

# Greater Than the Sum

## The ISIS Project: Strategic Systems Thinking to Improve Public Health

Scott J. Leischow, Ph.D.

Department of Health and Human Services

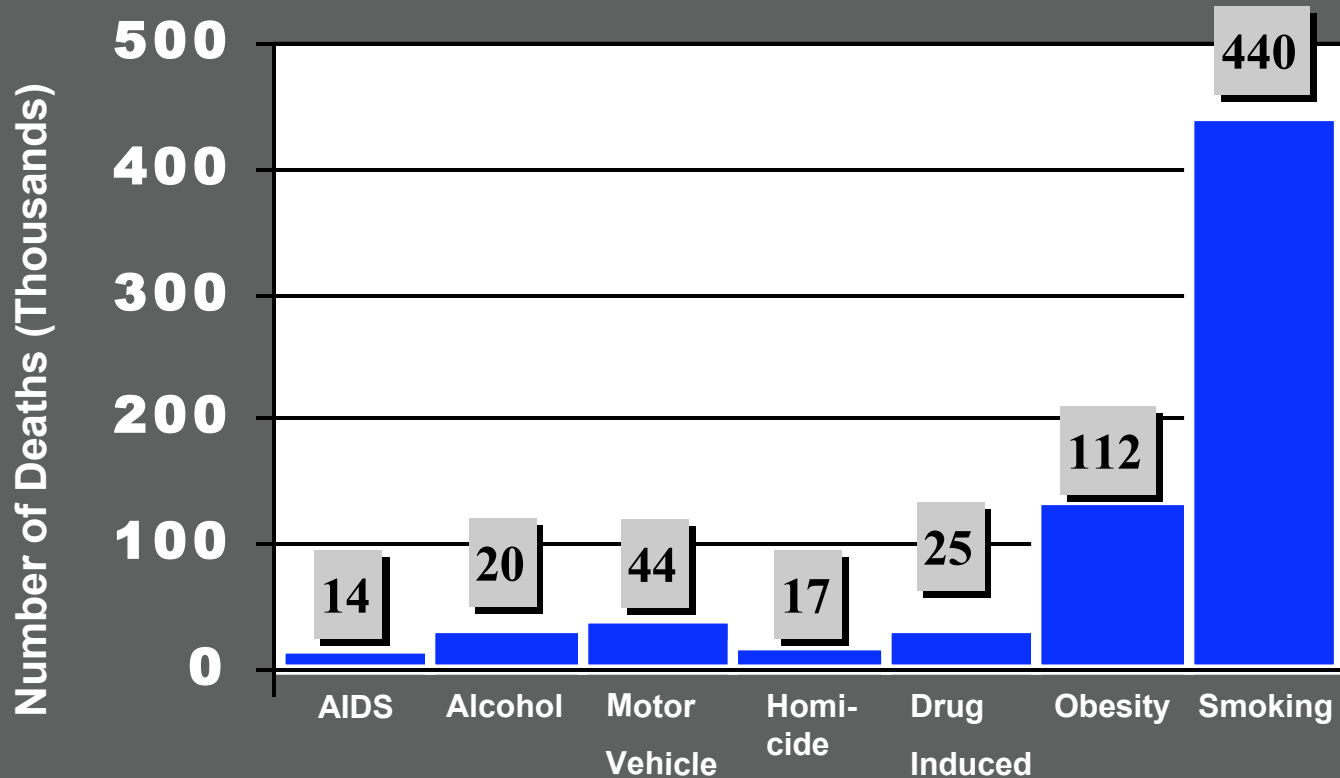
# What Is ISIS?

- The **I**nitiative on the **S**tudy and **I**mplementation of **S**ystems
- NCI-funded, transdisciplinary initiative to study systems approaches in tobacco control
- A proof of concept for analyzing and applying systems thinking methods to public health

# Why Tobacco Control?

- It is the leading preventable cause of death in the US, and kills 5 million worldwide

# Comparative Causes of Annual Deaths in the United States



- Smoking is responsible for almost **90%** of lung cancers.

- Lung cancer is the leading cause of cancer death in women.

- Smoking causes over 155,000 cancer deaths each year.

# The First Two Years of ISIS



- Implement 'Innovation Team' to decide on essential approaches to explore
- Experts in chosen fields to develop case examples, and to work to bridge disciplines
- Develop a vision for systems-centric structures and functions for tobacco control/public health – taking advantage of the 'learnings' from other fields and a vision for needed cyber-infrastructures

# ISIS Directions

- Understand, Optimize, Link and Effectively Use New and Existing Data (KM)
- Link stakeholders in a participatory, collaborative environment (Networks)
- Model the nature of relationships and potential futures (SD, Econometrics, etc) to develop strategic direction

# Knowledge Management and Transfer (KMT): What We Know

- Review existing tobacco control knowledge resources:
  - PLANET—Plan, Link, Act, and Network with Evidence-based Tools
  - SEER—Surveillance, Epidemiology, and End Results registry
  - CISNET—Cancer Intervention Surveillance Network
  - caBIG—Cancer Biomedical Informatics Grid
  - Others: eHealth Express, marketing and sales data

# NCI KMT Review: Conclusions

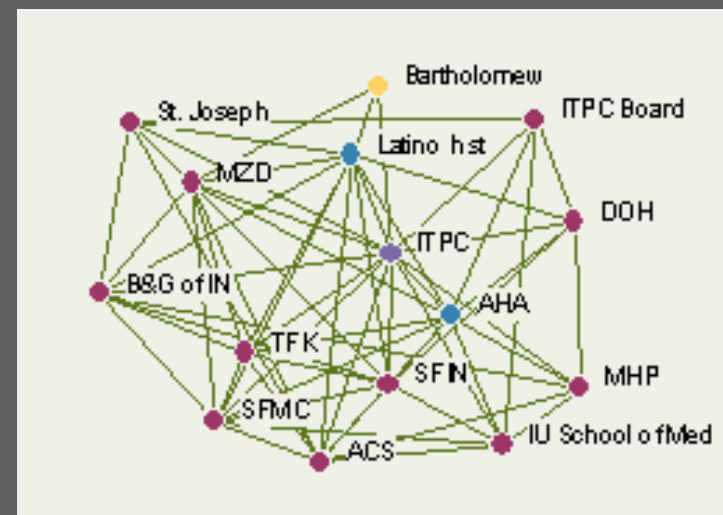
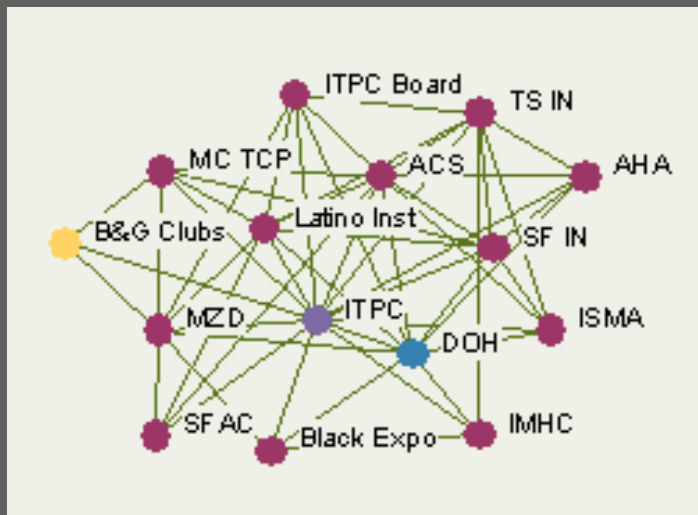
Key future directions: Propose a unified KMT framework for tobacco control and public health

- From contact directories to repositories of tacit knowledge
- From data sources to an integrated KMT environment
- From “silos” of information and knowledge created for specific needs to an infrastructure for the global knowledge needs of tobacco control, driven by the KMT framework

# Network Methods: Who We Are

- Examine networks as a means to link tobacco control stakeholders for improved outcomes
- Understand structural issues and indicators of networks: centrality, multiplexity, broker relationships and holes, cliques, etc.
- Use network analysis as a means to understand—and more important, manage—the dynamics of collaboration

# Example: Impact of Funding on Tobacco Control Networks



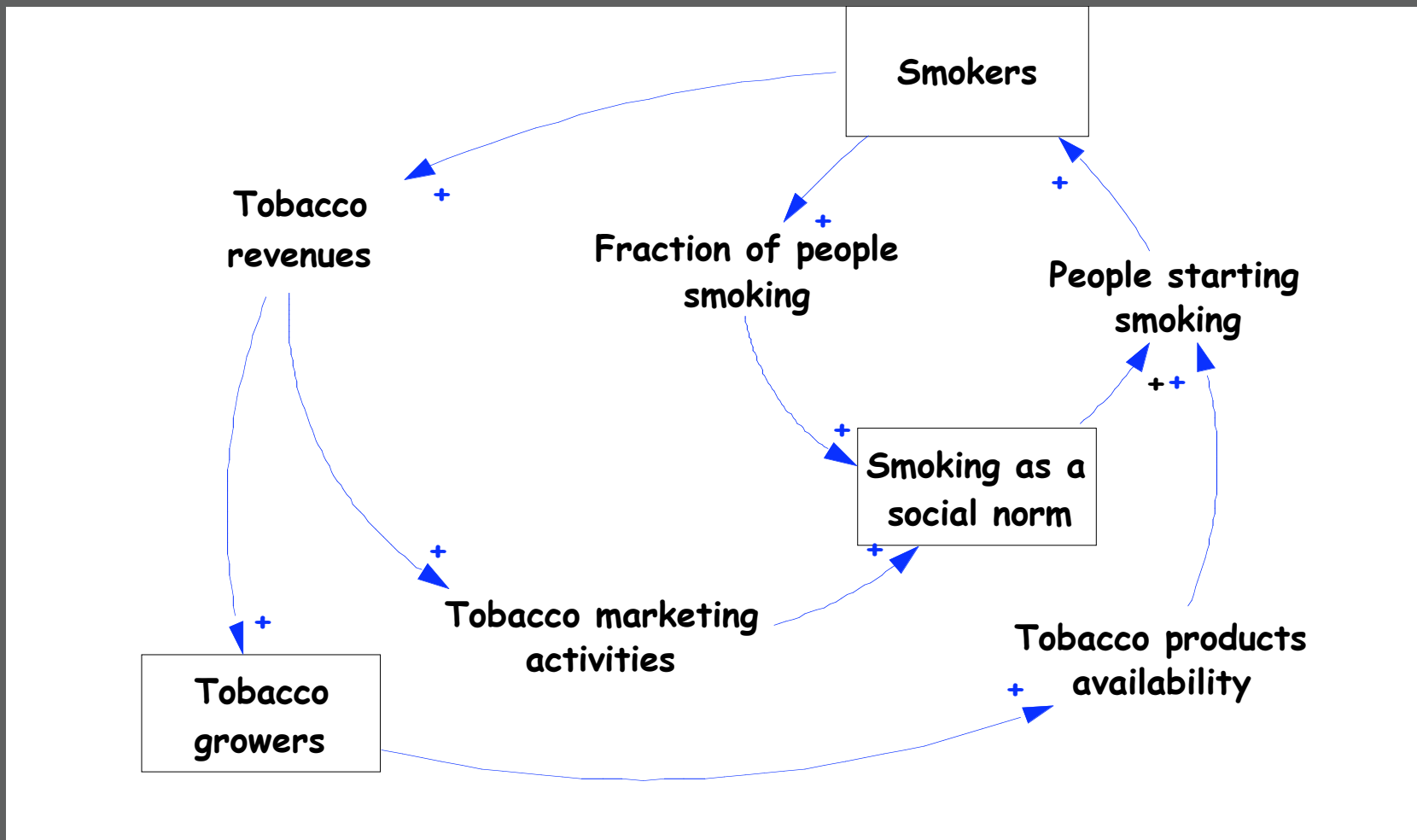
Change in Indiana's tobacco control contact network structure from 2002 (left) to 2004 (right). Centrality decreases from .23 to .13.

—Doug Luke, Center for Tobacco Policy Research at the Saint Louis University School of Public Health ([ctpr.slu.edu](http://ctpr.slu.edu))

# Systems Methods: How We Anticipate Change

- From simple cause-and-effect models to the complexity of the real world
- Simulation of real behavior, including feedback, evolution, and unintended consequences
- Broad continuum spanning qualitative and quantitative approaches
- Future directions: chaos and complexity theory, simultaneous equations, others

# “Shard” of Causal Map



# Next Steps: Build System and Knowledge Capacity

- Integrate information silos through cyber-infrastructure development
- Expand public health and clinical data to enable systems analyses
- Build capacity for systems analyses, including secondary analyses and quasi-experimental designs using existing datasets

# Next Steps: Build and Maintain Network Relationships

- Research on networks to determine their structure and function
- Create multijurisdictional/multilevel networks of networks for systems thinking and action
- Encourage transdisciplinarity

# Next Steps: Develop and Apply Systems Methods and Analyses

- Encourage systems analysis and research (e.g. expand CISNET)
- Foster mixed-methods systems thinking
- Conduct participatory systems needs assessments
- Encourage an ecological perspective on implementation
- Test systems models/projections as strategic guides for action

# Summary

- Tobacco control is a complex, adaptive environment
- Development and implementation of cyberinfrastructures to optimize knowledge and networks can create the shared situational awareness needed as a foundation for self-synchronization within the public health community
- Analysis of systems can provide added value to KM and networks so that strategic decisions can be best informed by the most comprehensive data

# Tenets of Network-Centric Public Health

*Robustly networked teams*

improves

*Information Sharing*

*Information Sharing  
and  
Collaboration*

enhances

*Quality of information  
and  
Shared Situational Awareness*

*Shared situational awareness*

enables

*Self-synchronization*

*dramatically increases*

*Public Health Effectiveness*

Derived from  
Alberts, 2005