

# Complex Adaptive Systems and Tobacco Control: Leverage points for sustainable change

**Gregg Moor**  
Project Manager and Director  
*InSource Research Group*

Clean Air Coalition of BC  
Knowledge Exchange  
June 16, 2014

**IN***Source*



# Contents

- A Systems Thinking Primer, a.k.a, “How you became a systems thinker and you didn’t even get the T-shirt”
- What is a Complex Adaptive System?
- A Causal Map of Tobacco Control
- The Process Toward BC’s Tobacco Control Framework 2015-2019

# What is “systems thinking”?

- Holism rather than reductionism
- Emerged in multiple disciplines simultaneously
- You can't solve complex problems by breaking things down into smaller and smaller parts

*If you're working in tobacco control, you're probably already a systems thinker!*



# Some Definitions

**System:** A set of elements interrelated among themselves and within the environment

**Systems approaches:** Theories that use systems methods in an organized framework to address systems (e.g. chaos theory or complexity theory)

# Some Definitions, cont'd

**Systems methods:** Specialized techniques or procedures for researching and understanding systems (e.g. system dynamics modeling, structured conceptualization, or network analysis)

**Systems thinking:** Use of systems approaches to view the world

# Some Definitions, cont'd

**Simple system:** based on well established rules leading to predictable results (e.g. recipes)

**Complicated system:** established rules, plus coordination of unrelated elements and processes (e.g. randomized controlled trial for a new drug)

# Complex Adaptive Systems

## = **Dynamic relationships**

- Many elements in constant interaction
- Often difficult to draw the boundary around the system

## = **High degree of unpredictability in response to change**

- Potentially affecting even seemingly unrelated elements within the system
- Changes can produce results that are non-linear (small interventions can have a major impact and large interventions can sometimes have no lasting effect)

## = **Self-organizing**

- Control is distributed rather than centralized

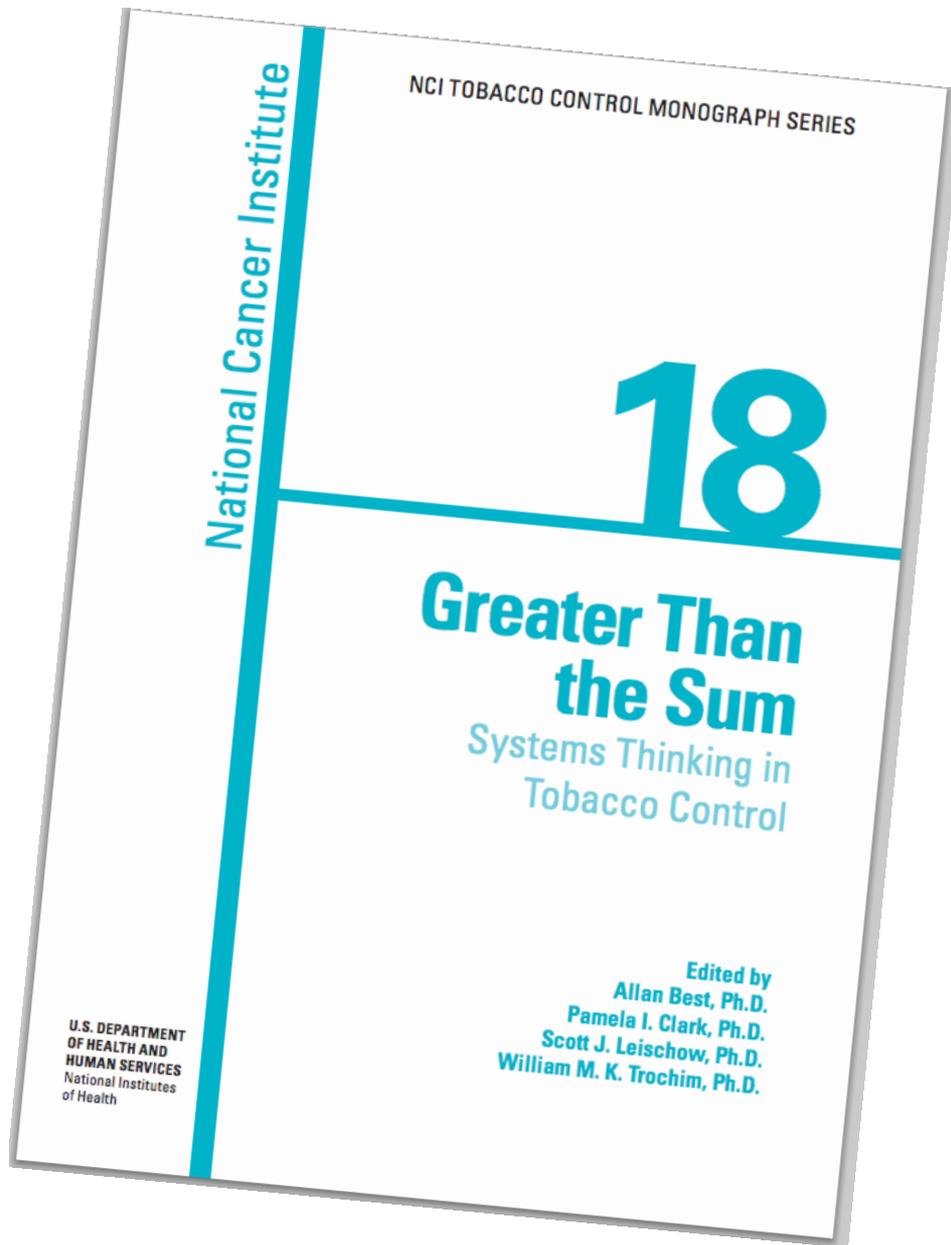
## = **Evolve over time**

- *The likelihood of positive self-organizing change in a CAS can be increased if leverage points can be identified*

“Systems thinking is just damned good thinking.”

– George P. Richardson  
Emeritus Professor of Public Admin. and Policy, and Informatics  
University of Albany – State University of New York  
Outstanding Service Award, System Dynamics Society

“There is no one perfect model of a system... but  
some are better than others.”

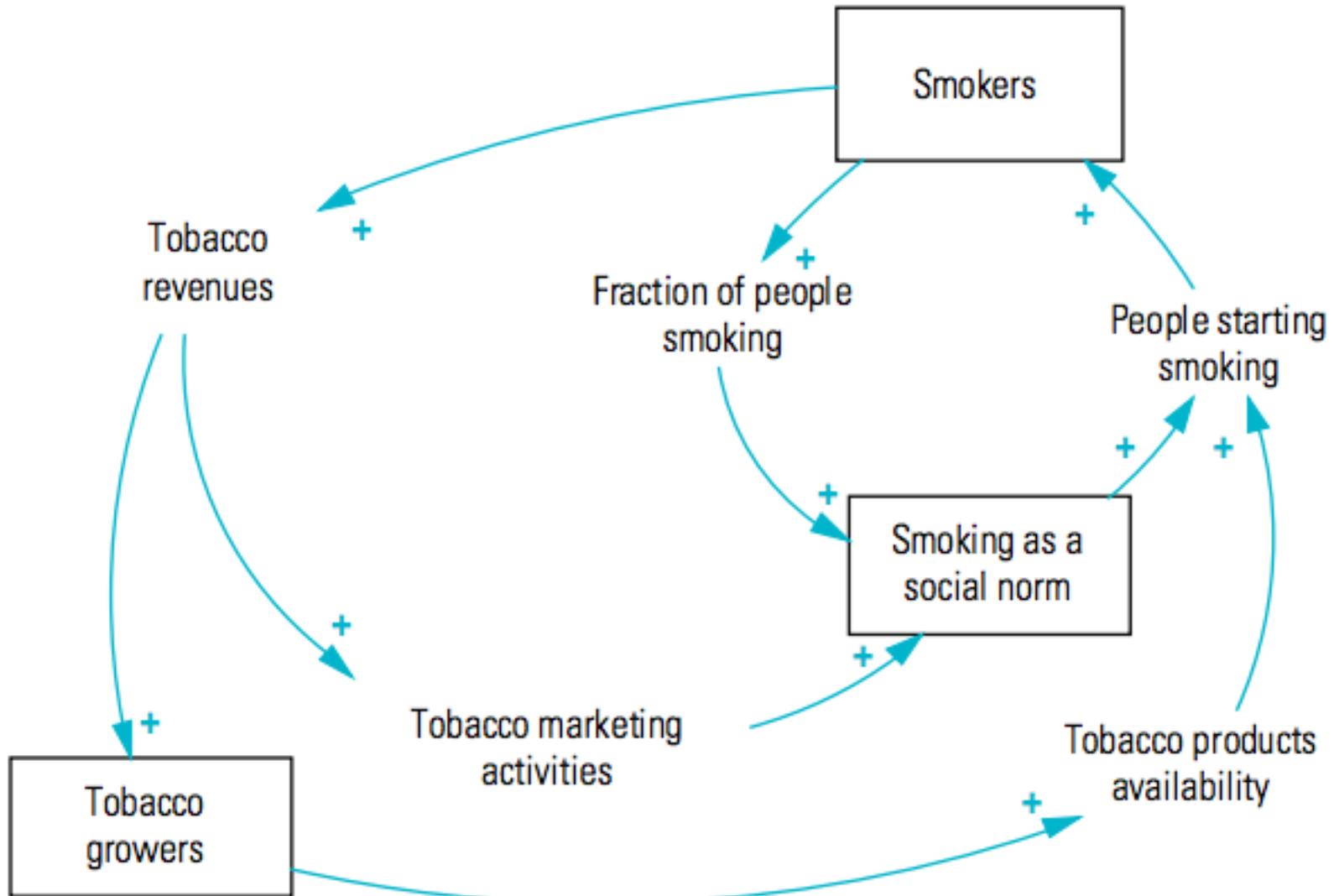


<http://cancercontrol.cancer.gov/brp/tcrb/monographs/18/>

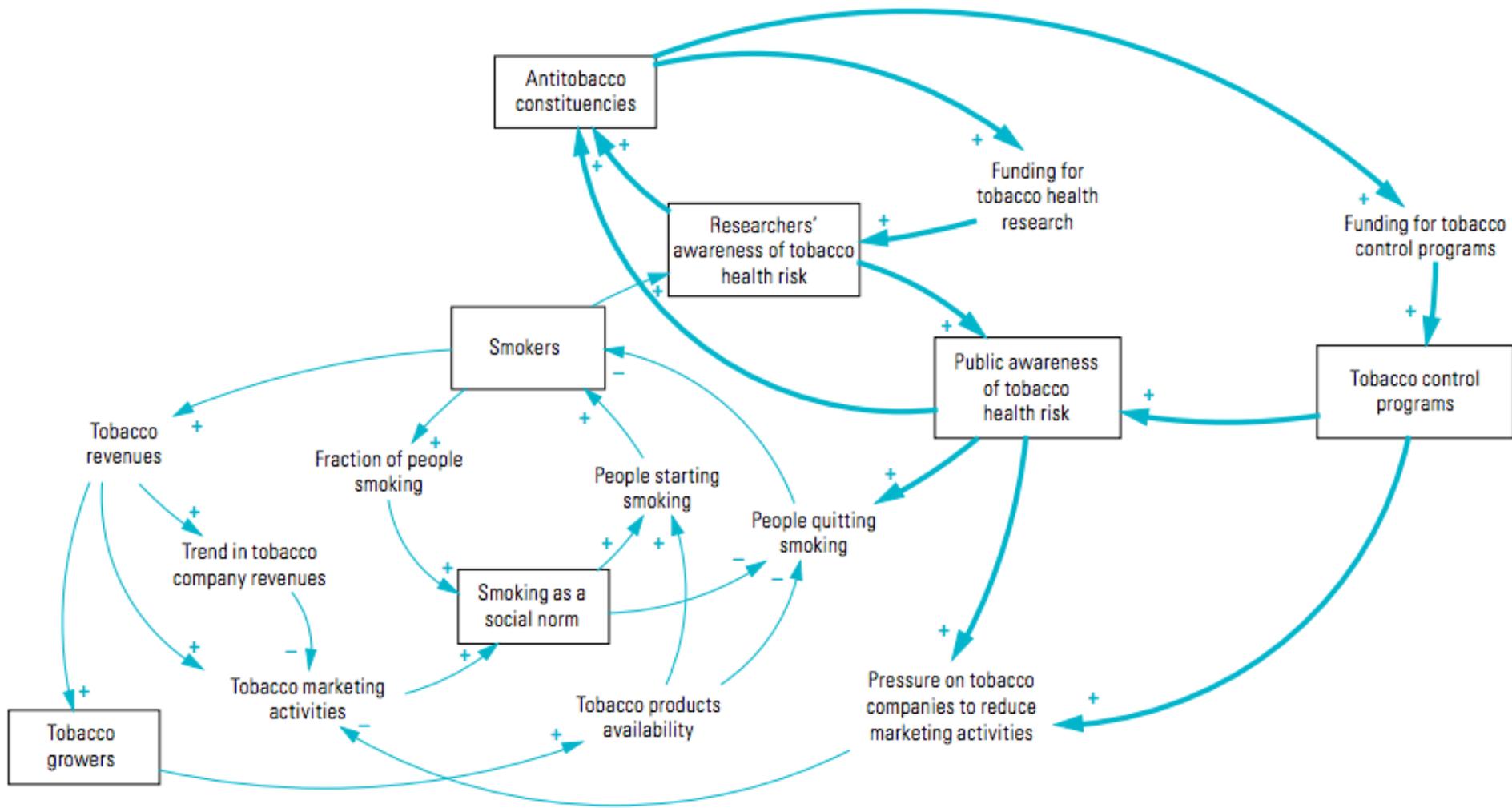
# System Dynamics Causal Loop Diagram

- **Stocks** = Accumulated or integrated quantities with values or levels that do not change instantaneously
  - They go up or down in response to flows
  - Stocks that are central to specific causal loops are highlighted in boxes
- **Flows** = Varying quantities that create the dynamics in the system by increasing or decreasing stocks
- **Loops** = Linked, directional relationships between parts of the model

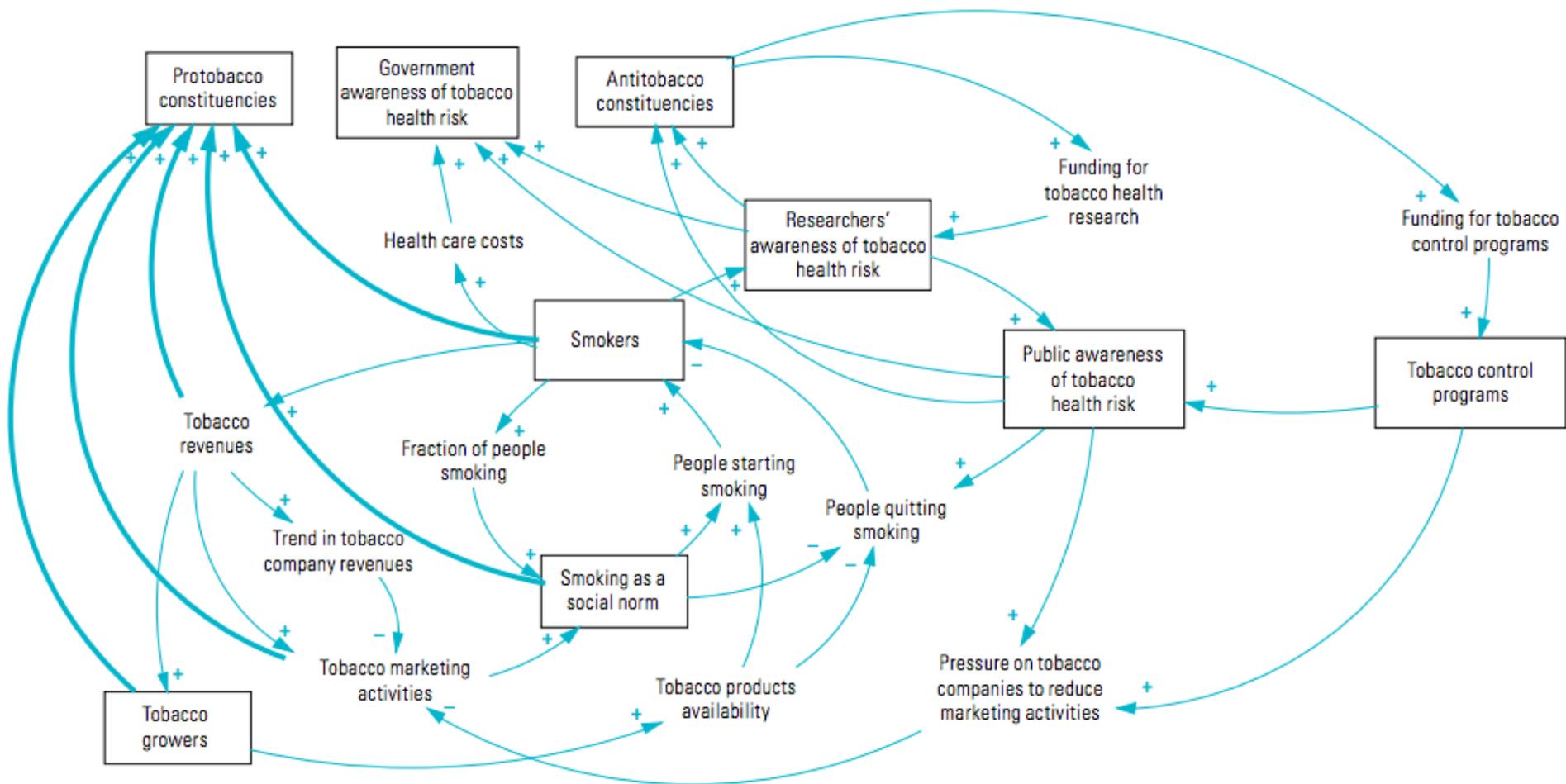
# Causal Map of Smokers, Pt. 1



# Adding Antitobacco Constituencies



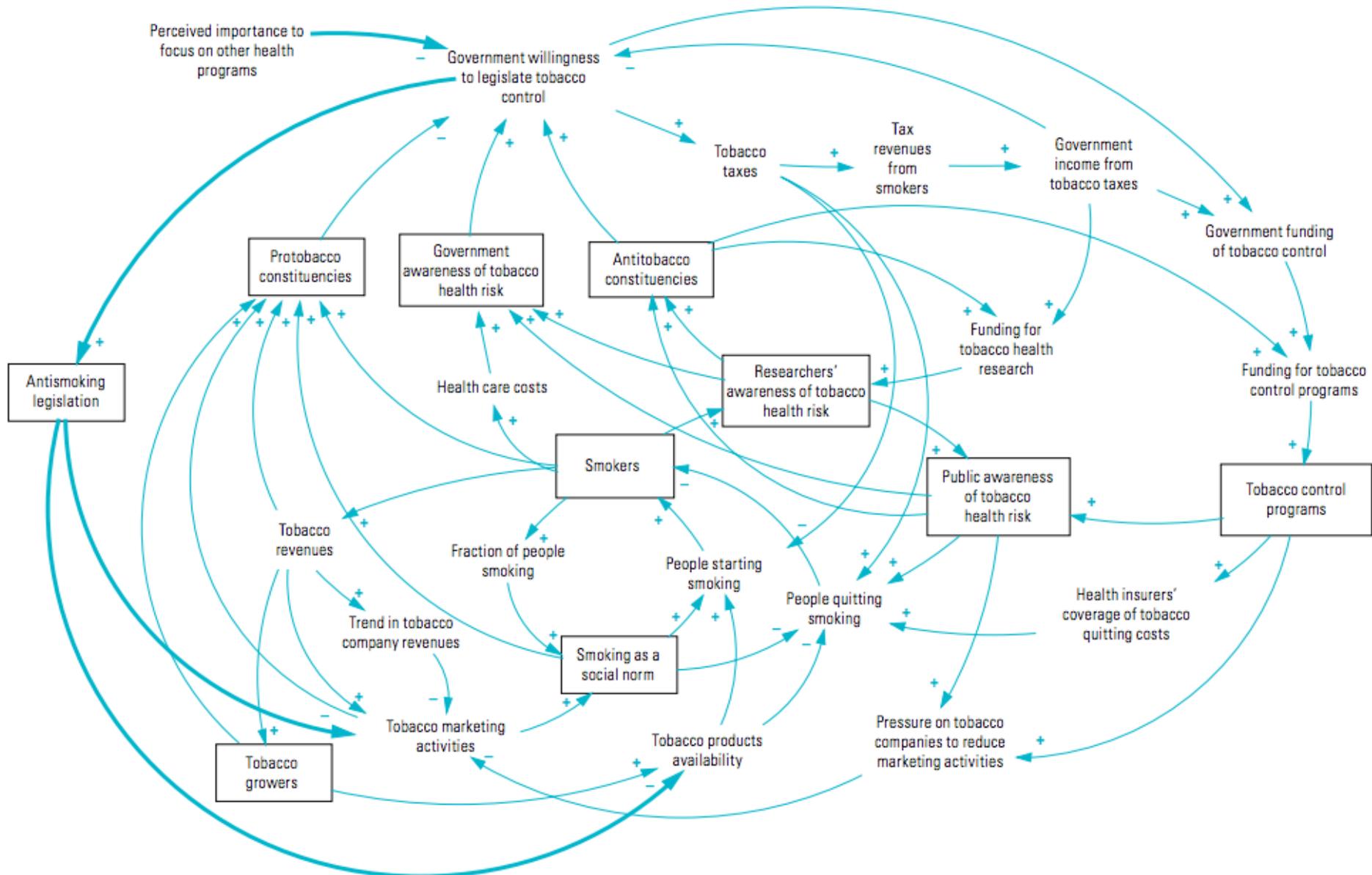
# Adding Pro-tobacco Constituencies







# Final Causal Map for Tobacco Control in ISIS



Note. An earlier version of this figure was published as Figure 1 in A. Best et al. 2006. Systemic transformational change in tobacco control: An overview of the Initiative for the Study and Implementation of Systems (ISIS). In *Innovations in health care: A reality check*, ed. A. L. Casebeer, A. Harrison, and A. L. Mark, 189–205. New York: Palgrave Macmillan. Reproduced with permission of Palgrave Macmillan.

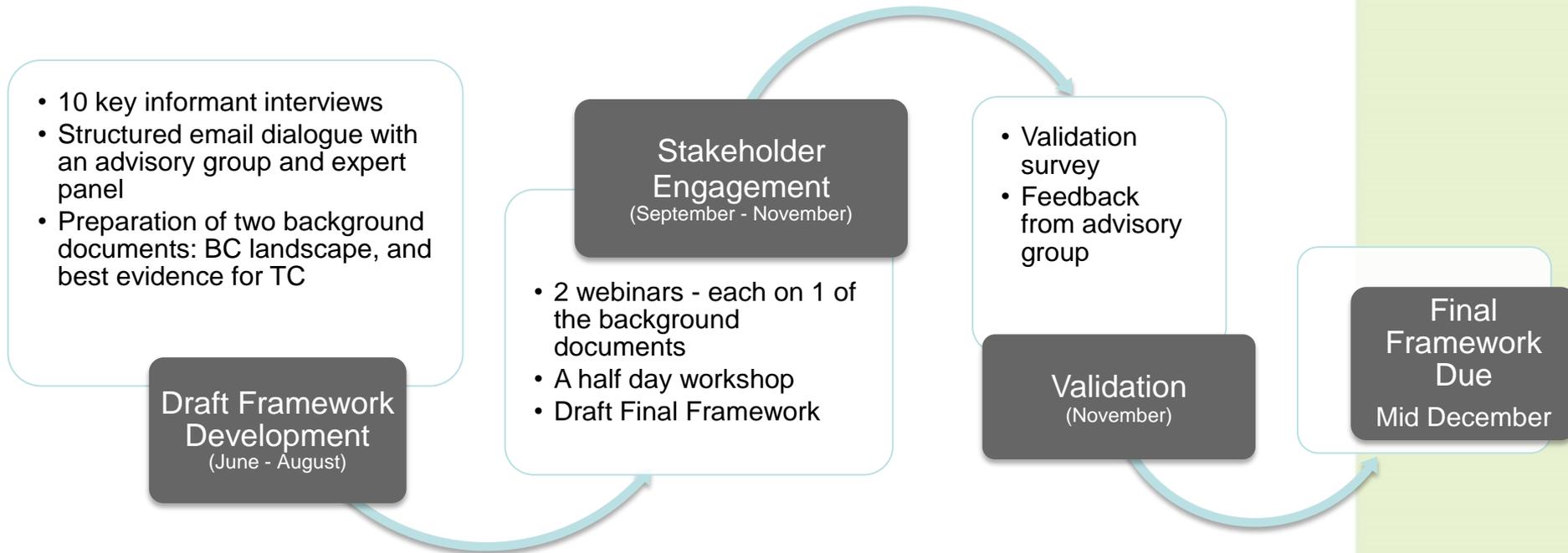
# Making Sustainable Change in a CAS

- Requires acknowledging that you're working within a complex adaptive system
- There are no one-shot silver bullet solutions!
- Leadership distributed throughout the organization
- Engaging the right people in dialogue at the right time to promote a shared vision and values and to foster collaborative relationships
- Effective, ongoing communication and rapid feedback loops

# Making Sustainable Change in a CAS

- Tolerance of difference and conflict
- Encouragement of emergent solutions, risk taking and innovation
- Knowledge of the 'simple rules' affecting system performance
- Willingness to take action in the absence of perfect evidence
- A supportive, learning environment
- Expectation that there will be course corrections (complex adaptive systems are *adaptive*)

# In Preparation of a Guiding Framework for TC in BC



# How Can you Get Involved?

- If you received an invitation to this session directly from Jack Boomer, you will be invited to the webinars and the validation survey
- If you didn't, contact Jen Bitz at [jen.bitz@in-source.ca](mailto:jen.bitz@in-source.ca) to be put on the list
- Forward any research or information you think is relevant for the BC tobacco framework to Jen



*Research Expertise for Health System Solutions*

**Gregg Moor**  
**Project Manager and Director**  
**InSource Research Group**  
**[gregg.moor@in-source.ca](mailto:gregg.moor@in-source.ca)**  
**[www.in-source.ca](http://www.in-source.ca)**