

Introduction to the Use of Systems Thinking to Create a High-Leverage Civic Agenda



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What is a system?

- A **system** is a group of interacting, interrelated, and interdependent elements forming a complex whole.



Examples of systems

- The Greater Boston region
- Boston
- A forest
- The health care system
- An organization or corporation
- A family
- A person
- A single cell



Systems Thinking

A conceptual framework and set of tools that help us to understand:

- interrelationships and interconnections
- how systems behave over time
(i.e. *dynamic complexity* – change)



How has systems thinking been used?

- Systems thinking has been used in business, public health, the environment, international relations, and many other areas:
 - GM used it to understand the leased vehicle market, protecting as much as 25% of their profits in 1997
 - The US General Accounting Office used it to understand how financial guarantee programs can go wrong
 - DuPont realized savings of \$350M a year using systems thinking to improve maintenance



How can systems thinking help us?

- Makes it possible to understand complex and dynamic economic, social, and environmental problems, perspectives and trends
- Allows us to elicit, clarify, and reconcile our assumptions and **mental models** of how the world works
- Can help to design high-leverage policies for success
- Can help to improve collaboration

Why is it important to understand systems?



- **Today's problems often come from yesterday's solutions**
 - Sprawl is partly the result of yesterday's highways expansion to ease traffic congestion
 - Some of today's homeless population is the result of the deinstitutionalization of the mentally ill
 - Gentrification in some neighborhoods is a function of great local success
- **The harder you push, the harder the system pushes back**
 - Campaign finance and other reform efforts meet resistance from within the current system

Why is it important to understand systems?



- **Cause and effect are not necessarily close together in space or time**
 - Driving your car and its effect on global warming
 - Prenatal care and educational outcomes
- **The cure can make the situation worse before it gets better**
 - MCAS testing? (The jury is still out.)
- **“Tipping Points” can create unanticipated and dramatic change**
 - Reduction in crime rates as a result of collaborative action
 - Fads in fashion and behavior

Why is it important to understand systems?



- **There are very few effective, high-leverage policies.**



How do systems work?

- The way the pieces of a system are connected (i.e. its **structure**) determines the outcomes it can generate.
- Changing one part of a system may affect the behavior of other parts -- and the overall system -- in complicated ways over time.
- You can understand each part of a system in isolation and still have no idea how the overall system behaves.



Common problems that systems thinking can help us understand

- **Shifting the burden:** imported food aid decreases market for local food, bankrupts farmers and results in less capacity to grow food locally
- **Drifting goals:** rigid effort to improve test scores decreases students' desire to learn, undermining goal of education
- **Fixes that backfire:** hospital reduces nurses to cut costs, loses confidence of patients, loses market share
- **Overshoot and collapse:** speculation leads to inflated stock prices, which is followed by a sudden collapse (e.g. the tech bubble/burst)



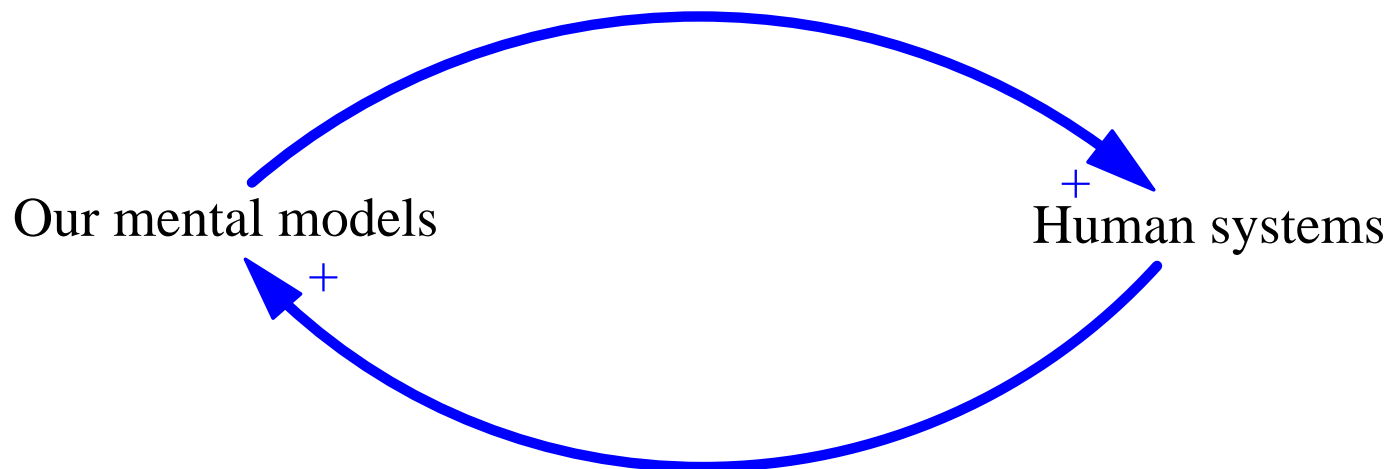
Common problems that systems thinking can help us understand

- **Limits to success:** a beautiful national park attracts so many people it deteriorates
- **Success to the successful:** wealthy people able to send their children to good schools, helping them succeed relative to lower income children of equal intelligence, merit
- **Tragedy of the commons:** everyone depletes or despoils a shared resource no one is responsible for (ocean fisheries, a clean river used for drinking water)



How do we influence systems?

Human systems are the reflection of our **mental models** and vice versa



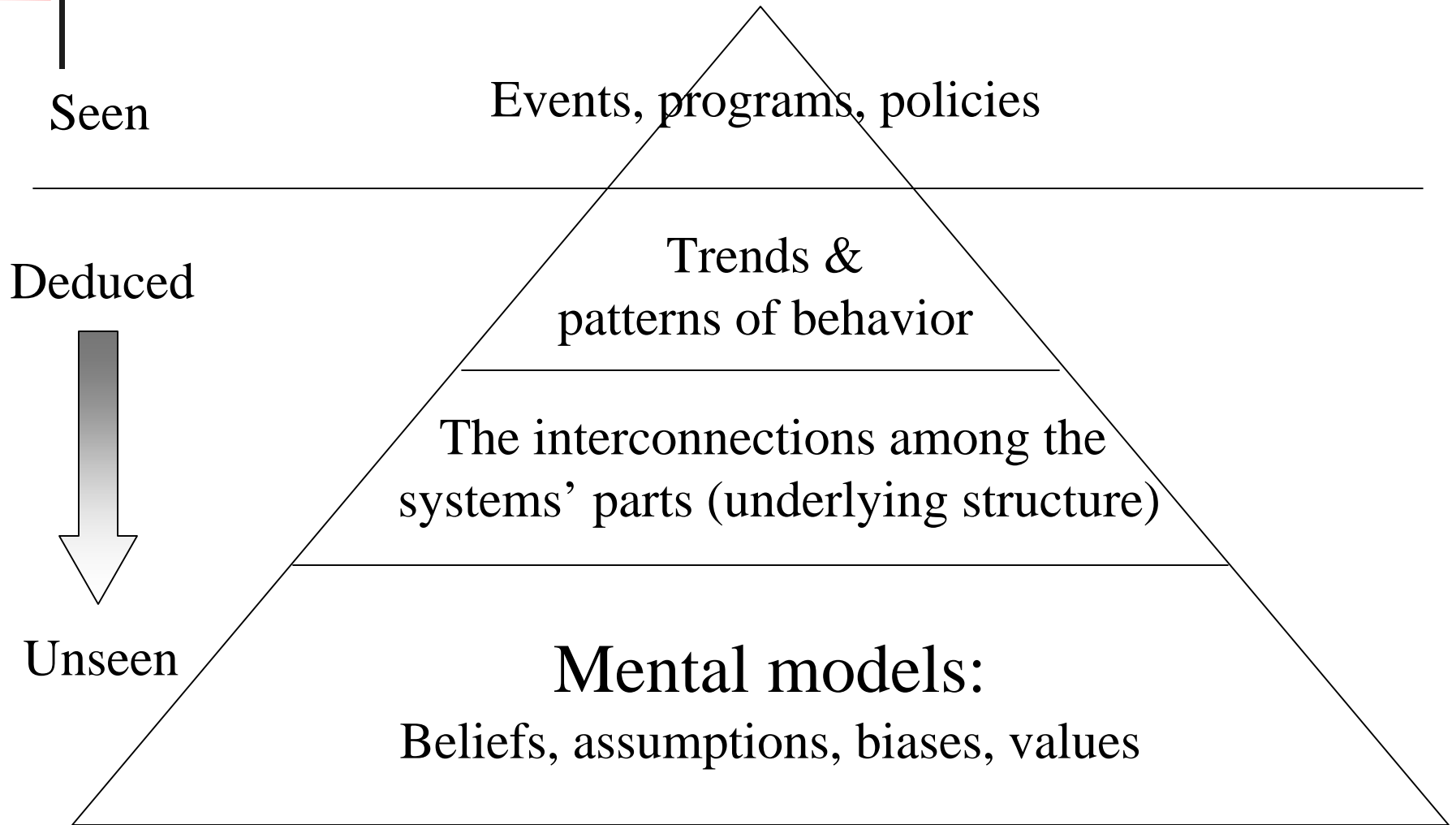


Mental models

- **Mental models** are defined as our *beliefs* about the systems of causes and effects in the world.

These include our assumptions, attitudes, values, and our understanding of how we think the world works.

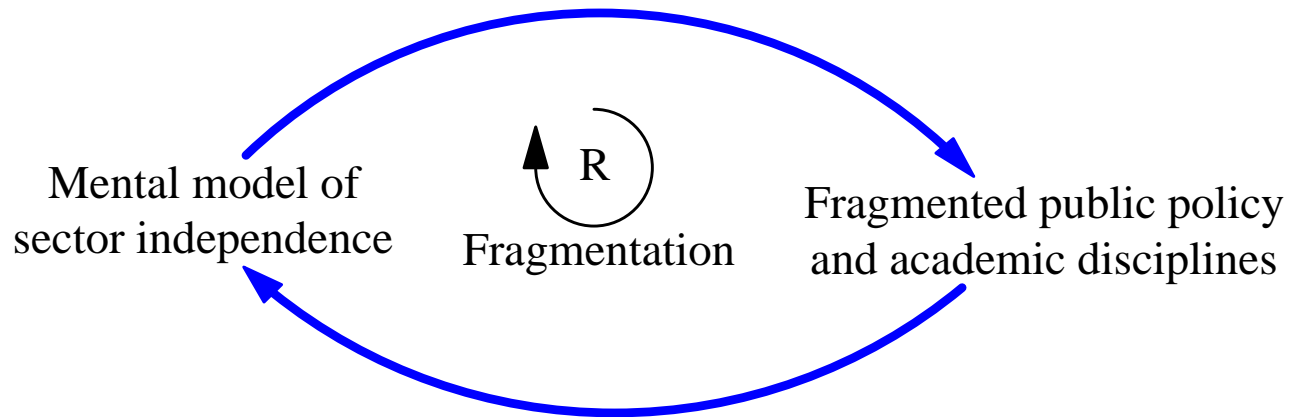
The Systems "Iceberg"



Adapted from Innovations Associates, Inc.

Example

- Assumption: Sectors (social, economic, environment) operate independently





Features of mental models

- Like all models, they are only approximations of reality
- They are partly conscious and partly subconscious
- Engaging others' perspectives can help us to improve our mental models together

For more information see Senge, 1990; Sterman, 2000; Argyris, 1992

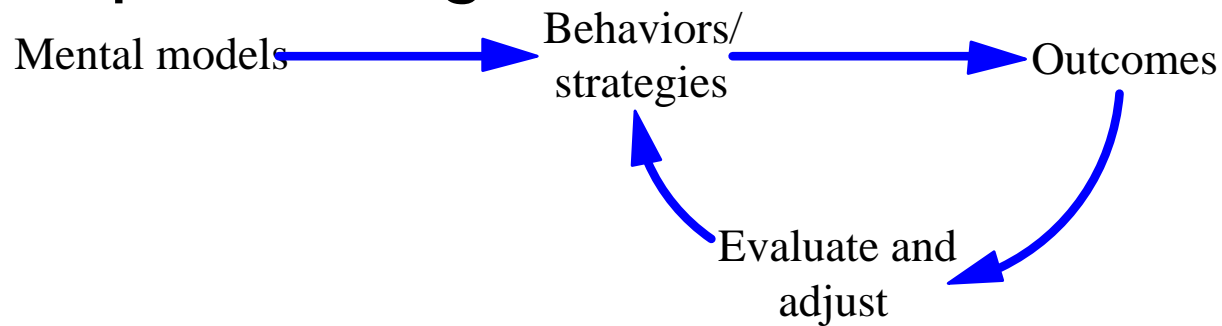
Learning about our mental models



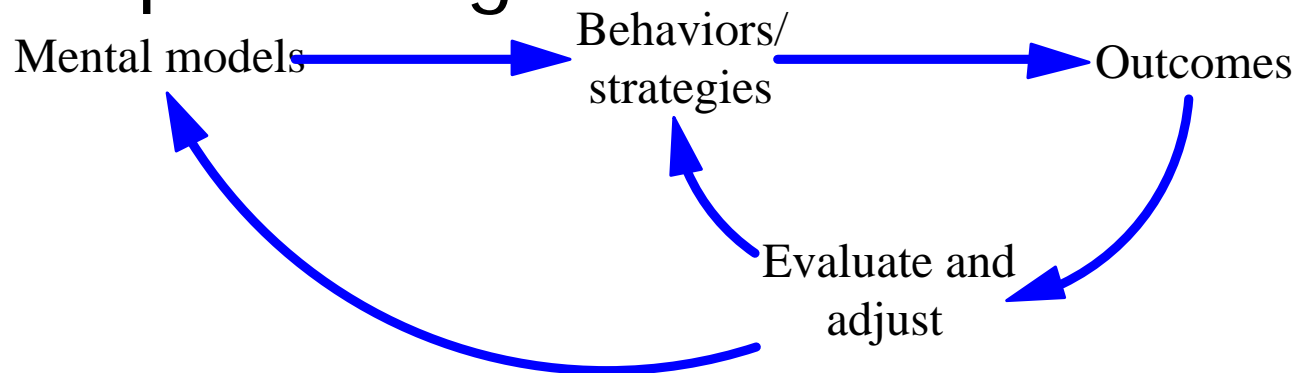
- **Dialogue** and **systems thinking** can help us to understand our own perceptions and reconcile them with others' – to create, together, a better “brain” to grasp complex reality
- Our ground rules today help us to create space for dialogue

Double-loop learning is needed to develop effective strategies

Single loop learning



Double loop learning





Building our understanding

- Focusing on trends helps us to understand underlying systems and to see how things *change* over time
- Computer simulation can help us to understand how systems change over time
- With this new understanding we can begin to develop **strategies for change** that move us closer to our vision

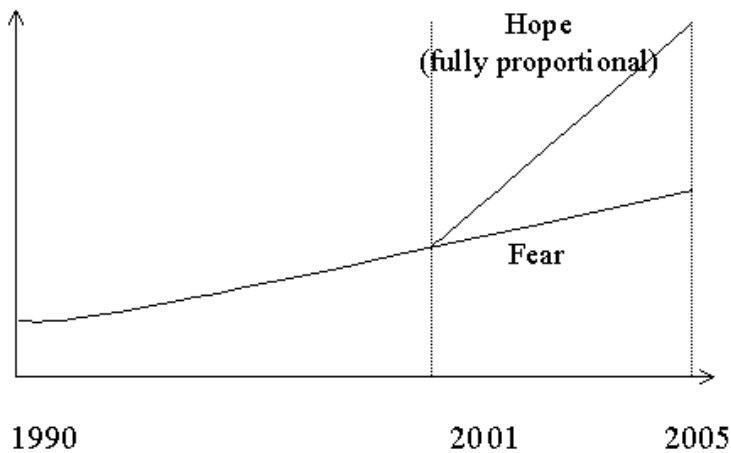


Building our understanding

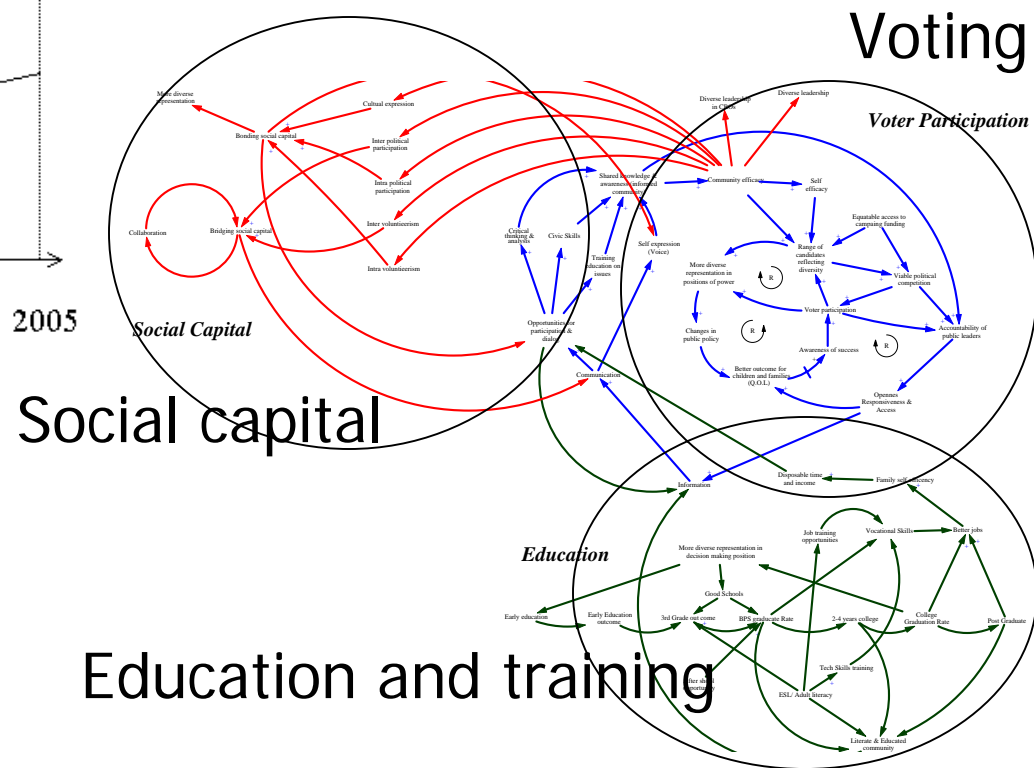
- We have already begun to investigate a few trends
- Your perspectives will contribute to our shared understanding of other trends
- Work has been begun on...

We can also begin to see patterns and connections

7) Diversity of representation in leadership position in all sectors



Civic participation



Note: Untested hypotheses



High-Leverage Strategies

- Once we understand the systems in which we operate, we can identify **drivers** and look for **high-leverage strategies**



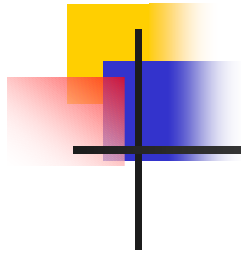
High-Leverage Civic Strategies are...

- **Well-focused**
- **Change the way people think and act**
- **Affect the system drivers**
- **And produce significant, enduring improvements**



We believe that they will also...

- Appeal to diverse constituencies
- Inspire confidence and hope
- Impact multiple sectors simultaneously
- Expand rather than consumes resources
- Encourage and harness civic participation and private investment
- Use coordinated and efficient decision-making and implementation
- Be time bound



- But where does the motivation for “change” come from?



Vision / Current reality

- Our desire for change results from the creative tension between our vision for the future and a truthful assessment of current reality