4.669...
Evaluation & Planning

Drawing From Complexity Science to Inform Program Theory, Methodology, and Data Interpretation

Workshop for the Australian Evaluation Society

Jonathan A. Morell, Ph.D.
4.669 Evaluation and Planning

Download slides from here.

Phone   +1 734 646-8622
Website   www.jamorell.com
Email   jamorell@jamorell.com
Blog   https://evaluationuncertainty.com/
YouTube   https://www.youtube.com/channel/UCqRIJjhqmy3ngSB1AF9ZKLg

Workshop goals

- Provide tools and knowledge to incorporate complexity into program theory, evaluation design, data interpretation and working with stakeholders.

	Evaluation Intellectual Traditions							
	RCT	CIPP	Realist	Process tracing	Empowerment	Developmental	Outcome harvesting	Others
models								
data needs								
methodologies								
data interpretation								
acceptable answers								
questions to engage								
convincing arguments								
hypothesis generation								
choice of research design								
assembling research teams								

Part 1   Intellectual History

Part 2   Cases to practice on if workshop participants don't offer their own. Presented here to give you something concrete to map workshop material into
stimulate thinking about your own cases

Part 3   Complexity Knowledge. What can we know and how can we know it?
- Spoiler alert: We are already well versed in most of the tools and methodologies we will need.

Part 4   Some constructs from complexity that evaluators will find useful

Part 5   When not to invoke complexity

Part 6   A few more constructs from complexity that evaluators will find useful

Part 7   Working with Stakeholders   analysis → planning

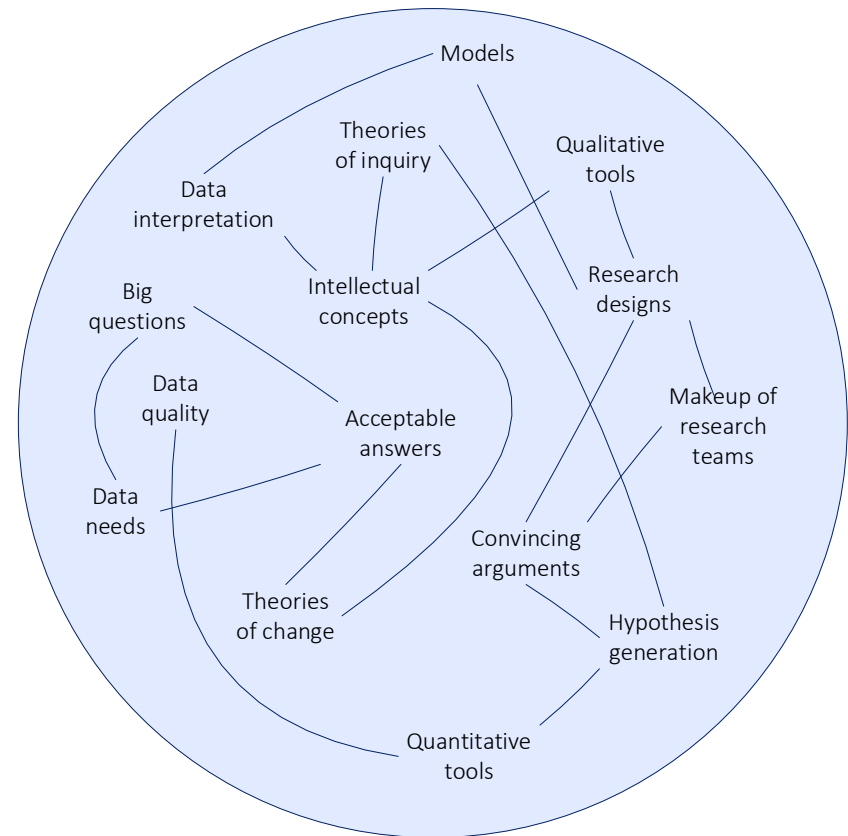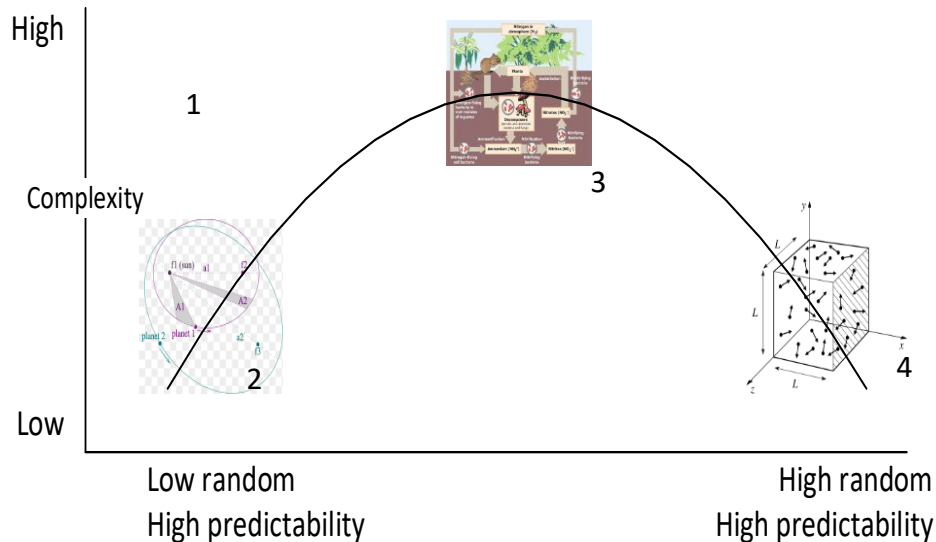Part 8   Evaluation writing that invokes complexity

Every field has its own:
- Favorites
- Standards
- Criteria and
- Preferences

Elements are networked
- Emergent inquiry is different from any single component.

Complexity domain

High

Complexity

Low

1

2

3

4

Low random
High predictability

High random
High predictability

Models

Theories of inquiry

Qualitative tools

Data interpretation

Big questions

Intellectual concepts

Research designs

Data quality

Acceptable answers

Makeup of research teams

Data needs

Theories of change

Convincing arguments

Hypothesis generation

Quantitative tools

Evaluators
- Need to appreciate how Complexity Science can inform their work, but
- should not become complexity scientists.

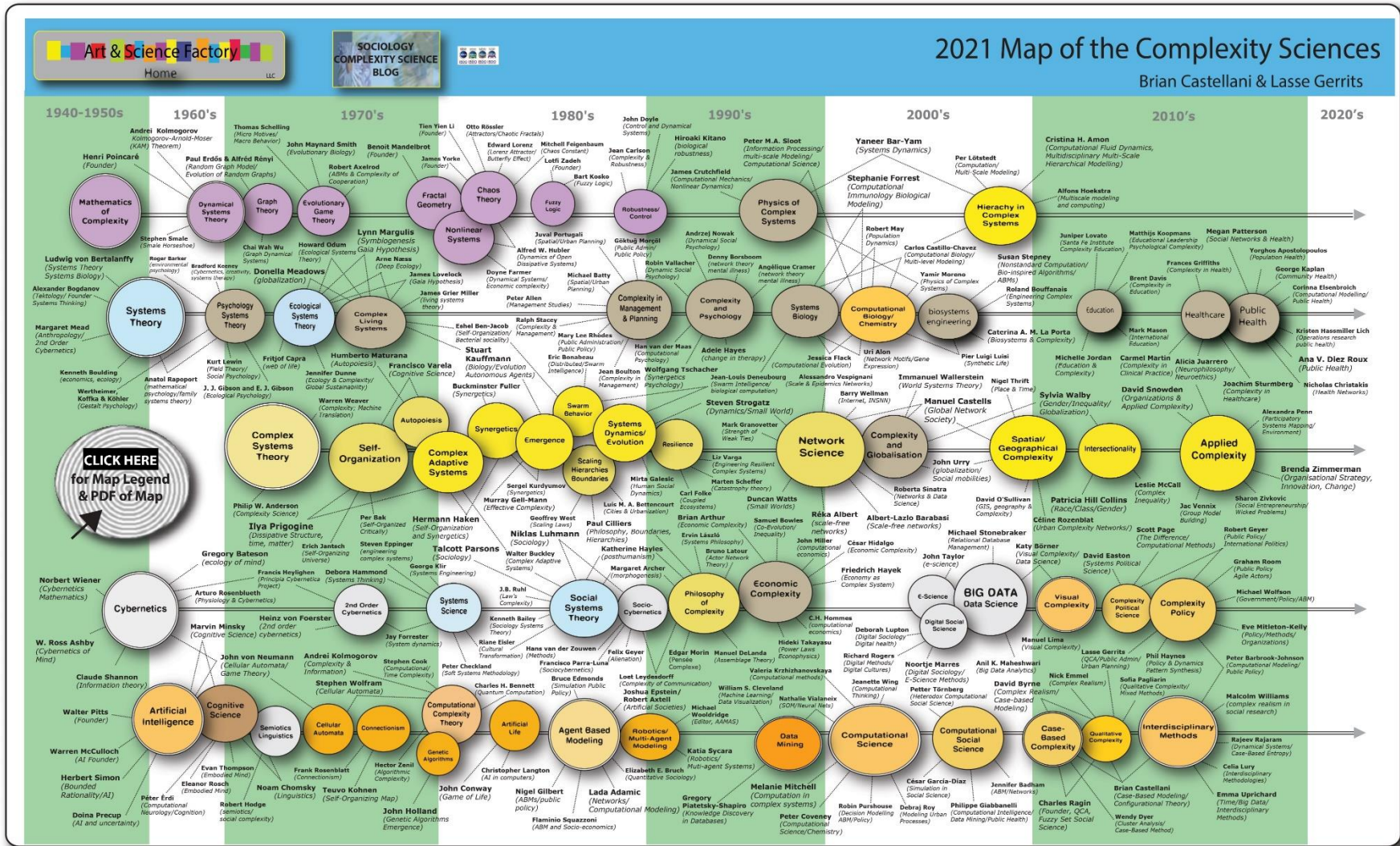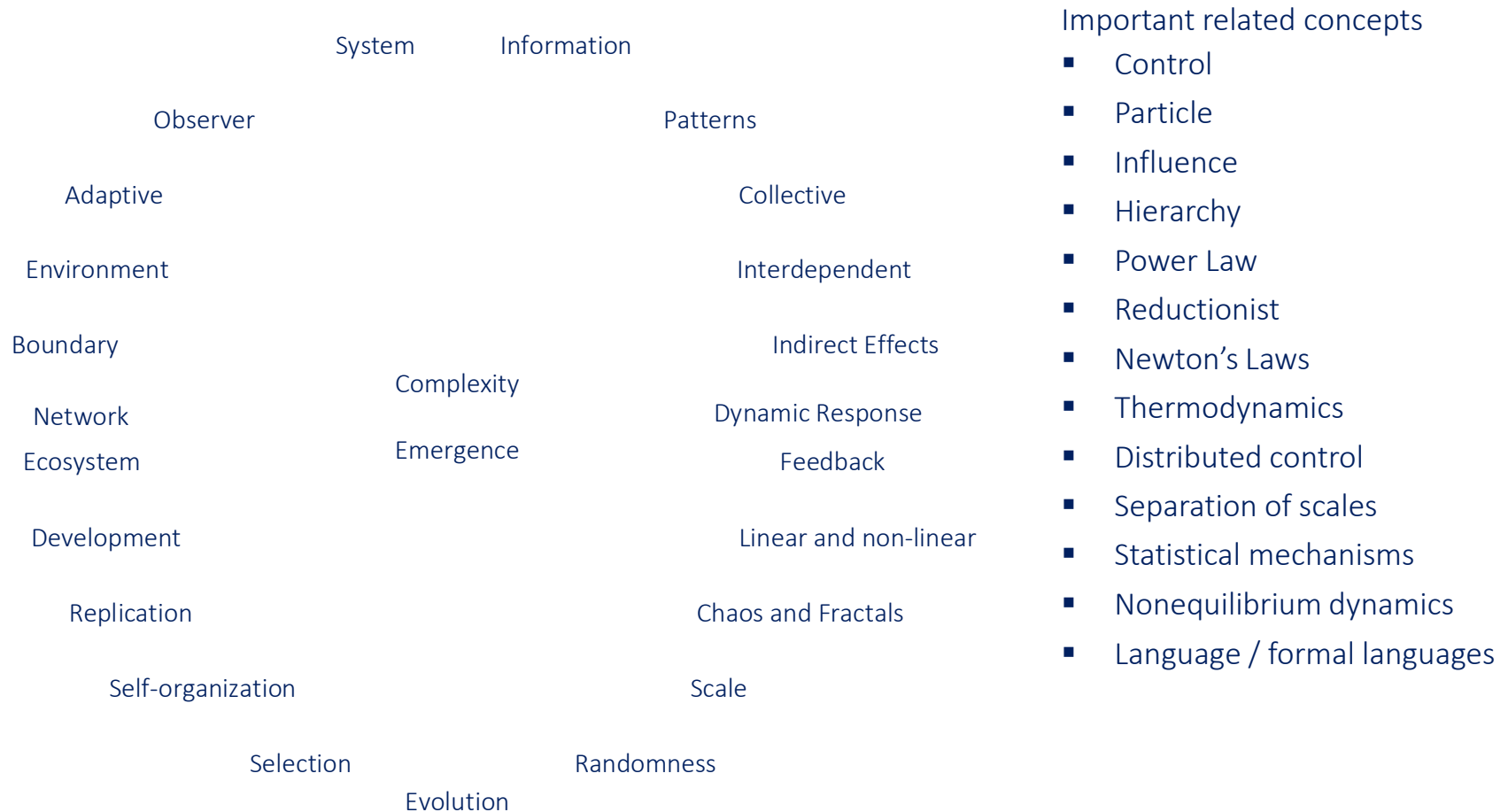1- Adapted from: David Krakauer What is Complexity?
2- https://www.pngegg.com/en/png-ovskm
3- https://en.wikipedia.org/wiki/Ecosystem
4- https://cosmolearning.org/courses/statistical-mechanics-particles/

Complexity: Historical View*

2021 Map of the Complexity Sciences
Brian Castellani & Lasse Gerrits

- https://www.art-sciencefactory.com/complexity-map_feb09.html

Complexity: Concept Map View*

System　　　Information

Observer　　　　　　　　Patterns

Adaptive　　　　　　　　　Collective

Environment　　　　　　　Interdependent

Boundary　　　　　　　　　Indirect Effects

　　　　Complexity

Network　　　　　　　Dynamic Response

Ecosystem　　Emergence　　Feedback

Development　　　　　Linear and non-linear

Replication　　　　　　Chaos and Fractals

Self-organization　　　　　Scale

Selection　　　　　Randomness

Evolution

Important related concepts
- Control
- Particle
- Influence
- Hierarchy
- Power Law
- Reductionist
- Newton's Laws
- Thermodynamics
- Distributed control
- Separation of scales
- Statistical mechanisms
- Nonequilibrium dynamics
- Language / formal languages

* Adapted from: Concept Map, New England Complex Systems Institute 2011 Yaneer Bar-Yam

So, is there a "Complexity Science"?

Considering the social organization of a body of knowledge people call Complexity Science and the intellectual connections across work that is done, it's fair to say "yes". [1]

But as with so much of history, there is a contrary view [2]

The current vogue is for the third of the three C's: complexity. The buzzwords here are emergence and self-organization , as complexity theory seeks to understand how order and stability arise from the interactions of many components according to a few simple rules … . But very often what passes today for 'complexity science' is really something much older, dressed in fashionable apparel. The main themes in complexity theory have been studied for more than a hundred years by physicists who evolved a tool kit of concepts and techniques to which complexity studies have added barely a handful of new items.

1   Phelan, Steven E. 2001 What Is Complexity Science, Really? *Emergence* v3 https://doi.org/10.1207/S15327000EM0301_08
2   Ball, P. (2003) *Critical Mass: How One Thing Leads to Another*

Part 1   Intellectual History

Part 2   Cases to practice on if workshop participants don't offer their own.

Part 3   Complexity Knowledge. What can we know and how can we know it?
- Spoiler alert: We are already well versed in most of the tools and methodologies we will need.

Part 4   Some constructs from complexity that evaluators will find useful

Part 5   When not to invoke complexity

Part 6   A few more constructs from complexity that evaluators will find useful

Part 7   Working with stakeholders   analysis → planning

Part 8   Evaluation writing that invokes complexity

How to use this section
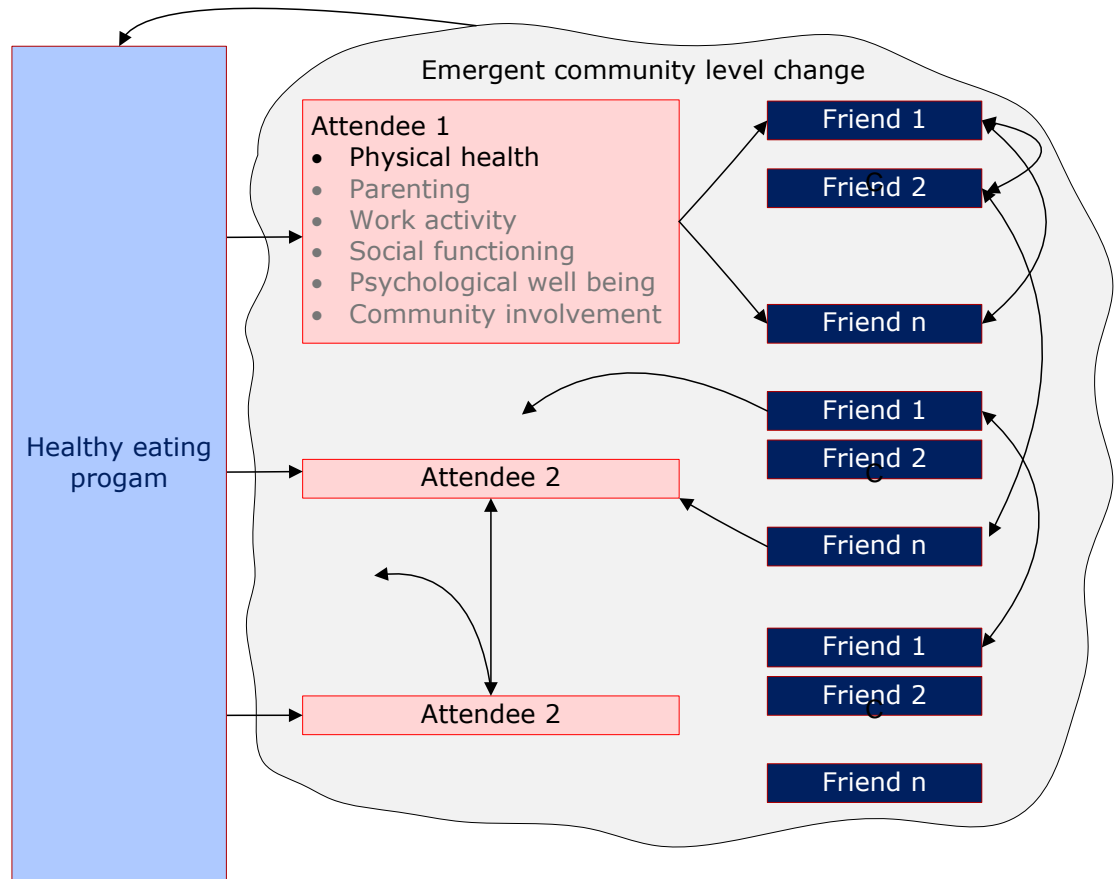
During the group exercises participants will be asked to apply the workshop material to specific cases. My hope is that members of the breakout groups will offer their own scenarios to work on. In case they don't, these are provided.

Case #1 Universal Literacy in a Geo-political Region

Theory:
- Literacy itself is desirable
- Widespread literacy will result in much change, most (if not all) of it desirable

Outreach to support attendance

Teacher training

Lower school fees

Improve physical infrastructure

Functional 8th grade literacy all people 15 – 18 years old

Literacy support groups

Training community based teachers

Adult oriented materials

Functional 8th grade literacy all adults

Functional 8th grade literacy entire population

Whatever else may happen positive and negative, if anything

Case #2 Portfolio of Community Support for Parents and Children

- Any single program can have unanticipated positive and negative consequences.
- Programs can combine to have widespread consequences

Healthy Eating

Any / all interested civic organizations

Provide best practice curricula for healthy eating

Technical assistance on implementing training

Free choice for program offered

Reduce food deserts

Farmers' markets

Social marketing to produce demand

Coordinate purchase across multiple stores

Work with small stores to stock fresh food

Parenting

Any / all interested civic organizations

Provide best practice curricula for parenting for mothers and fathers

1:1 coaching on parenting

Referrals as needed

Teen alcohol

Materials and implementation support to schools who volunteer

Enforcement

Education to recognize false ID's, straw purchasers

High publicity inforcemenht

Publicizing stores that offend

Part 1   Intellectual History

Part 2   Cases to practice on if workshop participants don't offer their own. Presented here to
              give you something concrete to map workshop material into
              stimulate thinking about your own cases

Part 3   Complexity Knowledge. What can we know and how can we know it?
              ▪ Spoiler alert: We are already well versed in most of the tools and methodologies
                we will need.

Part 4   Some constructs from complexity that evaluators will find useful

Part 5   When not to invoke complexity

Part 6   A few more constructs from complexity that evaluators will find useful

Part 7   Working with stakeholders   analysis → planning

Part 8   Evaluation writing that invokes complexity

Complex behavior, plebian methodology

Data

- Health markers
- Influence on friends
- Programming change
- Community level changes
- Immediate impact on participants
- Secondary impacts on participants
- What was implemented -- # of components, order

Methodologies

- Process tracing
- Records review
- Change over time
- Program activity monitoring
- Content analysis of social media
- Comparison with other communities
- Interviews (program staff, attendees and others)
- Observation (program staff, attendees and others)

Healthy eating progam

Emergent community level change

Attendee 1
- Physical health
- Parenting
- Work activity
- Social functioning
- Psychological well being
- Community involvement

Friend 1
Friend 2
Friend n

Friend 1
Friend 2
Friend n

Attendee 2

Attendee 2

Friend 1
Friend 2
Friend n

Exceptions

- Agent and system dynamic modeling
- Formal network structure
- AI applications

If we can recognize complex behaviors, we can predict with high accuracy.

If complex systems are so unstable, why is there so much resistance to change?

Snowflake   Internet

Preferential attachment yields fractal patterns
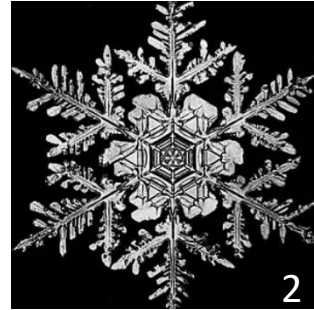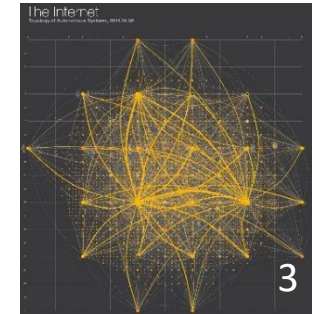
Scaling factors are common over a wide range of variables

Gross of Top 200 Movies 2011
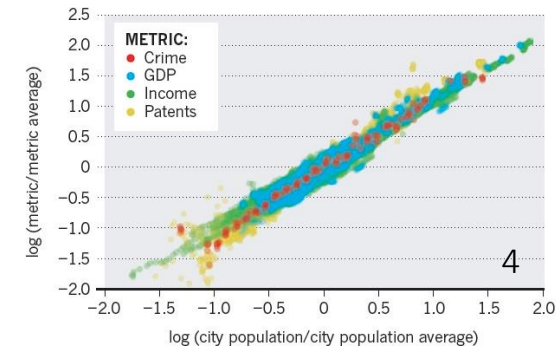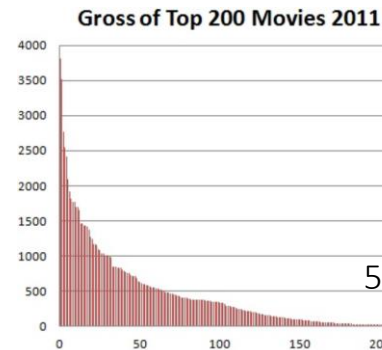
Emergence can often be expected

2   snowflake https://www.wbur.org/news/2022/02/25/snowflake-man-photographs-wilson-bentley
3   internet https://www.kaggle.com/general/177015
4   http://www.interculturalurbanism.com/?p=2879
5   https://praxtime.com/2012/12/16/digital-economics-the-hollow-middle/
6   https://motorlease.com/article/traffic-jams-explained/
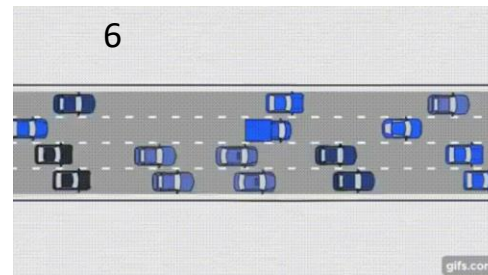
Prediction and explanation of model behavior
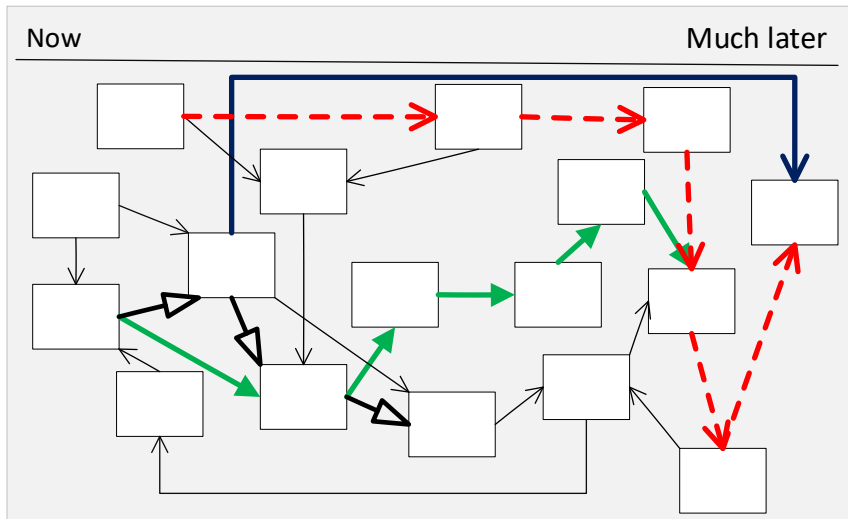
- Sensitive dependence – different model runs may
  o end at different locations
  o get to the same place through a different path
- Model evolution and adaptation
  o internal dynamics
  o environmental change
- But we may be able to identify
  o   network change over time
  o presence/magnitude of outcomes
  o "performance envelope" (attractor) of successful paths
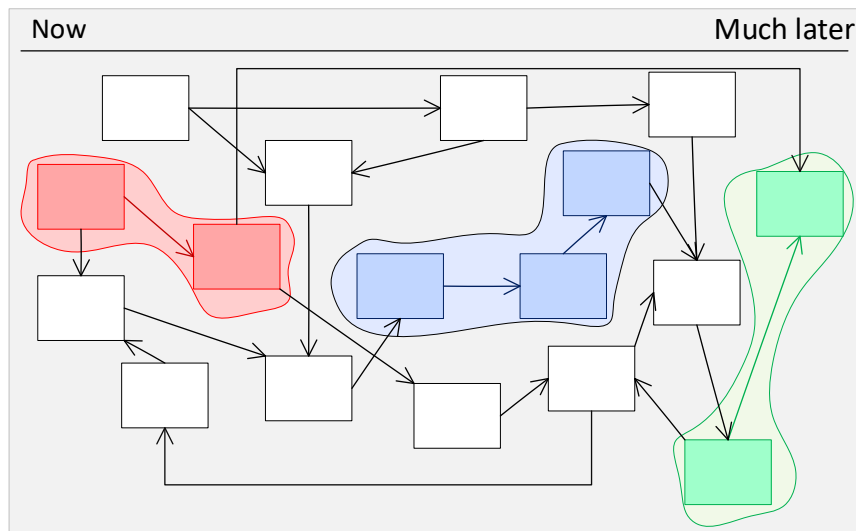
We sometimes can test relationships among a few elements
- Short time lag
- No feedback loops
- Few inputs and outputs

Part 1   Intellectual History

Part 2   Cases to practice on if workshop participants don't offer their own. Presented here to give you something concrete to map workshop material into
stimulate thinking about your own cases

Part 3   Complexity Knowledge. What can we know and how can we know it?
- Spoiler alert: We are already well versed in most of the tools and methodologies we will need.

Part 4   Some constructs from complexity that evaluators will find useful

Part 5   When not to invoke complexity

Part 6   A few more constructs from complexity that evaluators will find useful

Part 7   Working with stakeholders   analysis → planning

Part 8   Evaluation writing that invokes complexity

Use discrete tools. Think in terms of themes.

Complexity Science offers an intellectual shift

- Common sense → Foundation of research and theory
- Our social science world view → Complementary research and theory

	Complexity Theme		
	Pattern	Predictability	Change
Emergence			
Sensitivity to conditions			
Attractors			
Self-organization			
Stigmergy			
Scaling			
Evolutionary / ecological perspectives			

How much do you need to know?
- More is better
- At least more than minimal
- The statistics analogy holds

Actual order depends on discussion.
(And therein lies a message about complexity.)
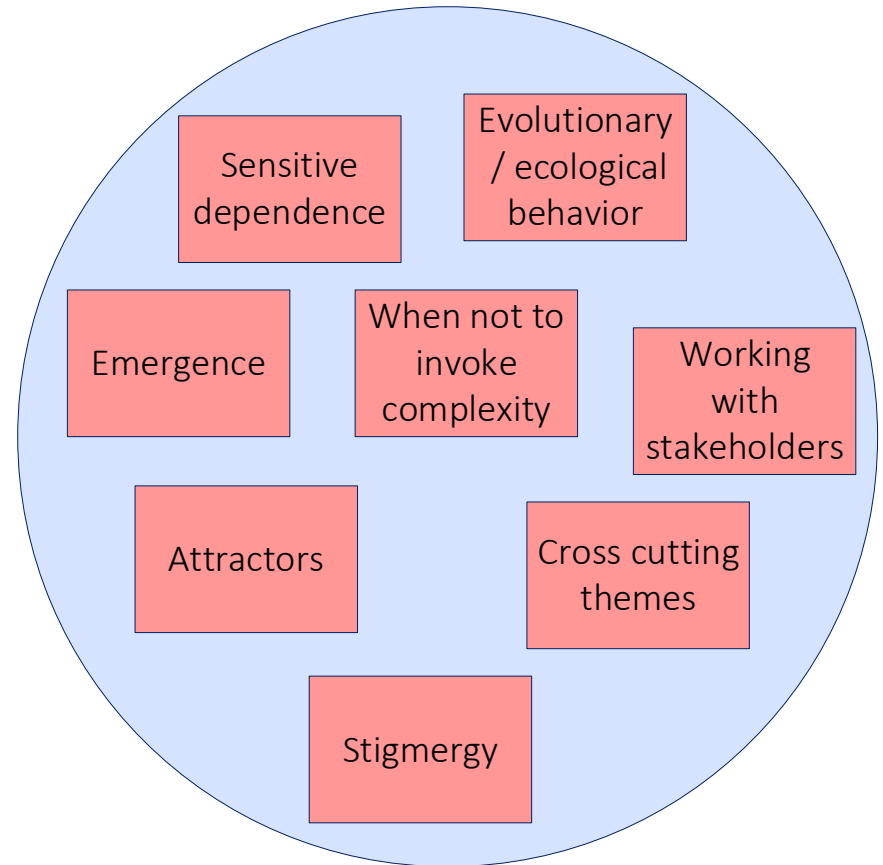
Emergence

A process by which a system of interacting subunits acquires qualitatively new properties that cannot be understood as the simple addition of their individual contributions.*

* Glossary at the Santa Fe Institute's Complexity Explorer

Ways to think about emergence
- Whole is greater than the sum of its parts
- "Emerged" phenomenon cannot be predicted.
- "Emerged" phenomenon cannot

Emergence

We know what a cylinder is and how it works to make a car go.

Image sources: URL: cylinder

Image sources: URL car

We know what a car is more than the sum of its parts.

- But the cylinder maintains its identity.
- Its unique contribution is always known.
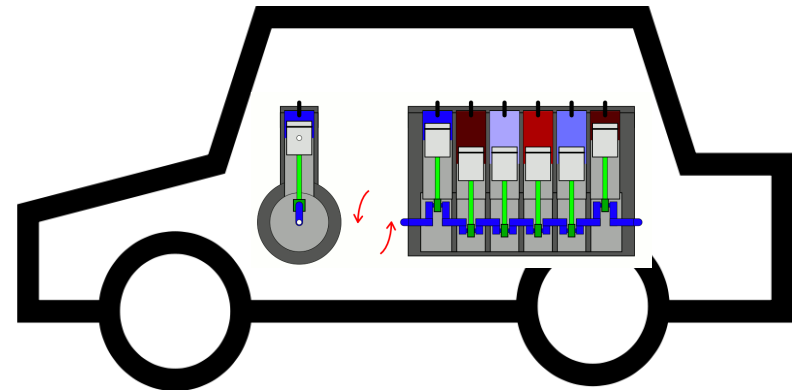
Image sources: cylinder, car, dog, school, traffic

"Urban vitality" as an emergent construct

A mix of many things that we can measure and calculate

- parks
- walkability
- inspiration
- transportation
- ethnic diversity
- cultural choices
- social networking
- like-minded people
- range of health care
- business opportunities
- educational opportunity
- others

Image sources:
Times Square
Jackson Heights Queens

Emergent construct

- May want to measure the parts, but
- Cannot explain it by knowing the parts
- Need a qualitatively different measure, e.g., real income.

Same adoption curve, different impact metrics

Diffusion of Innovations *

Market Share

New Users

| Innovators 2.5% | Early Adopters 13.5% | Early Majority 34% | Late Majority 34% | Laggards 16% | LikeFolio |
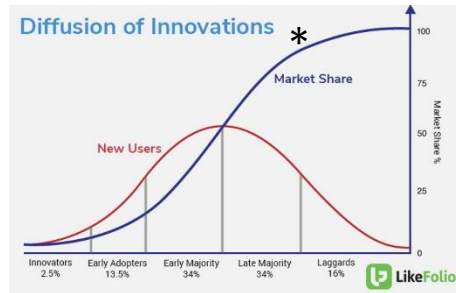
Connectivity in Internet Deseret
- New business activity
- Participation in civic groups

Qualitative transition

Flat screen TV
- # owned
- % penetration
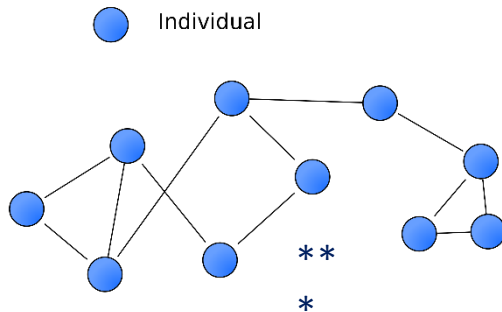
Individual

Groups of human beings, with members free to regulate themselves, tend to produce spontaneous order. **

Requires metrics of
- social organization,
- not individual behavior

**

*

*   Forbes: How To Spot Companies Accelerating Through The Adoption Curve
**   https://en.wikipedia.org/wiki/Emergence
***   Wykis - Own work, Public Domain,https://commons.wikimedia.org/w/index.php?curid=1618169

Emergence – Still more examples

Large scale social systems

Economic system[1]
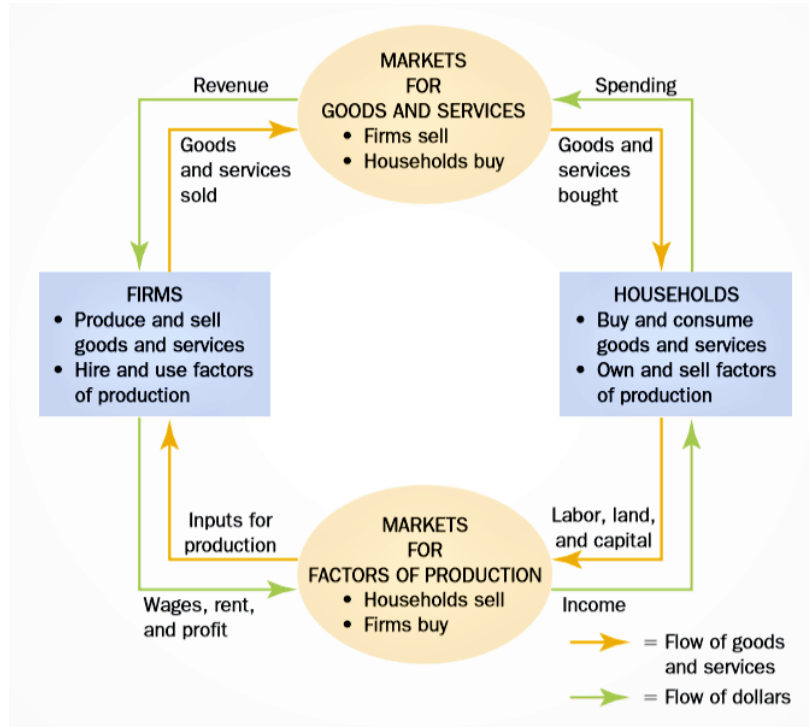
Many agent-based models

NetLogo models library[2]

Language change

Segregation

HIV

1 https://ilearnthis.com/a/circular-flow-diagram/
2 https://ccl.northwestern.edu/netlogo/

Sensitive dependence

A system's sensitivity to initial conditions

refers to the role that the starting configuration of that system plays in determining the subsequent states of that system.

When this sensitivity is high

slight changes to starting conditions will lead to significantly different conditions in the future. Sensitive dependence on initial conditions is a defining property of chaos in dynamical systems theory.*

* Glossary at the Santa Fe Institute's Complexity Explorer

If I told you these were the pieces of a program model and asked you to draw the logic of causation, what might it look like?

Program

Outcome 1

Outcome 2

Outcome 3
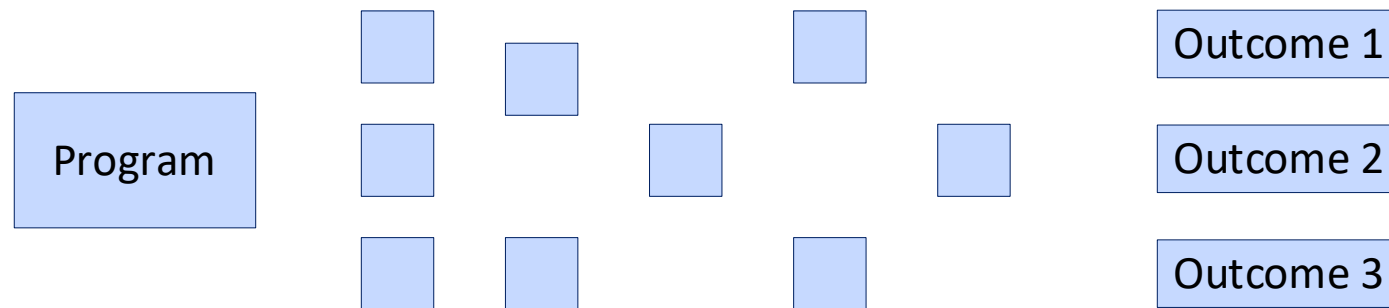
Sensitive dependence
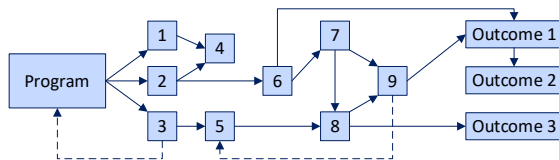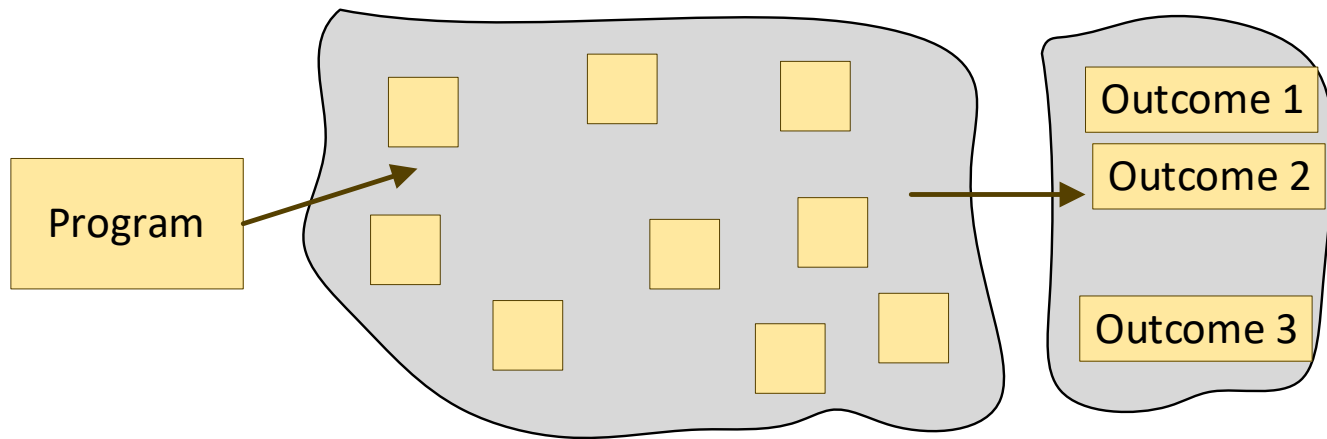
It would look something like this.

Do   these things

In   this order

And   these things will happen
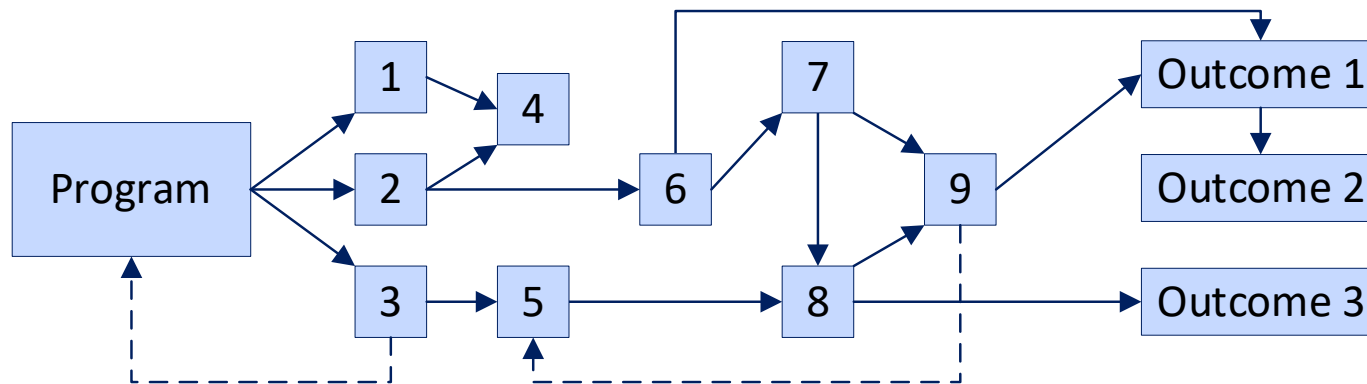
Sensitive dependence implies a model more like this

Do
- a lot of these things
- based on research, theory, and experiment

And
- a lot of these things will happen
- along unpredictable outcome paths
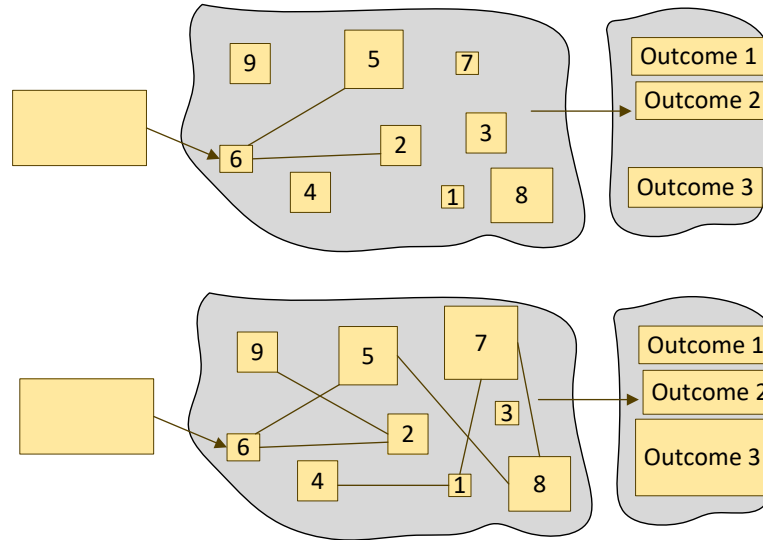- over time network relationships will develop

Sensitive dependence

- Small changes can affect a trajectory
- What path happened can be discovered
- What path will happen cannot be predicted
- One or many possible paths can lead to the same outcome
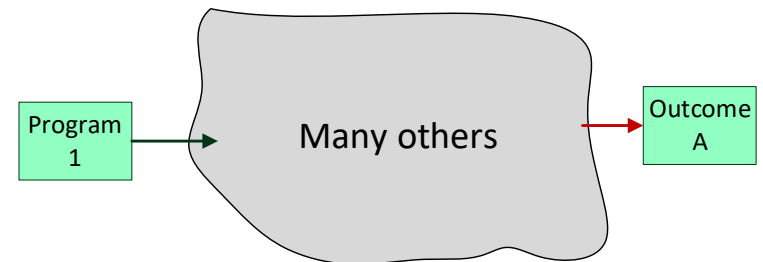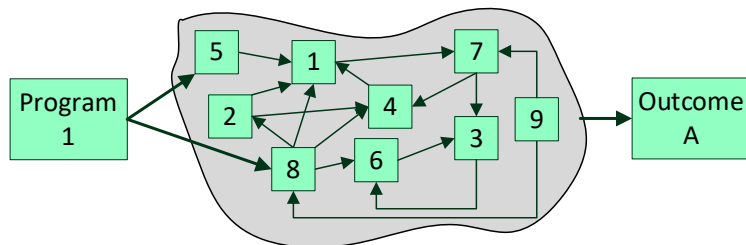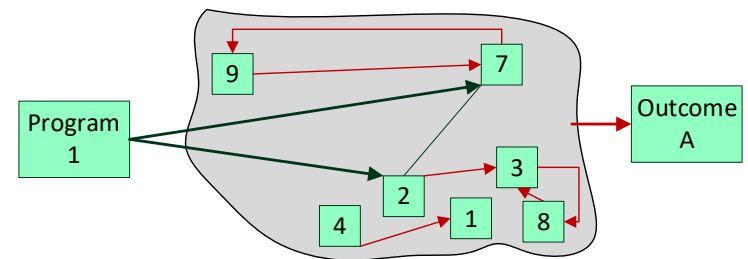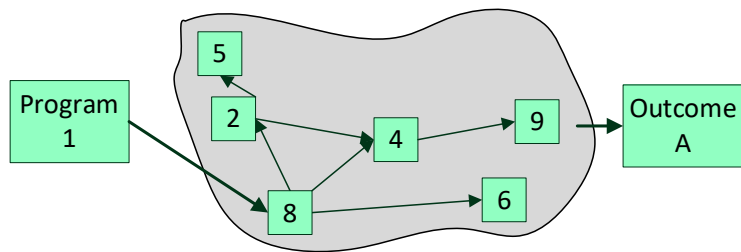
Sensitive dependence

What can we know?

|	
History	▪ What path led to success or failure
	▪ Whether multiple paths worked
	▪ Similarities in successful paths
Connections	▪ Change in network relationships over time
Magnitude of change	▪ Program elements
	▪ Outcomes
Policy makers find it hard to predict events	but they can and should anticipate developments.

Sensitive dependence models have decreasing certainty as range expands.
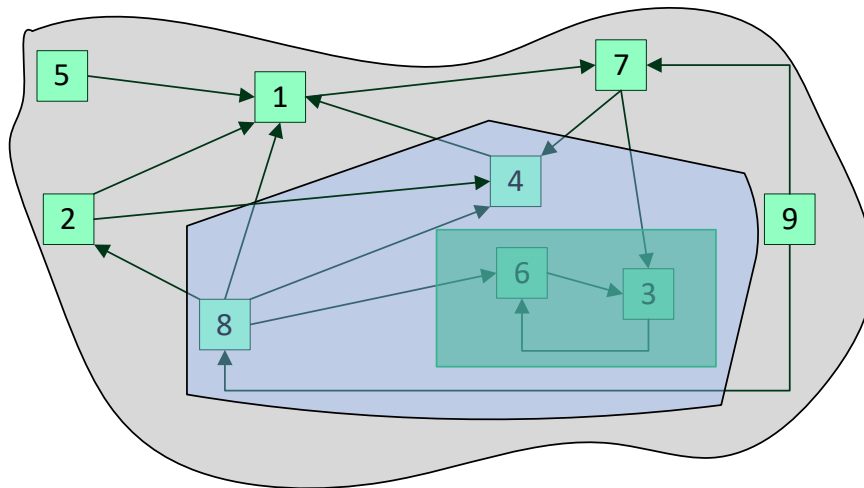
3 - 6   High

3, 4, 6, 8   OK

1, 2, 3, 4, 5,   Minimal
6, 7, 8, 9

Attractor

Where systems like to be
- resistance to change
- sustainability of change

In dynamical systems — an attractor is a value or set of values for the variables of a system to which they will tend towards over enough time, or enough iterations.*
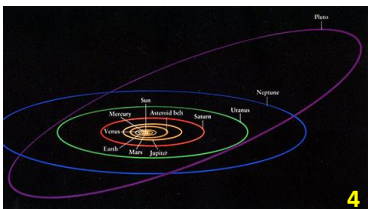

Social attractors — define a specific subset of states that a social system may take, which corresponds to its normal behavior towards which it will naturally gravitate**

Values close enough — remain close if slightly disturbed

Properties toward which a system evolves — regardless of starting conditions

1-http://www.livescience.com/images/i/000/087/324/original/river-basins.jpg
2-https://www.mnn.com/earth-matters/animals/quiz/what-do-you-call-these-groups-of-animals
3-http://barronberry.com/firm-news-and-events/celebrate-national-playground-safety-week-keep-your-kids-safe/
4-https://i.stack.imgur.com/cj3xs.jpg
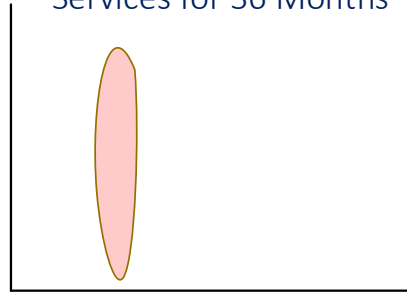
* Glossary at the Santa Fe Institute's Complexity Explorer
** Glossary at the Systems Innovation Network
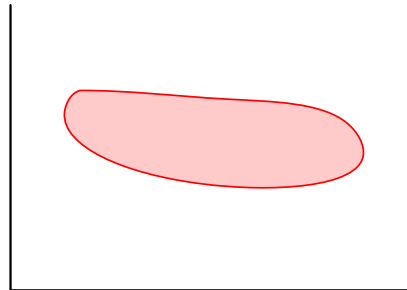
Social Attractor

Unhoused x # Receiving Services for 36 Months

"reachable" unhoused population

receiving mental health services

- # of unhoused changes
- narrow range of people served

What are the implications for each scenario?
- Service planning
- Resource planning
- Understanding need?

- amount of service varies
- despite a constant need

Why is there monthly variation?
- weather
- # unhoused
- office space
- # counselors
- monthly budget
- # student interns
- police behavior
- # outreach workers
- willingness to seek help
- much more
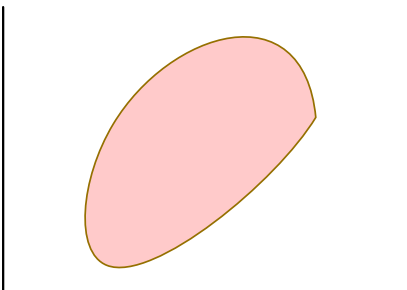
- Need and service scale pretty well.

Regulatory agencies tactics fluctuate
- Punitive
- Cooperative

Based on
- Political will
- Time since a dramatic accident
- Satisfaction with level of safety

Regulatory Agency Stance to Industry

Punitive | Collaborative

Regulatory Agency Stance to Industry

Punitive | Collaborative

Collaborative climate at the time a novel collaboration based safety program is introduced
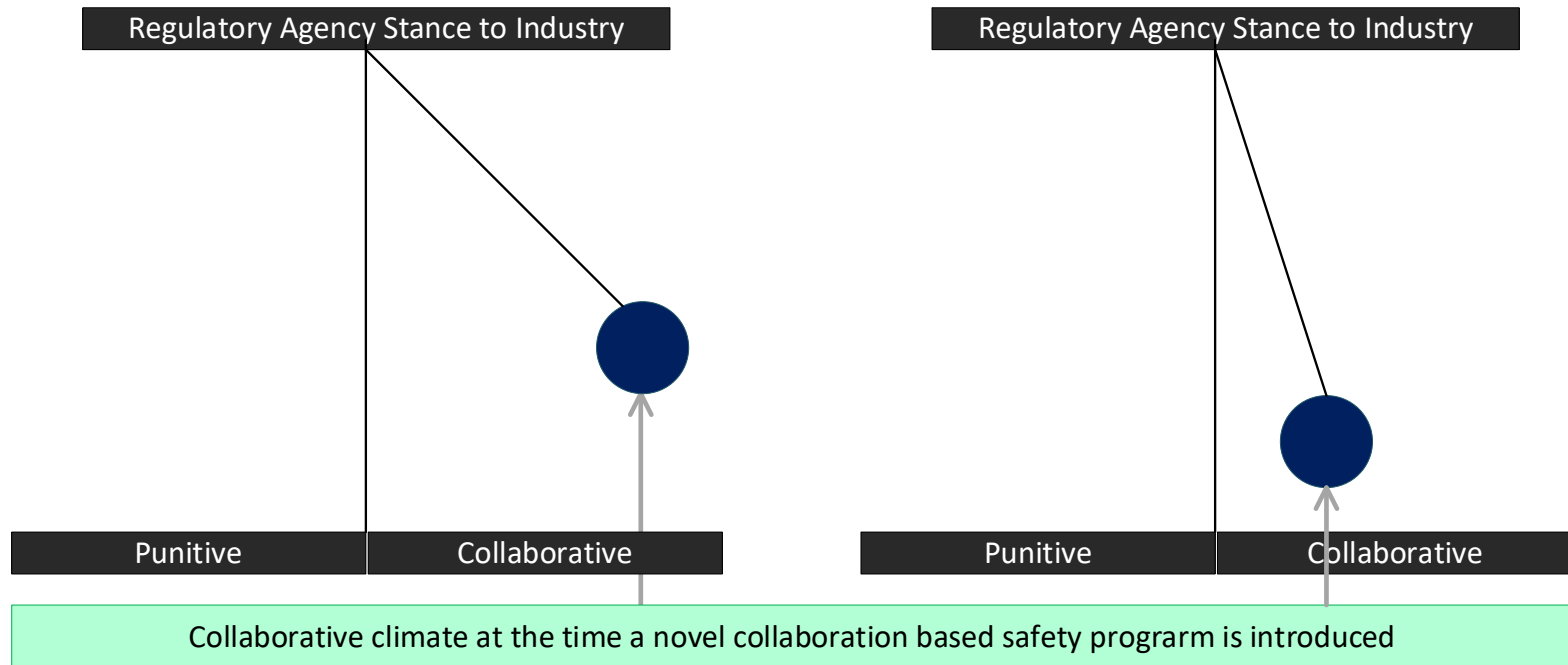
If the programs are equally effective, and the attractor is pendulum-like, then

what is the program's sustainability potential in each of these cases?

I would have done that anyway. Why invoke this foreign concept?

Compare across programs / program types

- What other types of programs, pursuing other outcomes, have the same attractor shape?

Is the change stable?

- How sustainable will change be?
- How much resistance to change will there be?

What attractor space describes the program's outcome?

- What is the range of values the outcomes can take?
- What patterns characterize those outcomes?

Why not think in terms of attractors?

- I would have done that anyway. No value added.
- The topics it raises don't matter.

Self organization is a related concept.

- A process in which pattern at the global level of a system emerges solely from numerous interactions among the lower-level components of the system.
- Moreover, the rules specifying interactions among the system's components are executed using local information, without reference to the global pattern.*

* Glossary at the Santa Fe Institute's Complexity Explorer

Evolutionary / Ecological Behavior

Shifting From
- Program Model to
- Model of the Program as a Charge in an Ecosystem
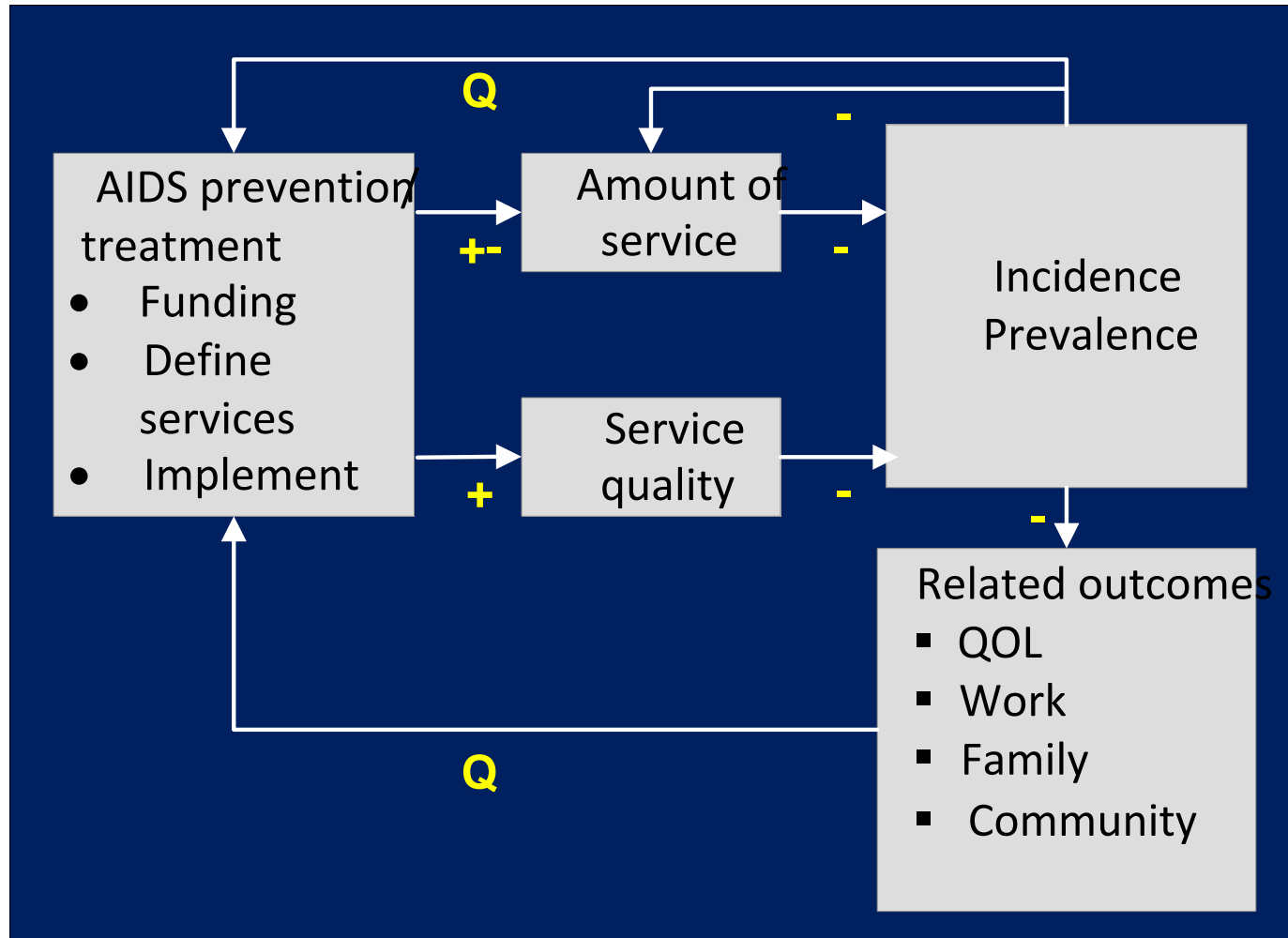
Evolutionary / Ecological Behavior

Outcome Maximization Program Theory
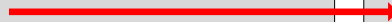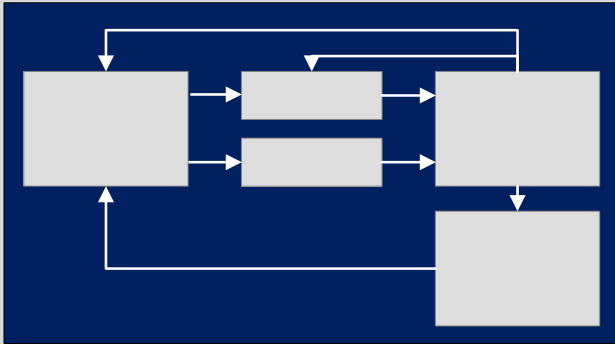
	Public Health	AIDS
After: Public health system		X
▪ Career choices		X
▪ Policy synergies		X
▪ Political capital		X
▪ Intellectual effort		X
▪ Skills people develop		X
▪ Informal relationships		X
▪ Supporting structures		X

Evolutionary / Adaptive Program Theory

Other | Tertiary | Routine | Women | Prenatal

Other | Tertiary | Routine | Women | Prenatal

Part 1   Intellectual History

Part 2   Cases to practice on if workshop participants don't offer their own. Presented here to
              give you something concrete to map workshop material into
              stimulate thinking about your own cases

Part 3   Complexity Knowledge. What can we know and how can we know it?
              ▪ Spoiler alert: We are already well versed in most of the tools and methodologies
                we will need.

Part 4   Some constructs from complexity that evaluators will find useful

Part 5   When not to invoke complexity

Part 6   A few more constructs from complexity that evaluators will find useful

Part 7   Working with Stakeholders   analysis → planning

Part 8   Evaluation writing that invokes complexity

Does invoking complexity always make sense? No.

- I would have done that anyway.
- It would be too resource intensive.
- It won't add value to the evaluation.
- My customer won't like it or benefit from it.
- It won't lead to different recommendations.
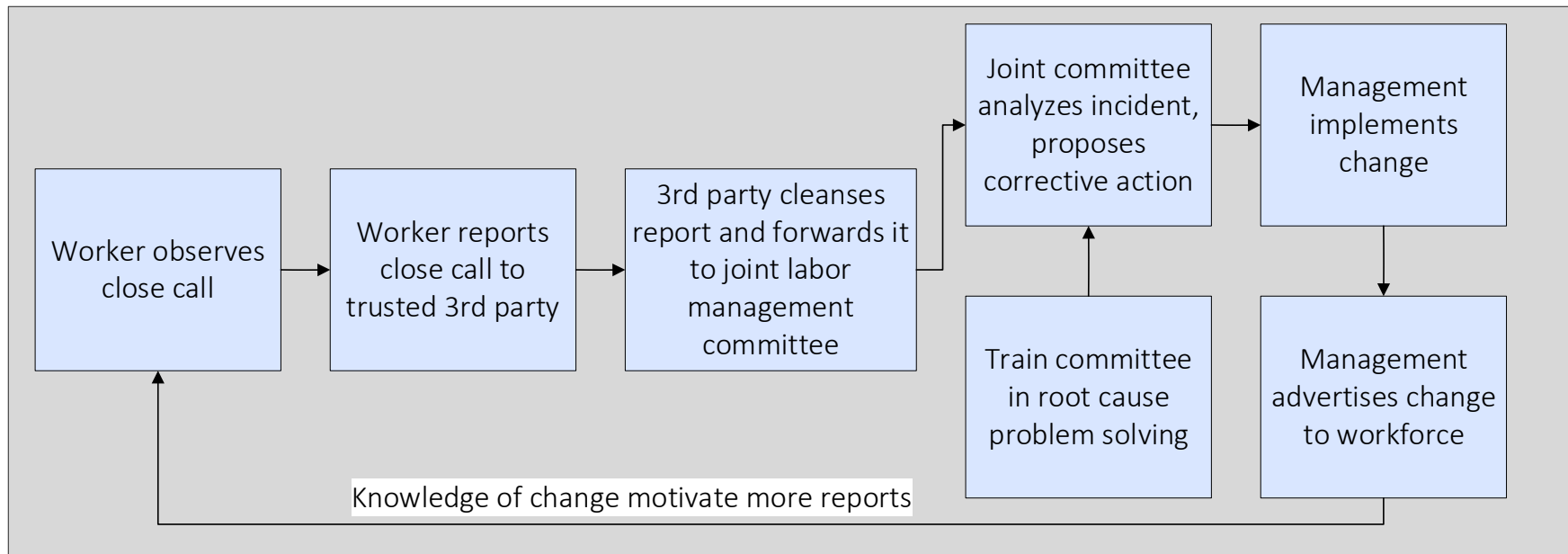- I don't have access to the necessary expertise.
- It won't lead to different understanding of how the program works.

Context
- Accidents are common in railroads.
- For legal and cultural reasons railroading is a blame based culture.
- Labor / management relations are fraught.
- Frank discussions of close calls do not take place

Program theory
- Knowing the root cause of "close calls" increases safety.
- Filtering reports through a trusted third party to scrub identifying detail will lead to knowledge of what happened and why.
- A diverse labor /management group can devise workable corrective actions

Worker observes close call → Worker reports close call to trusted 3rd party → 3rd party cleanses report and forwards it to joint labor management committee → Joint committee analyzes incident, proposes corrective action → Management implements change

Train committee in root cause problem solving → Joint committee analyzes incident, proposes corrective action

Management implements change → Management advertises change to workforce

Knowledge of change motivate more reports

Traditional if → then model

Build school infrastructure

Develop culturally appropriate curriculum

Hire teachers → Train teachers → Provide education → 80% of population have a functional 8th grade education

Set attractive fees and financial support → Outreach to students and families to support attendance

Complexity-based model

Build school infrastructure

Develop culturally appropriate curriculum

Much else

Hire teachers → Train teachers → Provide education

80% 8th grade education

Set attractive fees and financial support → Outreach to students and families to support attendance

Community leaders incease spport for education

Economy crashes, people cannot afford school fees.

	Most Likely Answer			
	Traditional		Complex	
	Yes	No	Yes	No
Environment considered?		■	■	
Cost easily accommodated?	■			■
Growth patterns recognized?		■	■	
Data requirements manageable?	■			■
Easily understandable to stakeholders?	■			
Important elements and connections missing?		■	■	
High % of findings provide actionable information?	■			■

Part 1   Intellectual History

Part 2   Cases to practice on if workshop participants don't offer their own. Presented here to
            give you something concrete to map workshop material into
            stimulate thinking about your own cases

Part 3   Complexity Knowledge. What can we know and how can we know it?
            ▪ Spoiler alert: We are already well versed in most of the tools and methodologies
              we will need.

Part 4   Some constructs from complexity that evaluators will find useful

Part 5   When not to invoke complexity

Part 6   A few more constructs from complexity that evaluators will find useful

Part 7   Working with stakeholders   analysis → planning

Part 8   Evaluation writing that invokes complexity

Stigmergy

a mechanism of indirect coordination, through the environment, between agents or actions. The principle is that the trace left in the environment by an individual action stimulates the performance of a succeeding action by the same or different agent.*

Related concepts

Self-organization

Self-organization is a process in which pattern at the global level of a system emerges solely from numerous interactions among the lower-level components of the system. Moreover, the rules specifying interactions among the system's components are executed using local information, without reference to the global pattern.**

Preferential attachment

A preferential attachment process is any of a class of processes in which some quantity, typically some form of wealth or credit, is distributed among a number of individuals or objects according to how much they already have, so that those who are already wealthy receive more than those who are not.***

*   https://en.wikipedia.org/wiki/Stigmergy

**   Glossary at the Santa Fe Institute's Complexity Explorer
*** https://en.wikipedia.org/wiki/Preferential_attachment

Stigmergy

Why should evaluators care about stigmergy?

- Explanation of change patterns and program effects
- Humility with respect to predicting or designing change patterns
- Framework for inquiry when evaluating planned and unplanned change
- Input for designing change efforts

Some examples of stigmergic processes

- Style in art
- Urban vitality
- Online communities
- Intellectual trends in science

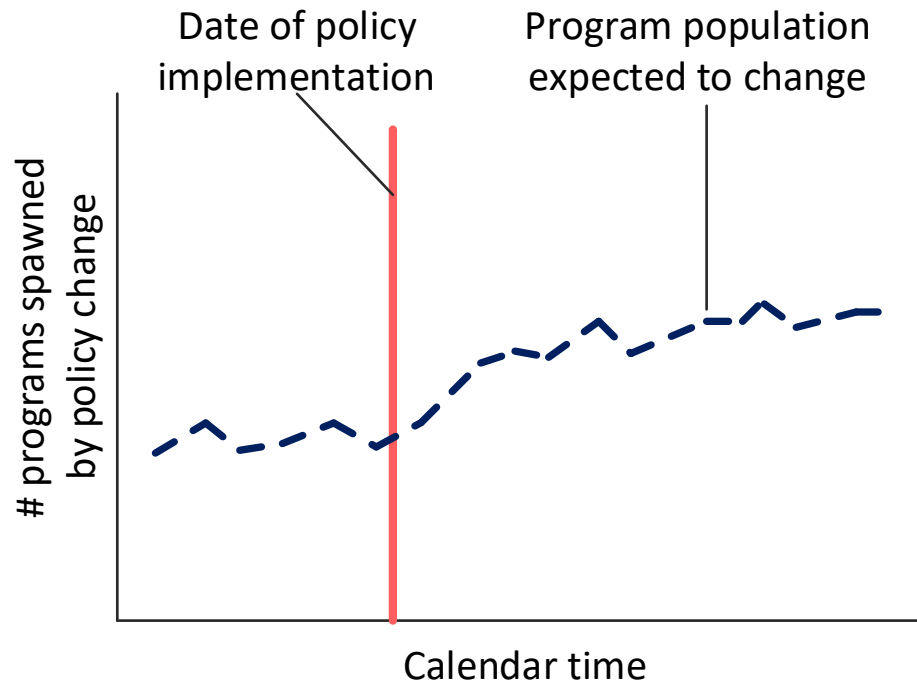## Evolutionary / Ecological Behavior (Building on previous)

Thinking in ecological terms conjures many related questions that may not derive from other ways of approaching an evaluation

Adaptation	▪ How do programs in an "ecosystem" react when other programs are introduced
Population size	▪ How many of a kind of program are there?
Rates of change	▪ At what rate does the number of programs change?
	▪ How quickly do programs change what they do?
	▪ How do programs change how they are structured?
Timing of changes	▪ How much time elapses between a policy change and program change?
Fitness landscape	▪ How much of a change is required to make a dramatic difference for the viability of a program?
Diversity of programs	▪ How many kinds of programs are there?

Evolutionary / Ecological Behavior – Shifting From a Policy → Program Model to a Policy → Ecosystem Model

A common model for evaluating the impact of a policy change.

- Program of primary interest is identified.
- Program growth is tracked over time.

- Primary measurement remains
- Measurements of other programs are added
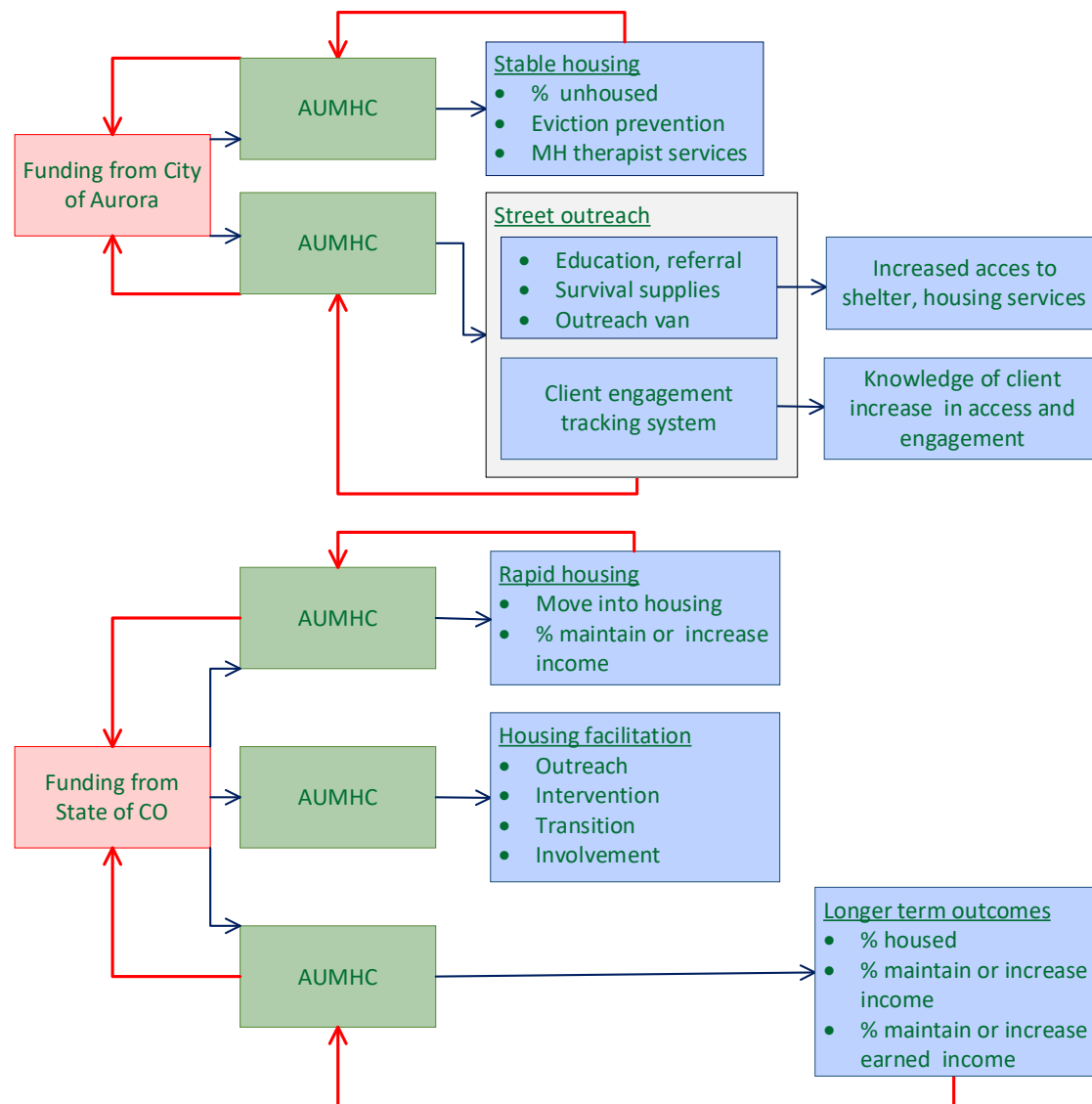- A different view of the policy appears

- Three new types of programs appear
- 2/3 of the new programs thrive
- 1 program appears soon after policy change
- 2 programs lag policy chabge
- Only 1 other program declines

- Three programs decline
- Only 1 other new program appears
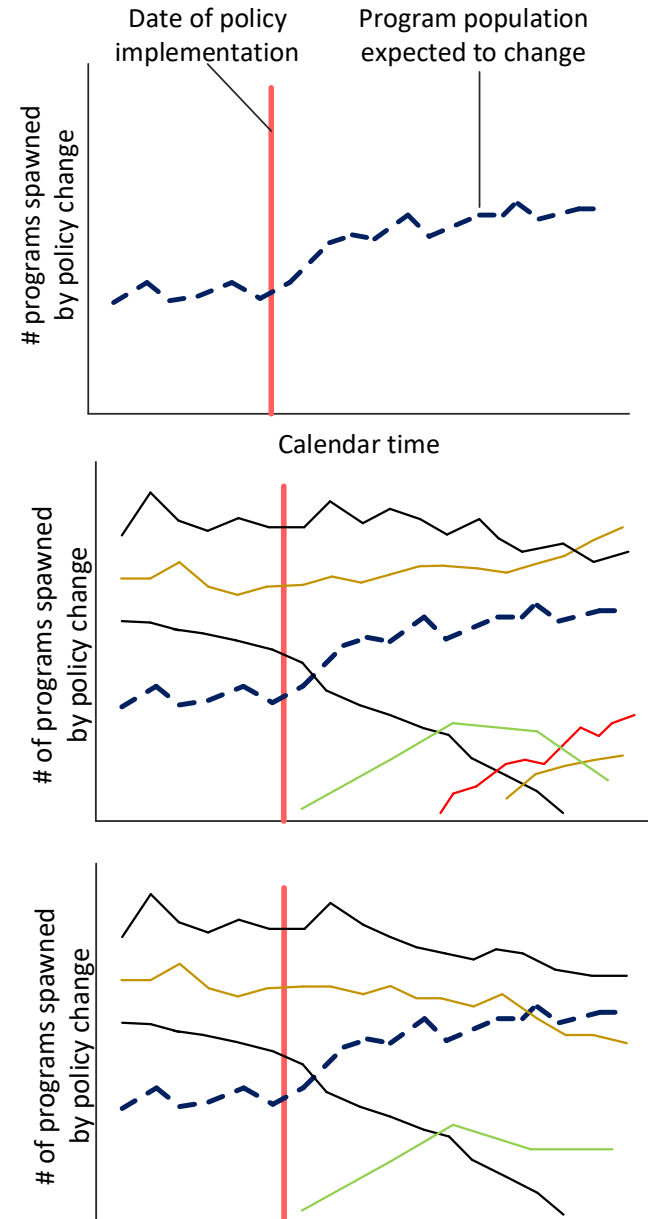
Evolutionary / Ecological Behavior – Population Flow

Working model for a traditional support program for the unhoused*

AUMHC

Funding from City of Aurora

AUMHC

Stable housing
- % unhoused
- Eviction prevention
- MH therapist services

Street outreach
- Education, referral
- Survival supplies
- Outreach van

Increased acces to shelter, housing services

Client engagement tracking system

Knowledge of client increase in access and engagement

AUMHC

Rapid housing
- Move into housing
- % maintain or increase income

Funding from State of CO

AUMHC

Housing facilitation
- Outreach
- Intervention
- Transition
- Involvement

AUMHC

Longer term outcomes
- % housed
- % maintain or increase income
- % maintain or increase earned income
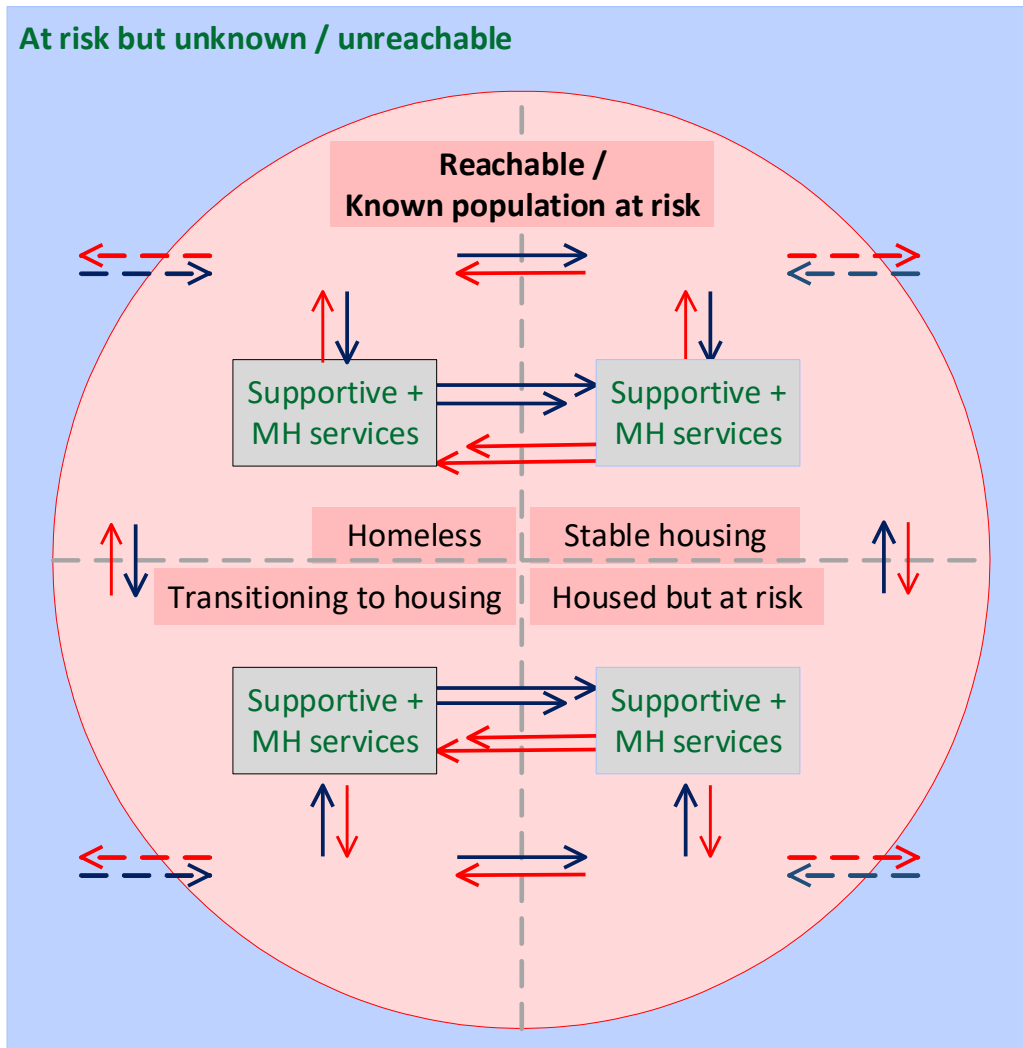
* Pathways to Home: Providing Wraparound Case Management and Clinical Services for Homeless Individuals in Aurora, CO, For information contact Antonio Olmos AntonioOlmos@aumhc.org
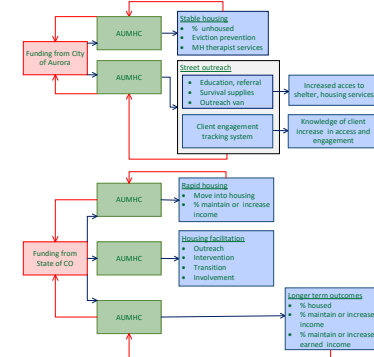
Evolutionary / Ecological Behavior – Population Flow

At risk but unknown / unreachable

**Reachable /
Known population at risk**

Supportive +
MH services

Supportive +
MH services

Homeless

Stable housing

Transitioning to housing

Housed but at risk

Supportive +
MH services

Supportive +
MH services

Example of analysis suggested by model			
		Rate of Boundary Crossing	
From	To	Scenario 1	Scenario 2
unreachable	reachable	up	up
receives services	leaves services	down	up

Part 1   Intellectual History

Part 2   Cases to practice on if workshop participants don't offer their own. Presented here to give you something concrete to map workshop material into
stimulate thinking about your own cases

Part 3   Complexity Knowledge. What can we know and how can we know it?
  ▪ Spoiler alert: We are already well versed in most of the tools and methodologies we will need.

Part 4   Some constructs from complexity that evaluators will find useful

Part 5   When not to invoke complexity

Part 6   A few more constructs from complexity that evaluators will find useful

Part 7   Working with Stakeholders   analysis → planning

Part 8   Evaluation writing that invokes complexity

Help planners escape the trap of "stovepipe" conflict with "coordination?

Model we almost always use

Model nature uses
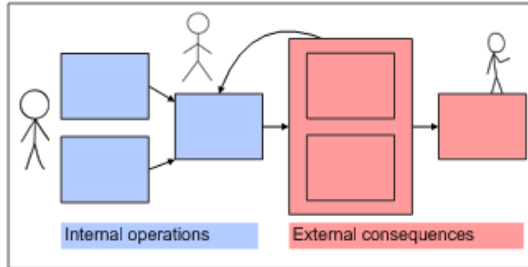
- Different time horizons
- Stovepipes are efficient
- Goals that may conflict
- Different organizational cultures
- Few personal working relationships
- Unknown, unknowable interactions
- Cost of coordination people, $, time
- Different contingencies to prepare for
- Different schedules for decision making
- Different stakeholders with different priorities
- Programs serve purposes besides stated goals
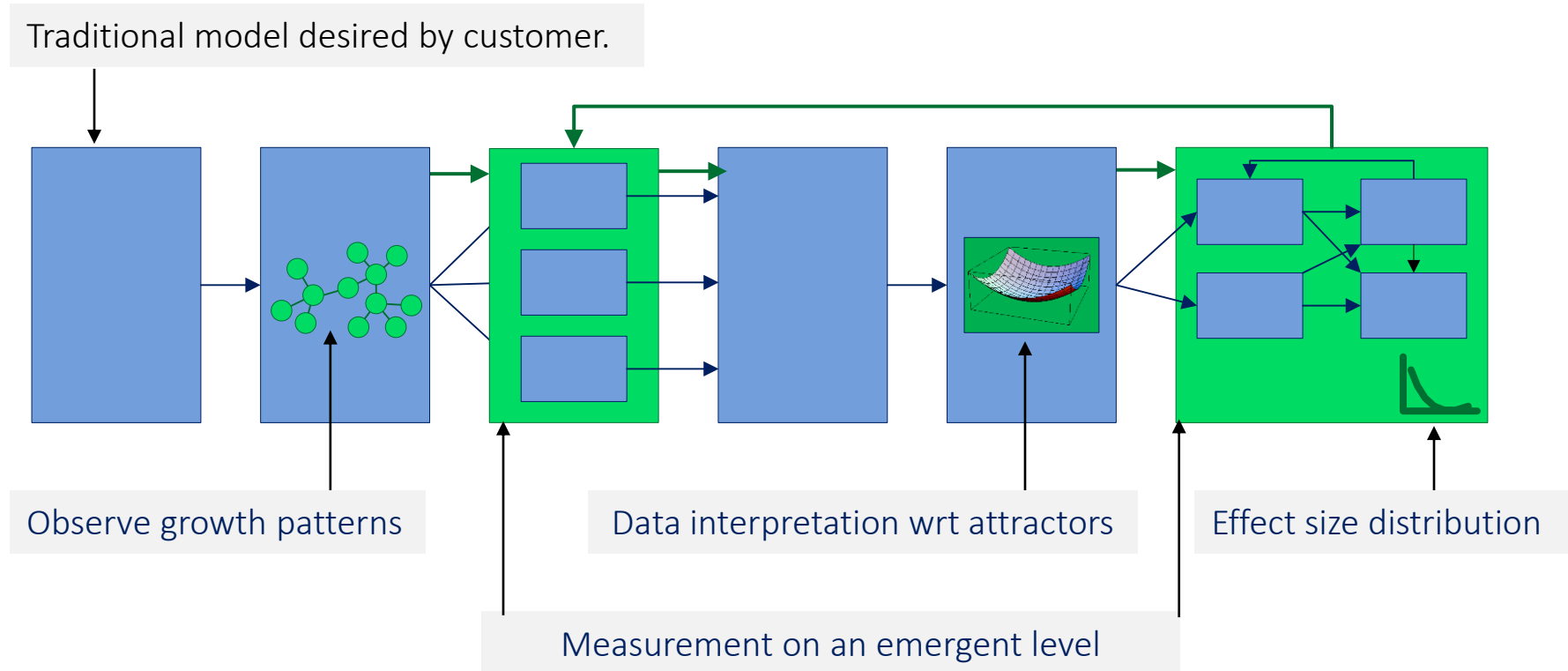- People have their favorite sources of information
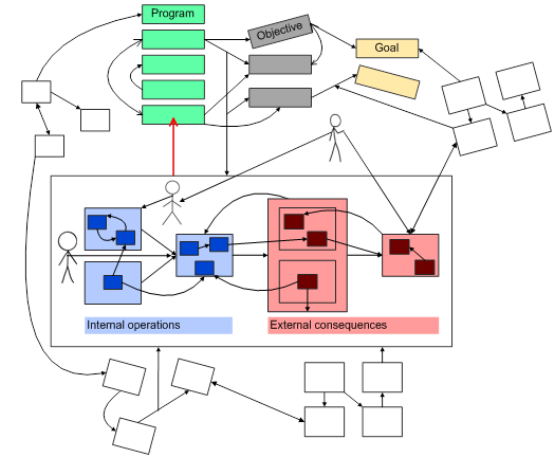
Stigmergic coordination*

- A few (of many) common metrics
- No compulsion, maintain independent decision making

* Reed, John H., and Gretchen Jordan. 2007. Using systems theory and logic models to define integrated outcomes and performance measures in multi-program settings. *Research Evaluation* 16 (3): 169–181.

Sometimes one invoke complexity even if funders insist on a traditional evaluation *

Traditional model desired by customer.

Observe growth patterns

Data interpretation wrt attractors

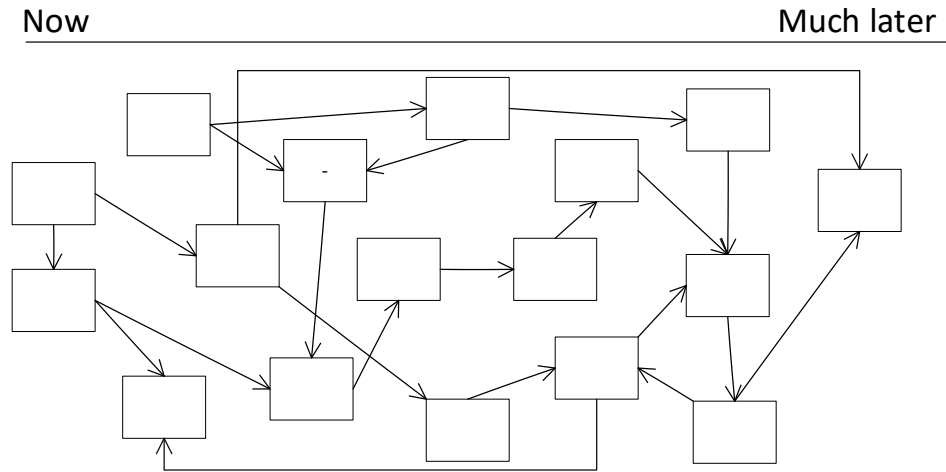Effect size distribution

Measurement on an emergent level

*   It depends on whether additional data collection or a parallel design is needed.

Planners and funders often like elaborate models. The sniff test can lead to realistic understanding

Now   Much later

- Each box and arrow states a belief about how the program works and its outcomes. Taking a step back, do you think it is really true?

- Do you think this model predicts outcomes?

- Do you think this model explains how the program works and what it will accomplish?

- Are there subparts in the model that you trust more than others?

Emergence

Parts of the model can't be understood in terms of their unique identities
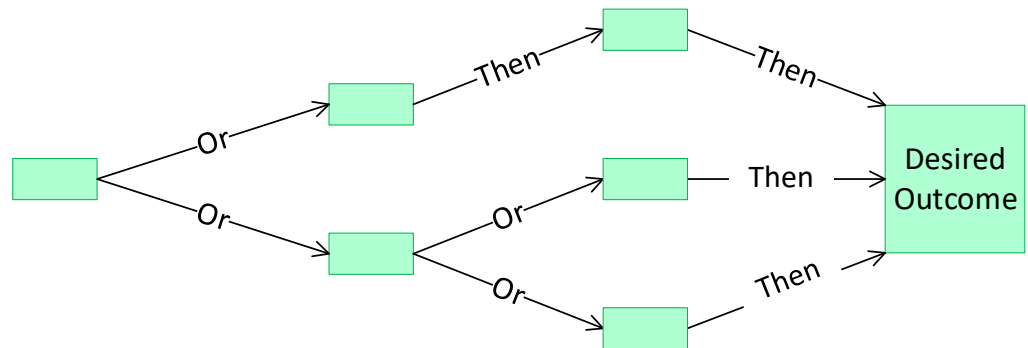
Sensitive dependence and model evolution time

We should expect the model to change

Asking stakeholders to specify conditionals facilitates expectation setting

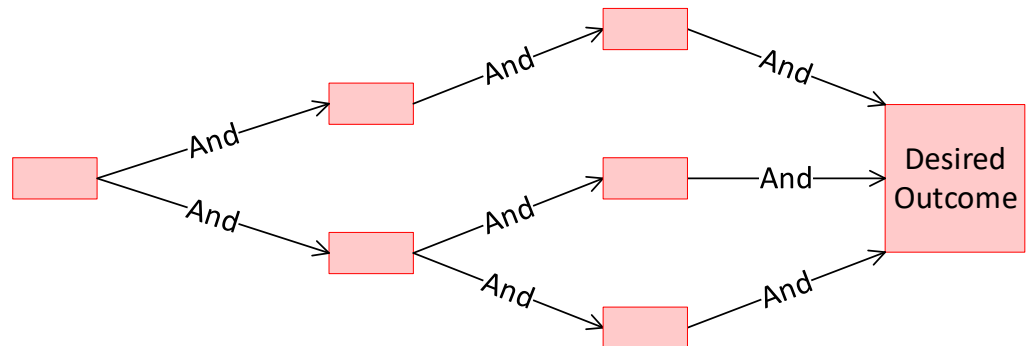Common model form has minimal predictive or explanatory ability.
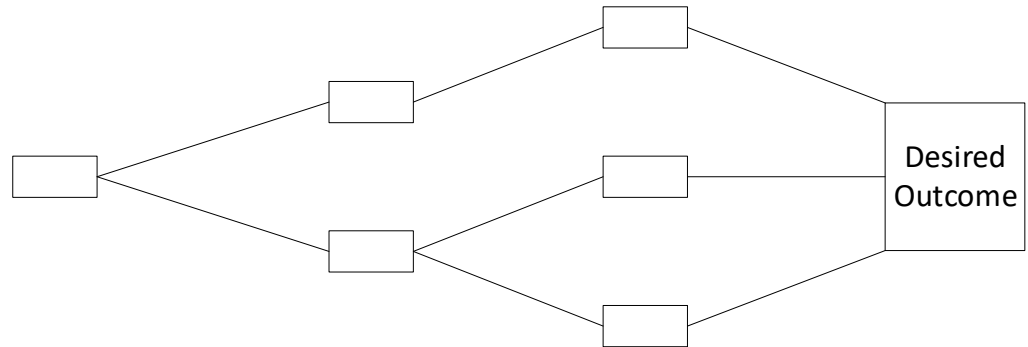
This program has a reasonable chance of working
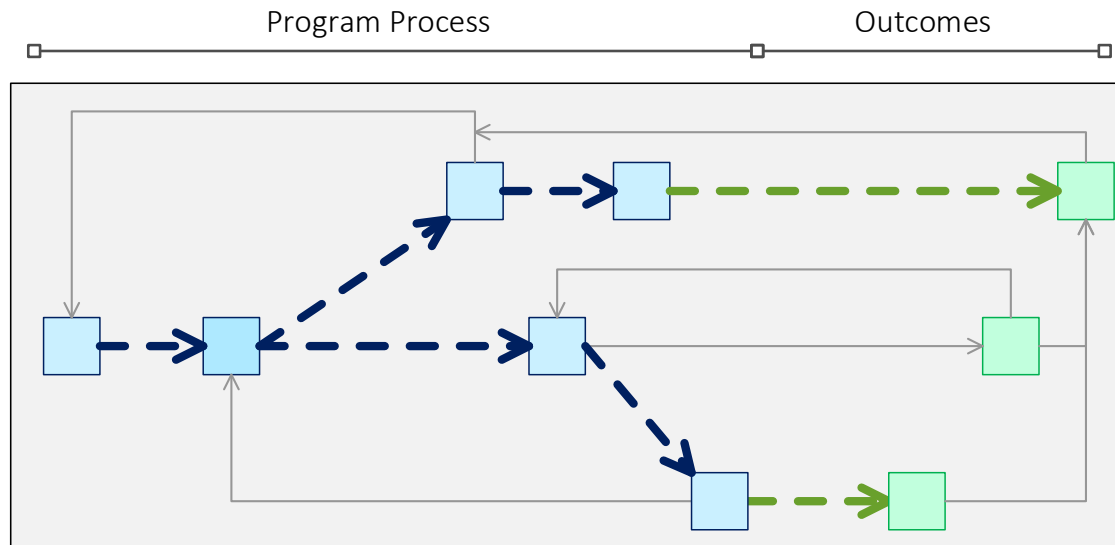
This program is doomed to failure

Asking stakeholders to state confidence in linkages facilitates expectation setting

- - - ➤ High confidence that linkage will succeed

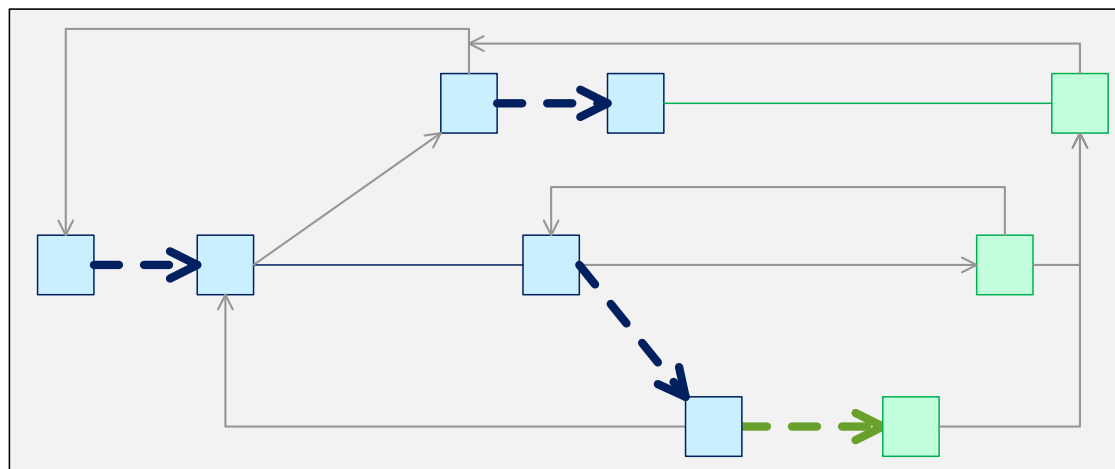⟶ Not high confidence that linkage will succeed

Program Process   Outcomes

Scenario 1: Stakeholders
- believe that program can be implemented successfully

Scenario 2: Stakeholders are
- uncertain about successful implementation
- confident that only 1/3 of the program – outcome links will work

Part 1   Intellectual History

Part 2   Cases to practice on if workshop participants don't offer their own. Presented here to give you something concrete to map workshop material into
stimulate thinking about your own cases

Part 3   Complexity Knowledge. What can we know and how can we know it?
Spoiler alert: We are already well versed in most of the tools and methodologies we will need.

Part 4   Some constructs from complexity that evaluators will find useful

Part 5   When not to invoke complexity

Part 6   A few more constructs from complexity that evaluators will find useful

Part 7   Working with stakeholders   analysis → planning

Part 8   Evaluation writing that invokes complexity

How to use this section

- There is nothing systematic about this list.

- Most of it consists of of articles I like in which evaluators engage "complexity".

- Some entries do not speak directly to evaluation but are relevant for the work we do.

- One way to use this list is to peruse the titles. Those alone will provide a glimpse into how evaluators have been working with complexity.

- If any of the titles pique your interest, have a it!

Bamberger, M., Vaessen, L., & Raimondo, E. (Eds.). (2015). *Dealing With Complexity in Development Evaluation: A Practical Approach*. Thousad Oaks CA.: Sage.

Barbrook-Johnson, P., Proctor, A., Giorgi, S., & Phillipson, J. (2020). How do policy evaluators understand complexity? *Evaluation, 26*(3), 315-332. doi:10.1177/1356389020930053

Bicket, M., Christie, I., Gilbert, N., Hills, D., Penn, A., & Helen Wilkinson. (2020). *Supplementary Guide: Handling Complexity in Policy Evaluation* (H. Treasury Ed.): CECAN – the Centre for Evaluating Complexity Across the Nexus.

Comfort, L. K. (1994). Self-Organization in Complex Systems. *Journal of Public Administration Research and Theory: J-PART, 4*(3), 393-410. Retrieved from http://www.jstor.org/stable/1181895

Cox, J. (2019). How does the commissioning process inhibit the uptake of complexity-appropriate evaluation? https://www.cecan.ac.uk/news/how-does-the-commissioning-process-inhibit-the-uptake-of-complexity-appropriate-evaluation/

Gates, E. F., Walton, M., Pablo, V., & McNall, M. (Eds.). (2021). *Special Issue: Systems and Complexity-Informed Evaluation: Insights from Practice* (Vol. 170): Wiley.

Hertz, T., Brattander, E., & Rose, L. (2021). Complexity-Aware Monitoring and Evaluation. *Journal of Multidisciplinary Evaluation, 17*(41), 35-50. Retrieved from https://journals.sfu.ca/jmde/index.php/jmde_1/article/view/679

Ling, T. (2012). Evaluating Complex and Unfolding Events in Real Time. *Evaluation*. doi:DOI: 10.1177/1356389011429629

Morell, J. A. (2021a). A Complexity-based Metatheory of Action for Transformation to a Green Energy Future. In R. D. Van den Berg, C. Maro, & M.-H. Adrien (Eds.), *Transformational Evaluation for the Global Crises of our Times*. (pp. 345 - 370). Exeter, UK: IDEAS.

Morell, J. A. (Writer) & J. A. Morell (Director). (2021b). Using Evolutionary Biology and Ecology to Think About Evaluation. In: 4.669... Evsaluation and Planning. https://www.youtube.com/channel/UCF0s_RM9Vmbu-j8T5pemjRw?view_as=subscriber

Morell, J. A. (2023 (in press)). A Complexity-based Plan for Evaluating Transformation. *Journal of Multidisciplinary Evaluation*. Retrieved from https://journals.sfu.ca/jmde/index.php/jmde_1

Morell, J. A., Hilscher, R., Magura, S., & Ford, J. (2010). Integrating Evaluation and Agent-Based Modeling: Rationale and an Example for Adopting Evidence-Based Practices. *Journal of Multidisciplinary Evaluation, 6*(14), 35 -- 37.

Morell, J. A., Parunak, H. V. D., Hwalek, M., & Knestis, K. (Producer). (2016a). Part 1 Combining Agent Based Modeling and Traditional Evaluation Retrieved from https://www.youtube.com/watch?v=jWDKSHQs0rA

Morell, J. A., Parunak, H. V. D., Hwalek, M., & Knestis, K. (Producer). (2016b, 2017). Part 2 Combining Agent Based Modeling and Traditional Evaluation. [Movie] Retrieved from https://www.youtube.com/watch?v=aoO1lIEcMzk

Morell, J. A., Parunak, H. V. D., Hwalek, M., & Knestis, K. (Producer). (2016c, 2017). Part 3 Integrating Agent Based Modeling and Traditional Evaluation. [YouTube] Retrieved from https://www.youtube.com/watch?v=8bSOO3lOvwI

Picciotto, R. (2021). Towared a Complexity Framework for Transformative Evaluation. *Journal.of Multidisciplinary Evaluation, 16*(35), 54 - 76.

Preiser, R., Biggs, R., De Vos, A., & Folke, C. (2018). Social-ecological systems as complex adaptive systems

organizing principles for advancing research methods and approaches. *Ecology and Society, 23*(4). Retrieved from https://www.jstor.org/stable/26796889

Renger, R. (2022). *System Evaluation Theory: A Blueprint for Practitioners Evaluating Complex Interventions Operating and Functioning as Systems*. Charlotte NC: Information Age Publishing.

Zazeueta, A. (2017). *Principles for the Development of Integrated Transformational Projects in Climate Change and Chemicals & Waste*. Retrieved from Washington DC: http://www.stapgef.org/sites/default/files/publications/Final_Principles%20for%20%20Development%20of%20Integrated%20CCM%20and%20ChW%20Projects_October%202017.pdf

Zazueta, A. E., Le, T. T., & Bahramalian, N. (2021). Development Trajectories and Complex Systems–Informed Theories of Change. *American Journal of Evaluation, 42*(1), 110-129. doi:10.1177/1098214020947782