

# **L'influence des Liens Sociaux sur la Santé**

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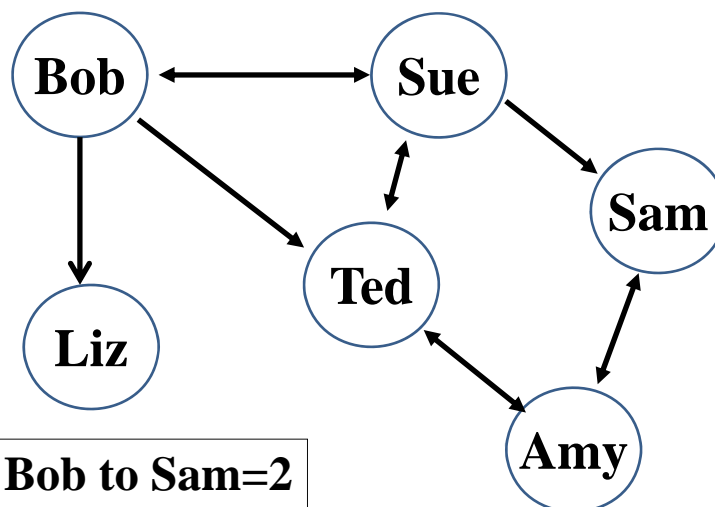
## **Acknowledgements**

- Thanks:
  - Yun Jen
- National Institutes of Health (NIH)
  - NIDA/OBSSR
    - Center for Prevention Implementation Methodology
    - University of Miami
  - NIAAA RC1AA019239
    - Social Networks and Networking ...
  - NCI: R0110866440
    - Social Networks and Health
- Kar-Hai Chu, PhD, for animations

## What is a network?

- A set of relations connecting units
  - Friendships (e.g., in schools or online)
  - Trading relations among countries
  - Exchanges between firms
  - Collaboration & cooperation among organizations.

## Sample Social Network



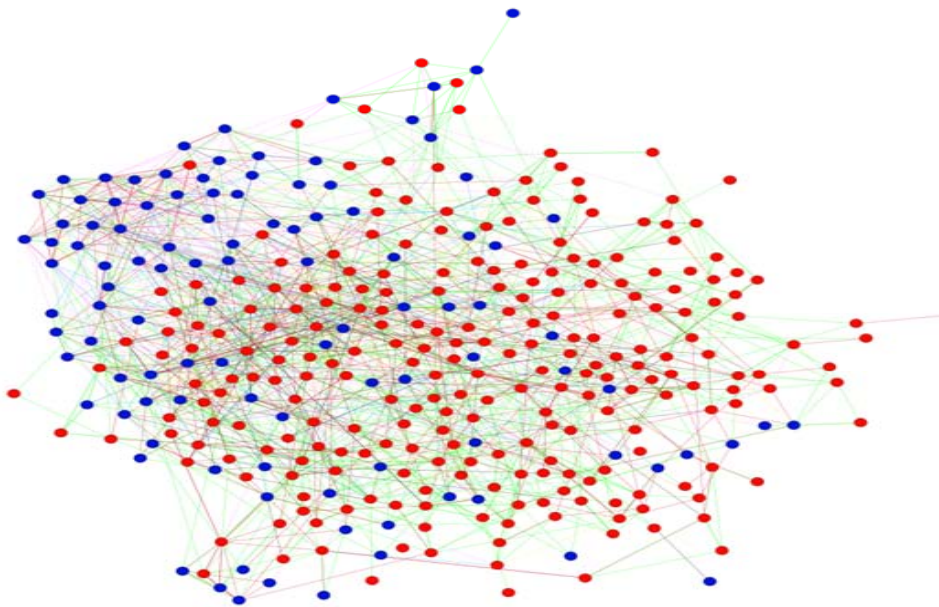
**Distance Bob to Sam=2**  
**Distance Sam to Bob=4**

## Why Study networks?

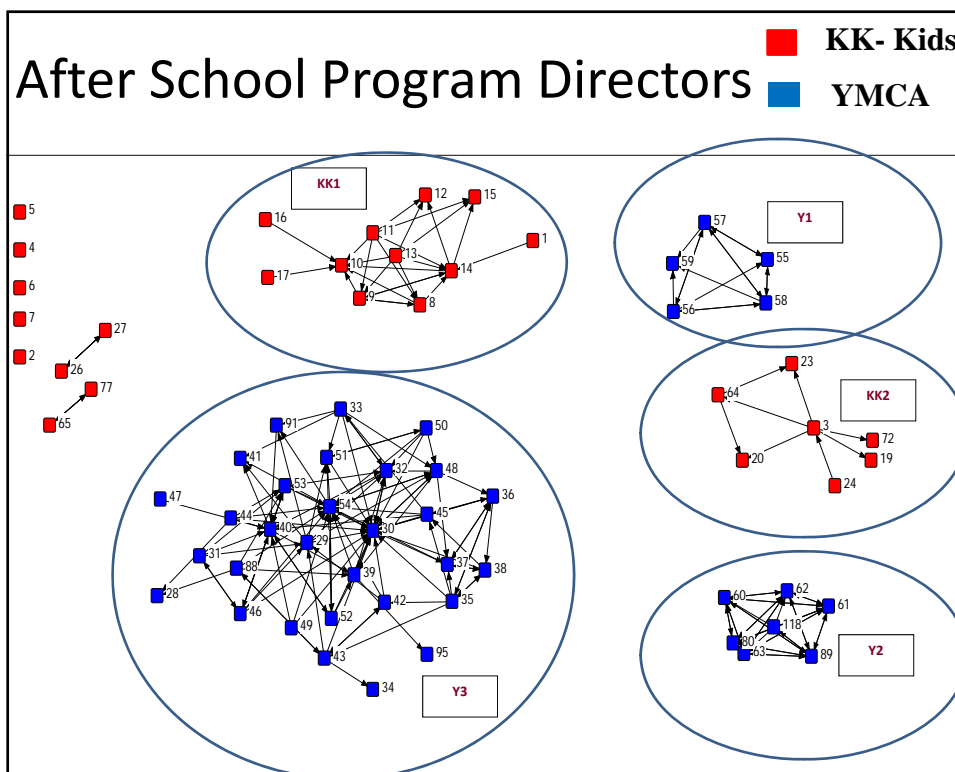
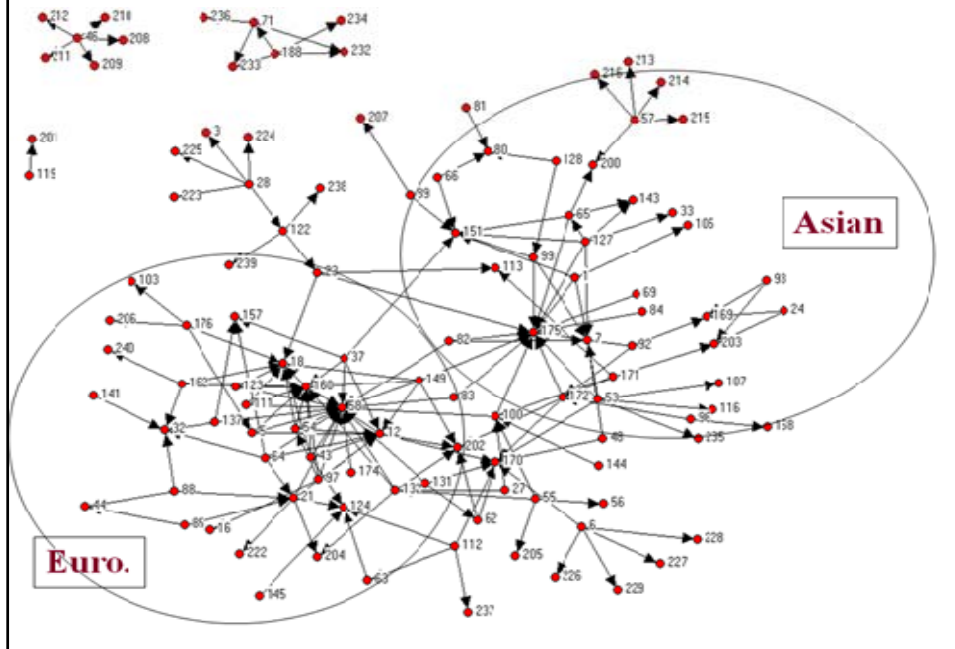
- Spread Disease
- Spread Behaviors
- Spread new ideas
- Important Planning and Policy
- Understanding Markets and Diffusion

And so on ...

## Relationships of 10<sup>th</sup> graders



# Discussion Network for SF MDs



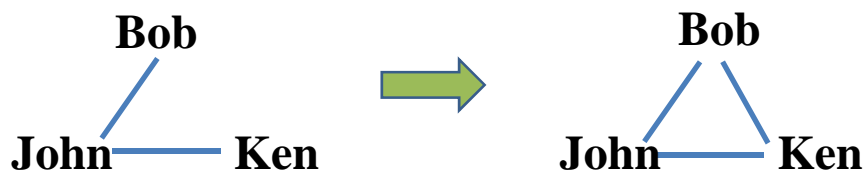
## Network Properties (1)

- Homophily (like sorts with like)



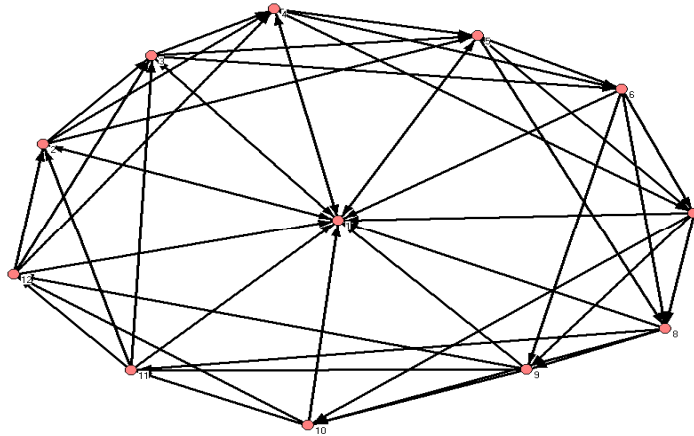
## Network Properties (2)

- Transitive (friends of friends become friends)



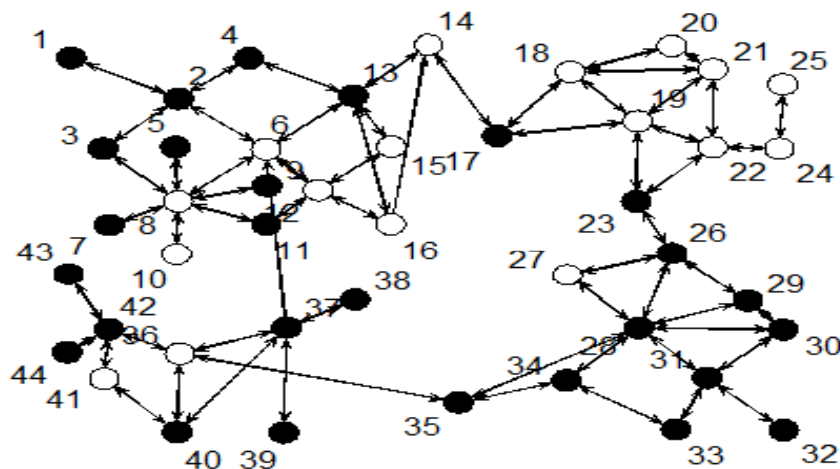
## Network Properties (3)

- Scale Free: Centralized (e.g., some people are popular)



## Network Properties (4)

- Small World: Local clusters connected by bridges



## Diffusion/contagion

- Today we'll focus on the importance of networks for understanding how to use networks to understand and change behavior.

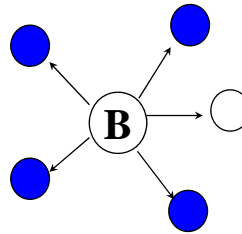
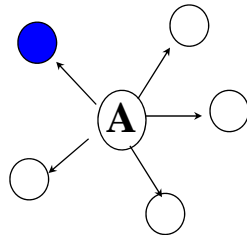
## Network Diffusion



## Network Exposure/Peer Influence

○ =non-user

● =user



**Person A has only 1 user in his/her network whereas person has 4 and so much more likely to adopt.**

## Evidence for network effects

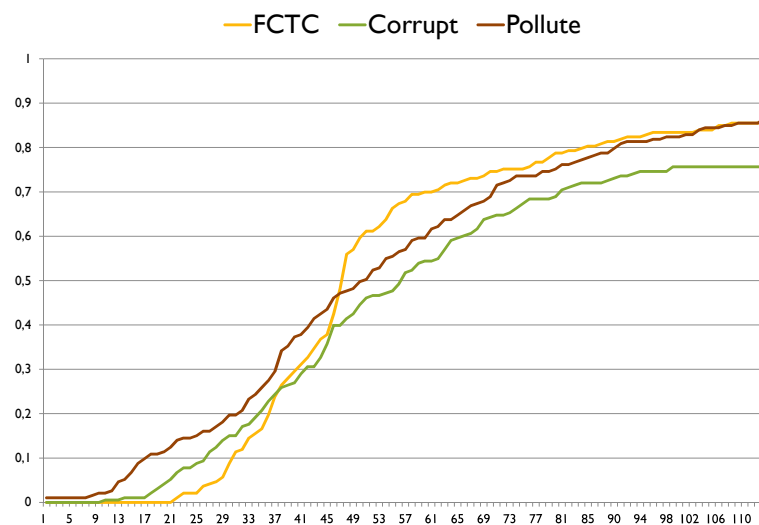
- Adolescents with smoking friends are more likely to smoke;
- Physicians use the same therapies their colleagues use;
- Women in developing countries use the same contraception as their friends; and
- Smokers quit when their network quits.
- ...



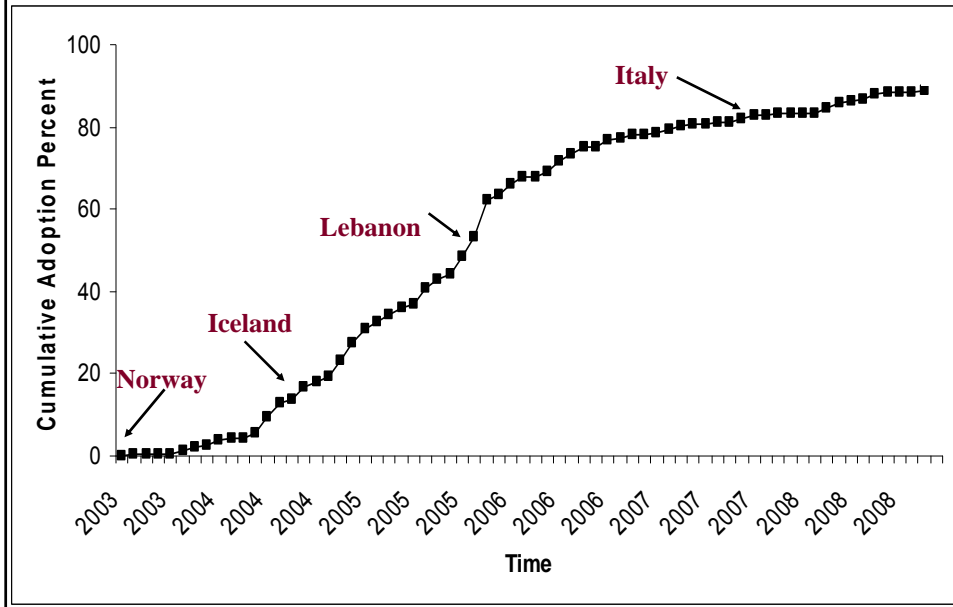
## Networks Can Also be Organizations or Countries

- Inter-firm and market competition;
- Inter-organizational collaboration; and
- Inter-state or inter-country diffusion.

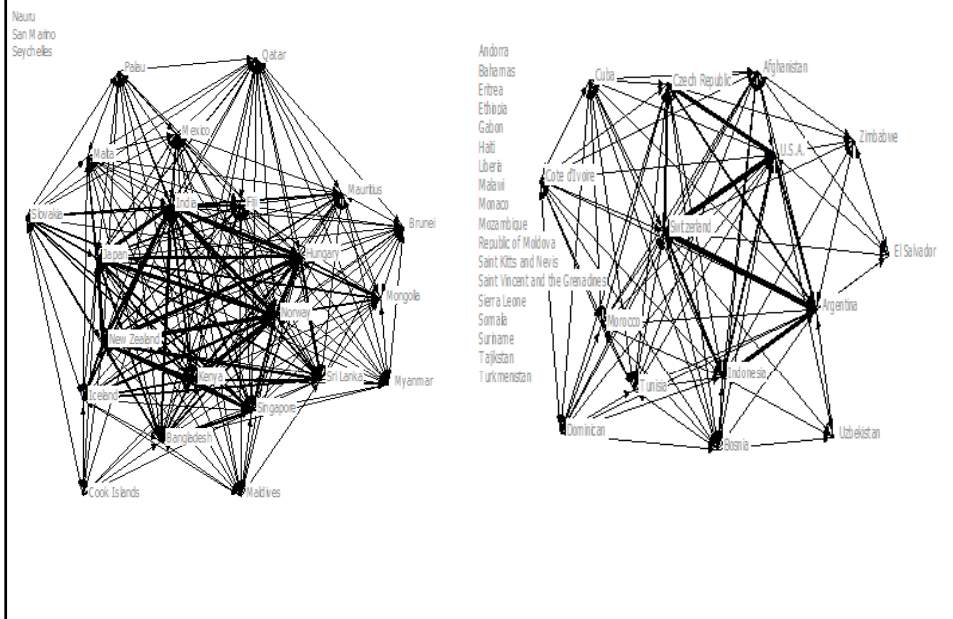
## 3 Treaties Diffused 2001-2010



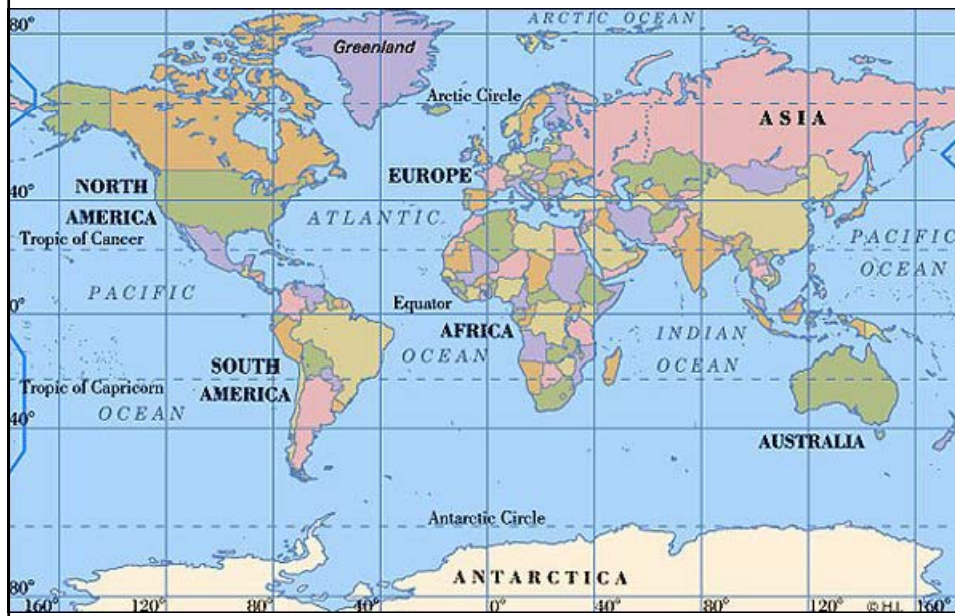
## Diffusion at Policy Level Country Ratifications of FCTC



## Co-membership on Globalink Earliest (15.5%)      Non-Ratifiers (17.1%)



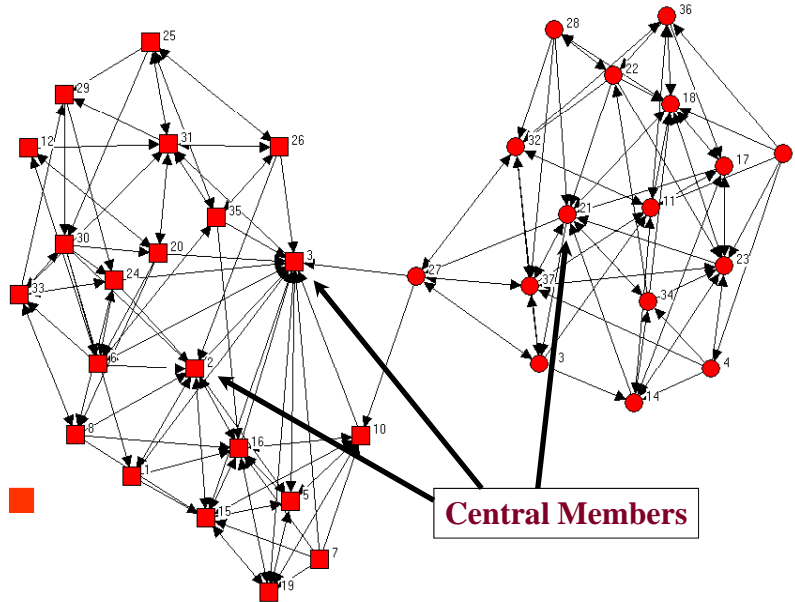
## FCTC Diffusion



### To accelerate diffusion: Use Networks to Identify Opinion Leaders

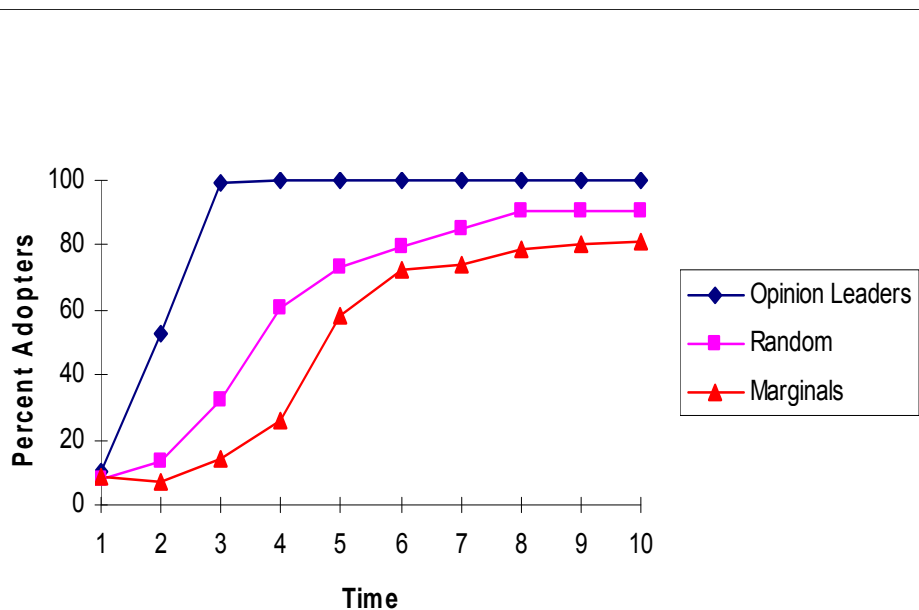
- OL interventions are the most typical network intervention
- Easy to measure
- Intuitively appealing
- Proven effectiveness
- Over 20 studies using network data to identify OLs and hundreds of others using other OL identification techniques

## Central People are Potential Opinion Leaders

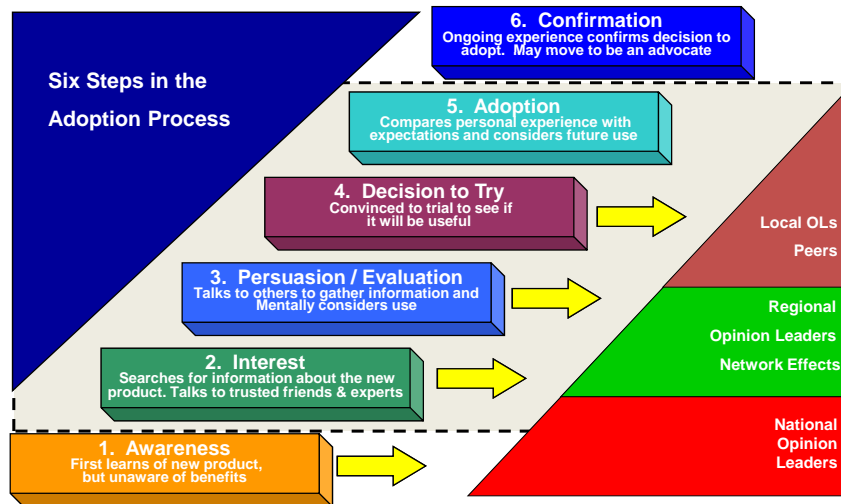


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## Simulation w/ 3 Initial Adopter Conditions



## Role of Leaders / Influentials in the Adoption Process



## 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

## Network Interventions

- Network interventions are any change program designed to improve organizational performance, promotion campaigns, and/or social mobilization that uses network data to:
  - Select change agents
  - Define groups
  - Affect network structure
  - Assist behavior change program implementation

## Principle 1: Program Goals Matter

- In some cases want to increase cohesion in others increase fragmentation
- Increase/decrease centralization
- E.g., slowing spread of STDs requires different strategy than accelerating adoption of office automation
- Network Interventions Are not Agnostic to Content.

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## Principle 2: Theory

- The type of change desired will be guided by theory (Behavior v Attitude)
- Understanding motivations for and barriers against behavior change is critical.
- A well-articulated theory of the behavior is often critical for successful interventions.

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## Principle 3: Learn As Well As Induce

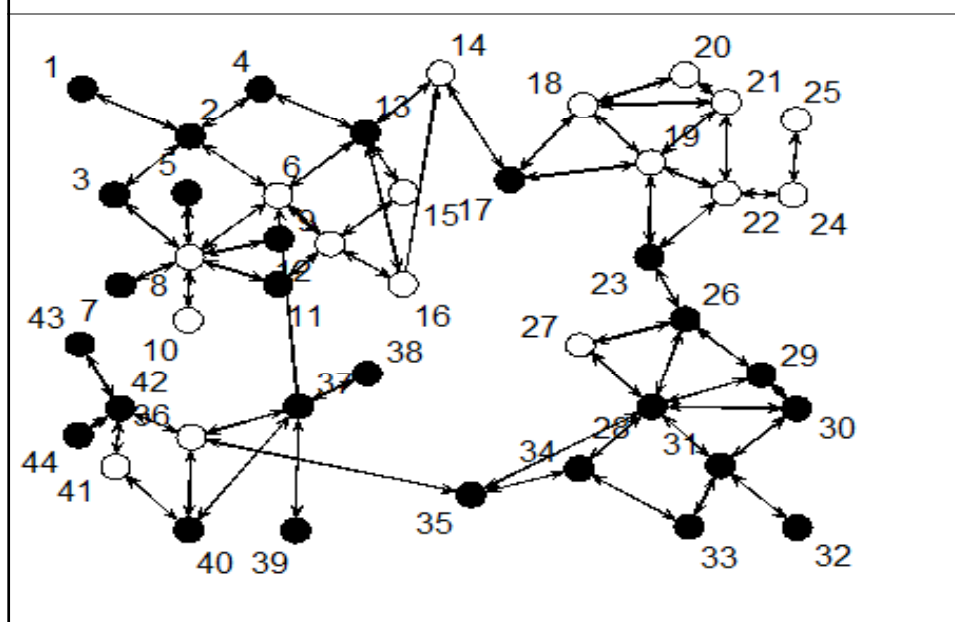
- The interventionist should use network methodology to learn from the community as much as try to influence it.
- Programs which meet the needs of their audiences are better received than those designed asymmetrically.

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# Network Interventions

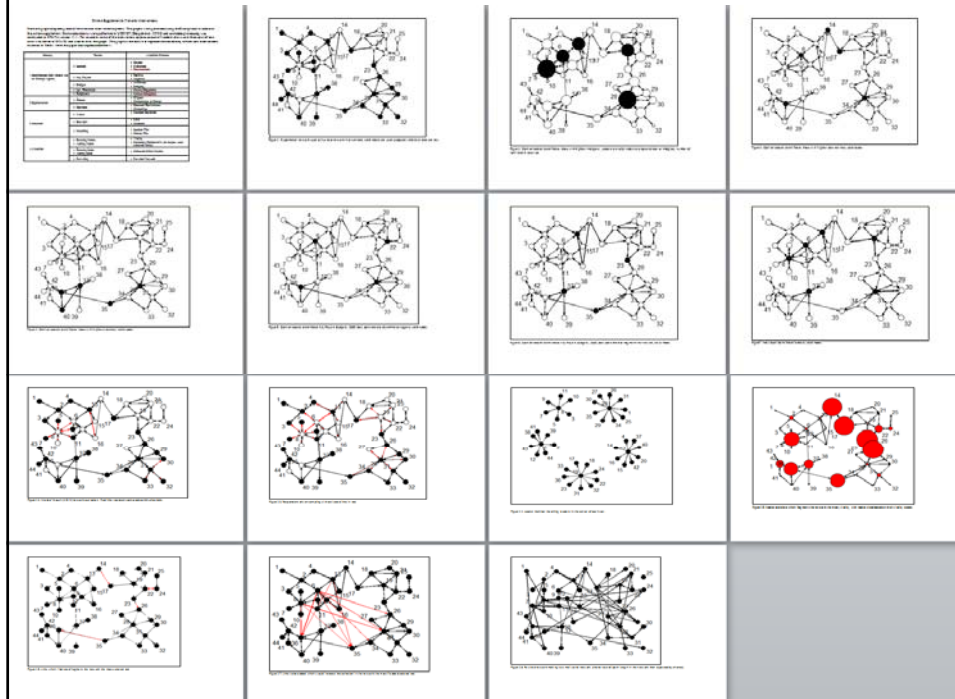
Strategy	Tactic	Operationalization
Identification	Leaders Bridges Key Players Peripherals Low Thresholds	Degree, Closeness, etc. Mediators, Bridges Positive, Negative  Proportions, Counts
Segmentation	Groups Positions	Components, Cliques Structural Equivalence, Hierarchies
Induction	WOM Snowball Matching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

## Graphical Displays of Intervention Choices





## 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.

## 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 Conflict Cohesion Isolation Thresholds	Leaders Bridges Key Players Peripherals Low Thresholds
Group Identification Structural Equivalence	Groups Positions
Information diffusion Hard to reach populations Closure Homophily	WOM Snowball Outreach Matching
Attributes Structure Structure!!	Deleting/Adding Nodes Deleting/Adding Links Rewiring

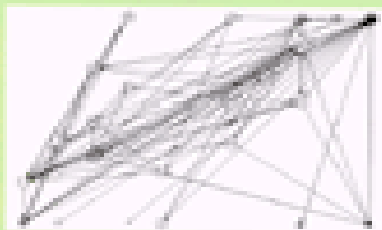
## Conclusions

- Network theories and methods can be used to understand motivations for and processes of human behavior change.
- Network interventions have the promise of improving outcomes (health, organizational performance, etc.); and
- Test theoretically interesting network theories.

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## More reading and information: [www-hsc.usc.edu/~tvalente/](http://www-hsc.usc.edu/~tvalente/)

### Network Models of the Diffusion of Innovations



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