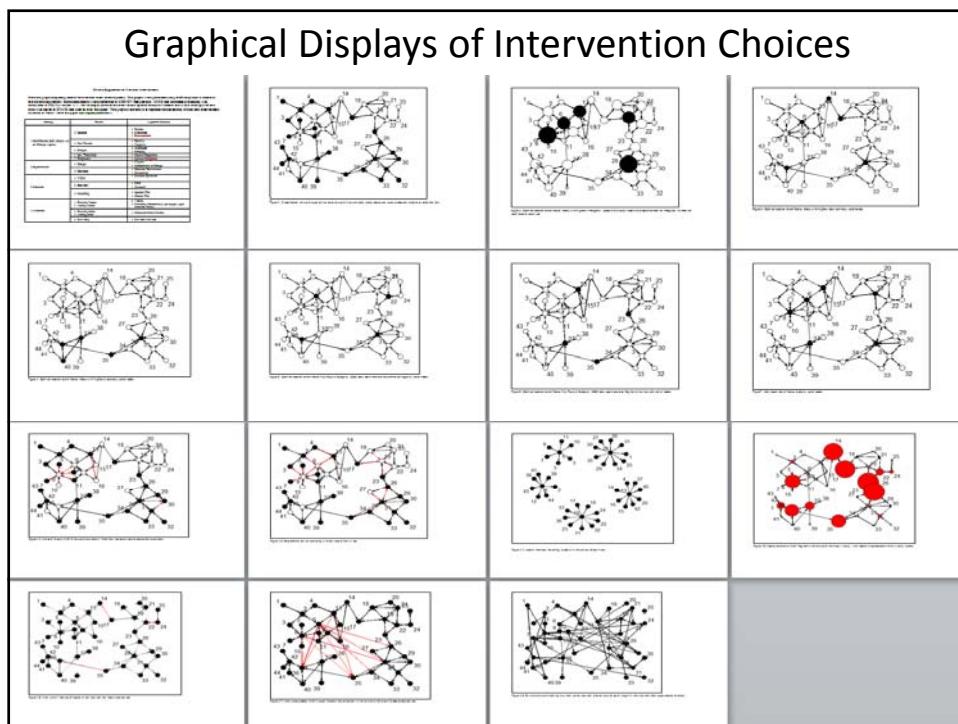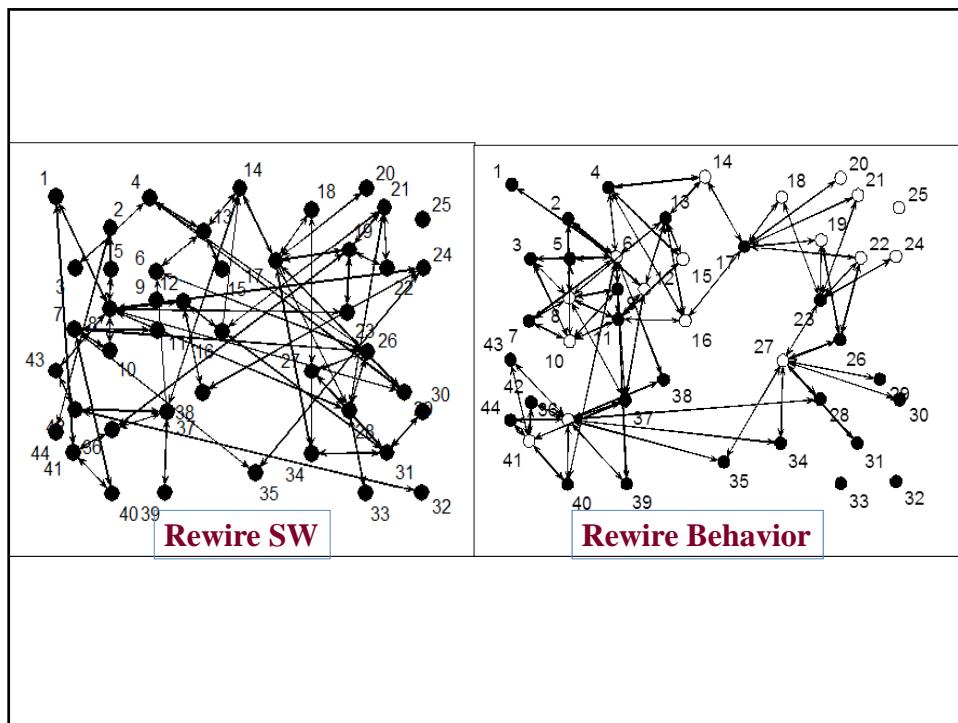
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**Degree**

**Closeness**

**Between**

**Keyplayers-Pos.**

Keyplayers

Brokers

Bridges

Thresholds

Groups

Positions

Hierarchies

WOM

Snow.

Outreach

Matching

Vitality

Node Addition

Link Deletion

Link Addition

Rewire SW          Rewire Behavior

# Graphical Displays of Intervention Choices

# Selecting a NI

- Availability and type of data
  - Types of networks
  - Existing network structure
- Behavioral characteristics
  - Existing prevalence
  - Perceived characteristics such as cultural compatibility; cost; trialability; etc.

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# Linking Theory to Intervention Strategy

- There are several theoretical mechanisms that drive contagion and behavior change
- Evidence for a particular mechanisms suggests choice of intervention strategy or tactic
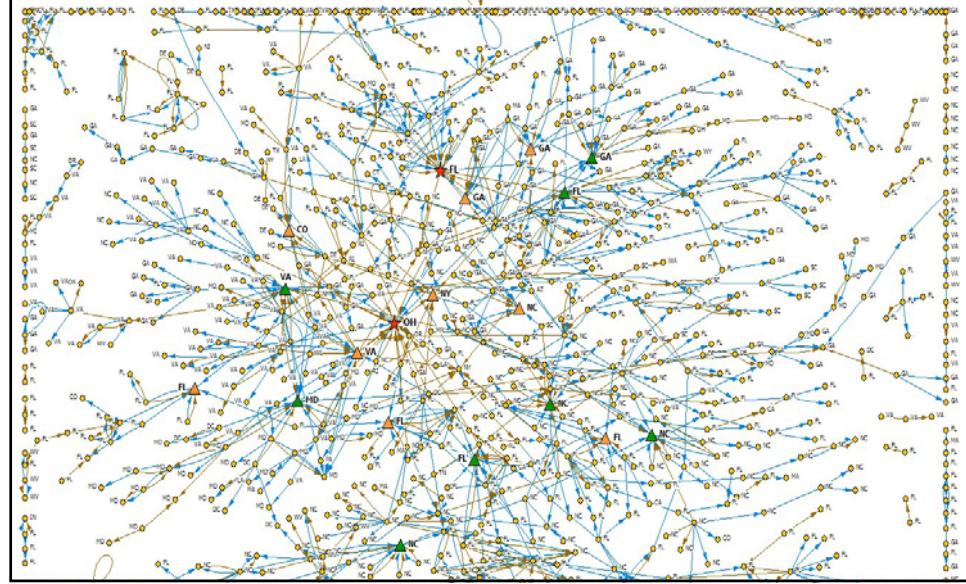
## Influence Mechanisms Aligned with Interv. Choices

| Mechanism | Tactic |
|---|---|
| Power<br>Conflict<br>Cohesion<br>Isolation<br>Thresholds | Leaders<br>Bridges<br>Key Players<br>Peripherals<br>Low Thresholds |
| Group Identification<br>Structural Equivalence | Groups<br>Positions |
| Information diffusion<br>Hard to reach populations<br>Closure<br>Homophily | WOM<br>Snowball<br>Outreach<br>Matching |
| Attributes<br>Structure<br>Structure!! | Deleting/Adding Nodes<br>Deleting/Adding Links<br>Rewiring |
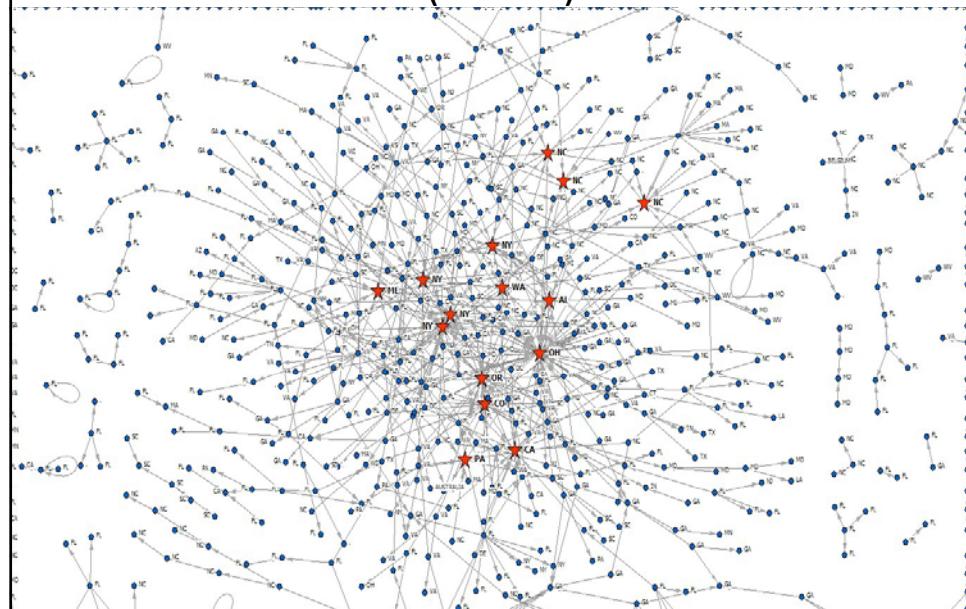
## Leadership & Influence have 2 Dimensions

| | | Trust | |
|---|---|---|---|
| | | Low | High |
| Expertise | Low | | |
| | High | | |

Discussion + Advice Nominations in the South Atlantic (Osteo.)



Prominence Nominations in the South Atlantic (Osteo.)

# SNA Application: Analyzing Communities by Geography