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Evaluation & Planning

Systems as Program Theory and as Methodology: A Hands on Approach Over the Evaluation Life Cycle

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Atlanta, Georgia 30346

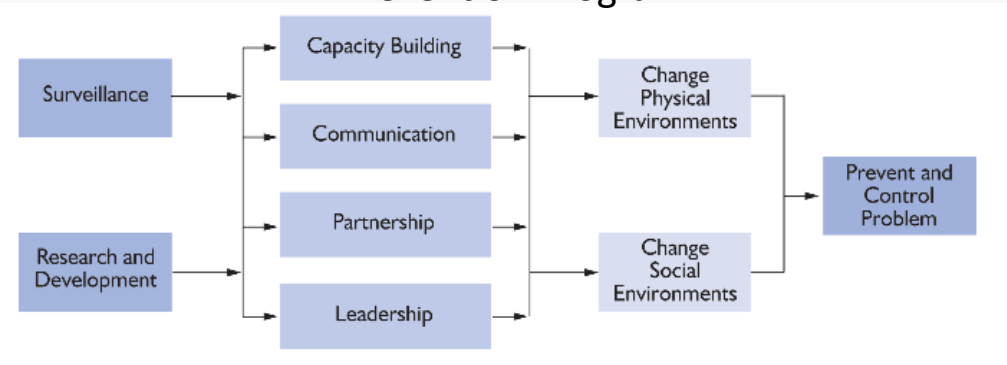
How do systems behave?	▪ System behave in complex ways, and this should affect what evaluators do.
What are the implications of systems behavior for:	▪ Program theory ▪ Methodology ▪ Data interpretation
What do systems “look like” in terms of form and structure?	▪ Definitions are not a prerequisite for starting. They are an indicator of knowledge.
We will answer the above questions with:	▪ Some lecturing ▪ A lot of collectively working through an example
We will work with well-defined programs.	▪ Good idea of how they operate and what we expect them to do ▪ Reasonable degree of stability over their life cycle.

What assumptions do we usually make when we design an evaluation?

All important --- in the model can be identified

- Elements
- Relationships
- Outcomes

Prevention Program *



There is no doubt about what to include.

- Either we know it is there and want to find out how well it works, or
- We have good reason to think it will happen, and want to find out

We don't construct models that say

- This element will show up about 50% of the time, or
- I think it should be in the model, but I'm not sure.

- There is only one causal path. It might be complicated and elaborate, but there is only one

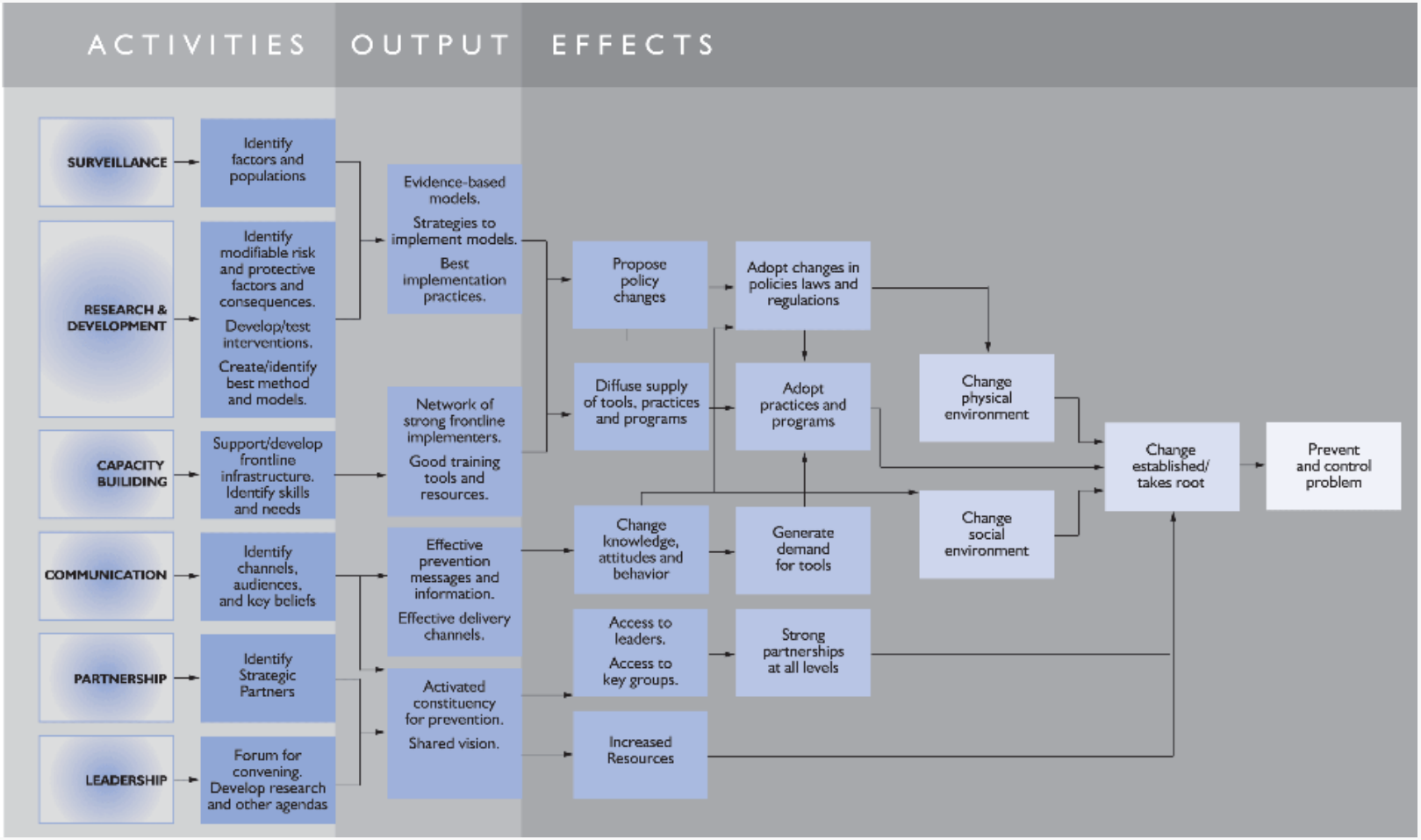
- The emphasis is on causality, not explanation about what is happening or why.

* *Introduction to Program Evaluation for Public Health Programs: A Self-Study Guide* U.S. Department of Health and Human Services Centers for Disease Control and Prevention. Office of the Director, Office of Strategy and Innovation. Introduction to program evaluation for public health programs: A self-study guide. Atlanta, GA: Centers for Disease Control and Prevention, 2011.

The problem is that the world does not behave this way because

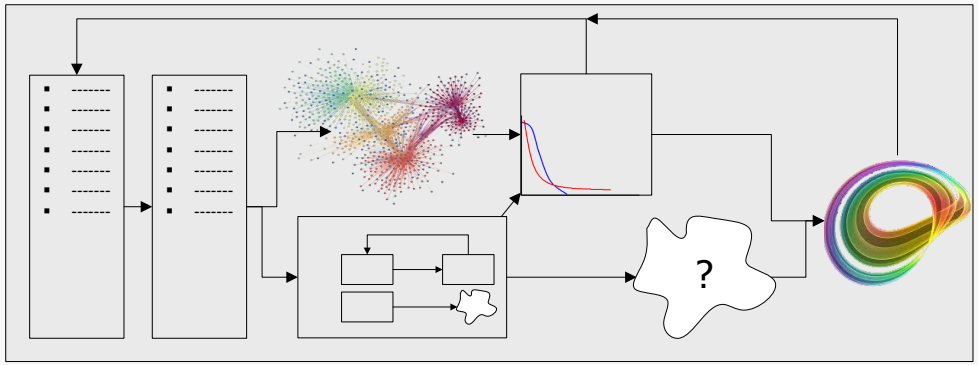
- these are descriptions of systems, and
- systems do not behave that way.

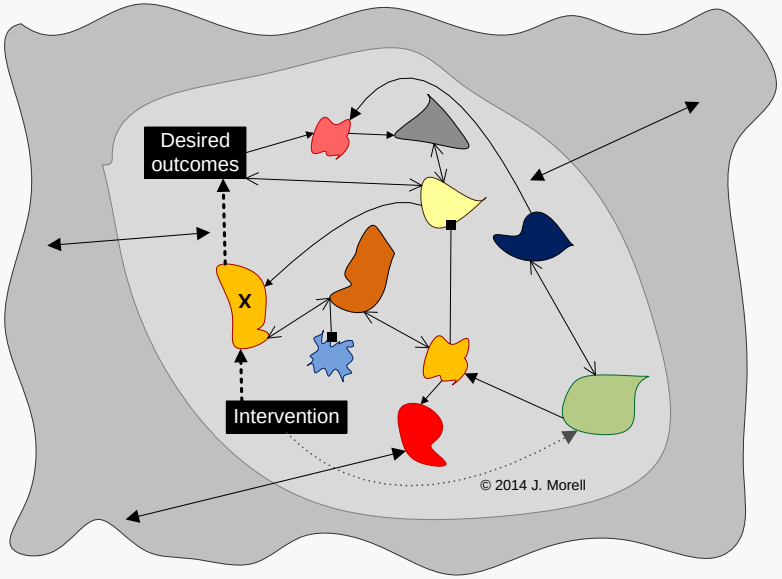
We might blow it up for more detail, but the assumptions do not change



How does the world behave? What is complex behavior?

- Emergence
- Phase shifts
- Network effects
- Path dependence
- Fractal processes
- Multiple causal paths
- Linkages –tight and loose
- Evolution and co-evolution
- Power law distributed outcomes
- Processes at different time scales
- Chaotic and non-chaotic attraction
- Causal relationships among outcomes
- Feedback loops with different latencies
- Many:many unspecifiable relationships
- Uncertainty about whether an element exists



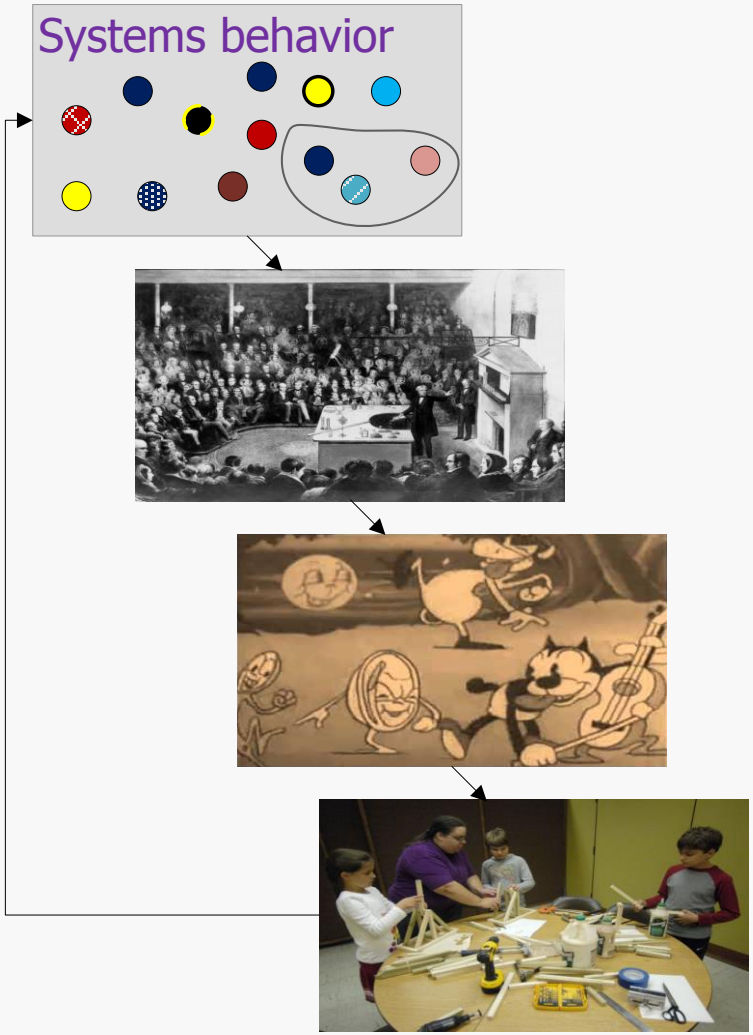


What are the implications for how we do evaluation?

- All our familiar qualitative and quantitative methods are still useful
- The difference is in how we deploy them, and how we interpret the data
- There are some specialized tools we could use. We will talk a bit about that.

How are we going learn how to apply these systems behaviors in the evaluation that we do?

- Reality and Metaphor
- Emphasis on complex behavior



Group a few related concepts

Lecture a bit

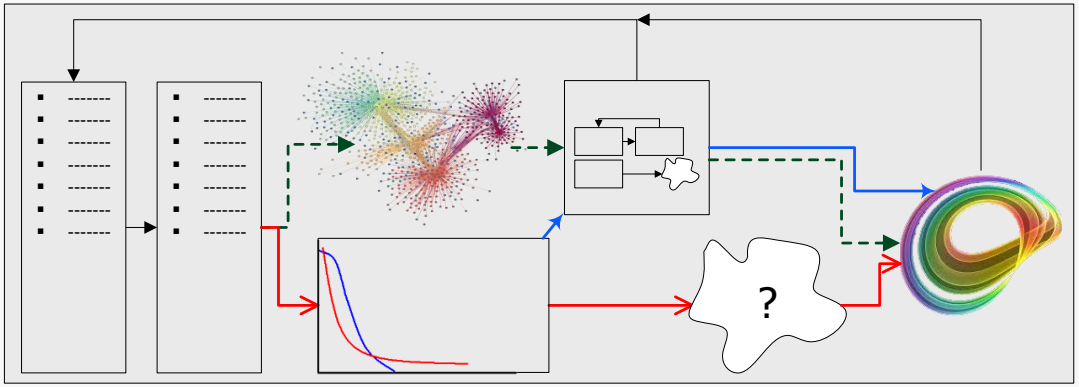
Small group breakout – apply to example

Reconvene, whole group discussion
Do as many rounds as we have time for

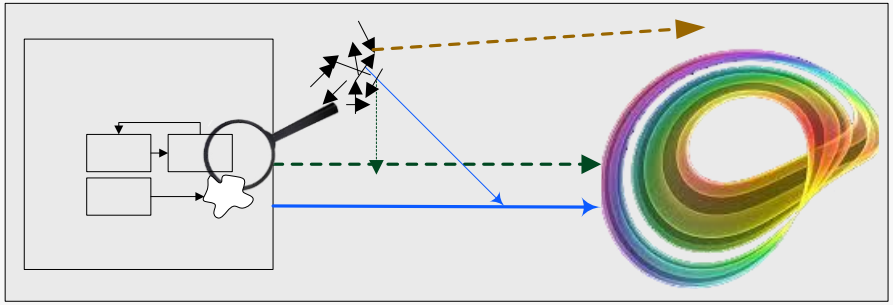
Lecture/Exercise #1 – Causal Paths

- Multiple paths
- Path dependence
- Attractors, chaotic attractors, and specifying outcome

Even assuming we can specify the outcome, there are three different paths by which the outcome may come about.



Within any program element, there is a lot of random activity that can determine the future path.



How do we get from:

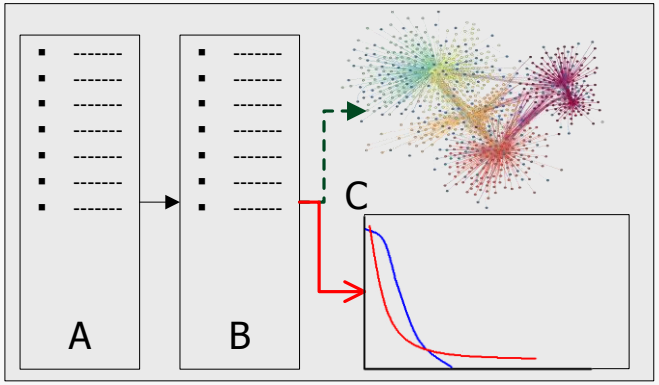
A → B, or

B → C?

Potential number of possibilities is astronomical.

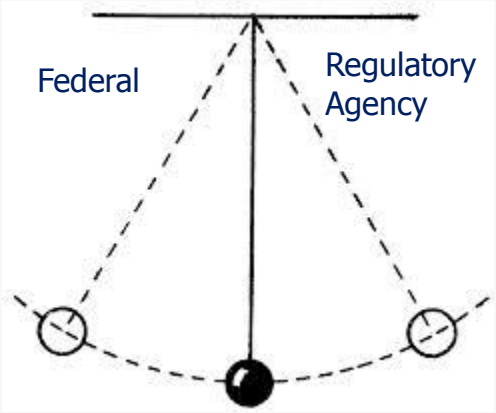
The best we can say is:

If a lot of stuff happens here, a lot of stuff will happen there.



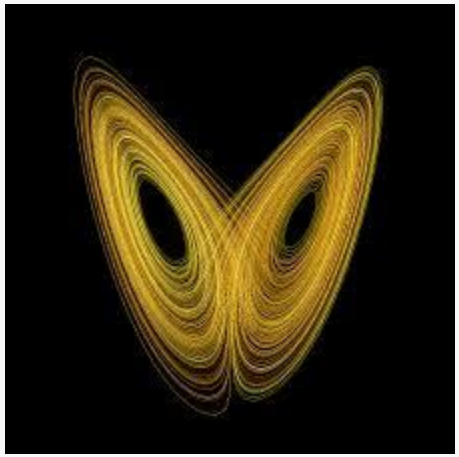
In dynamical systems, an attractor is a set of physical properties toward which a system tends to evolve, regardless of the starting conditions of the system. Property values that get close enough to the attractor values remain close even if slightly disturbed.*

Program theory can identify a particular program process or outcome with a reasonable degree of specificity.



When a bounded chaotic system does have some kind of long term pattern, but which is not a simple periodic oscillation or orbit we say that it has a Strange Attractor. If we plot the system's behaviour in a graph over an extended period we may discover patterns that are not obvious in the short term. In addition, even if we start with different initial conditions for the system, we will usually find the same pattern emerging. The area for which this holds true is called the basin of attraction for the attractor.*

Program theory can specify the "domain" of process or outcome, but it is impossible to specify locations within the domain.



* Definitions from Wikipedia

Exercise #1 Pick some or all of the example

Consider the implications of:

- Multiple causal paths
- Path dependence
- Attractors

For:

- Program theory
- Methodology
- Data integration and recommendations

Figure it out and report back to us.

Lecture/Exercise #2 – Patterns of Change

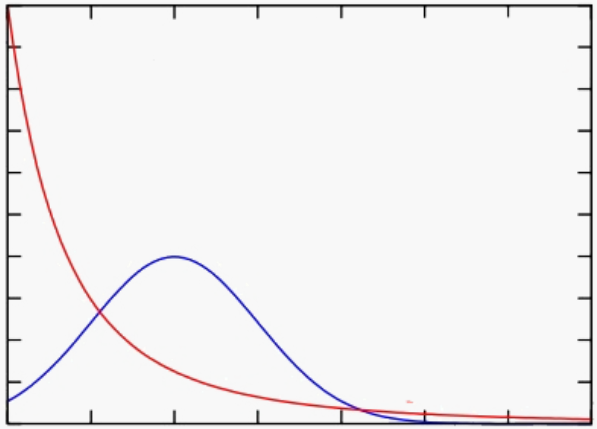
- Log and Symmetric
- Phase shifts
- Scaling

Which distribution defines "success" for:

- Weight loss due to healthy eating programs
- # employees in businesses supported by new business incubators?

What are the implications for

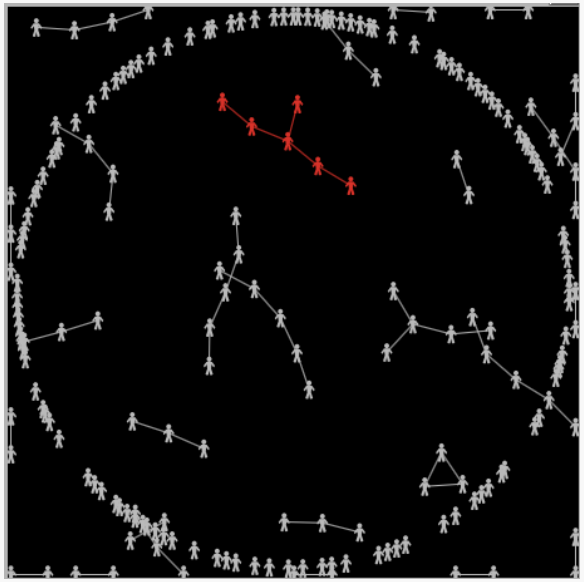
- Data interpretation
- Recommendations



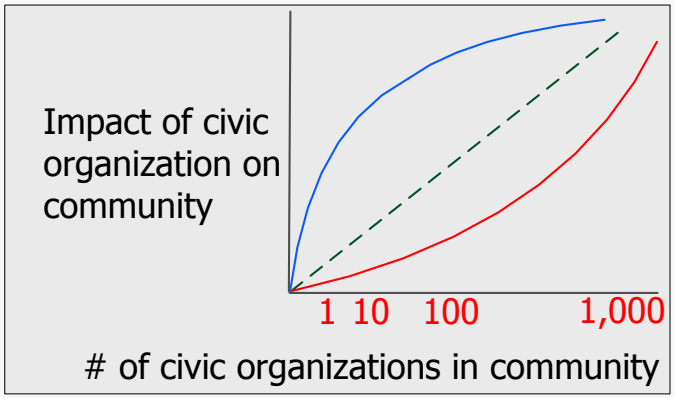
Sometimes the rate of change in the programs we evaluate can change suddenly.

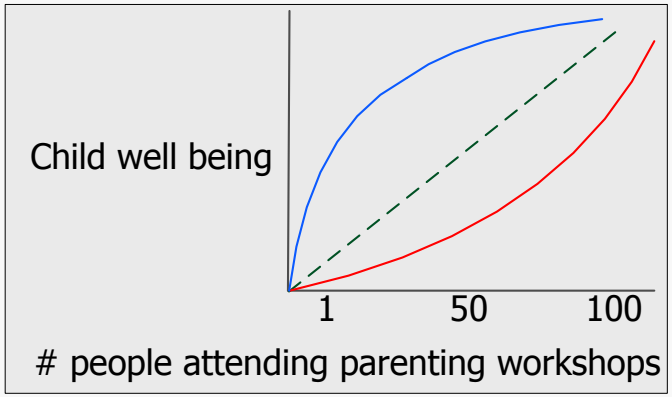
What are the implications for

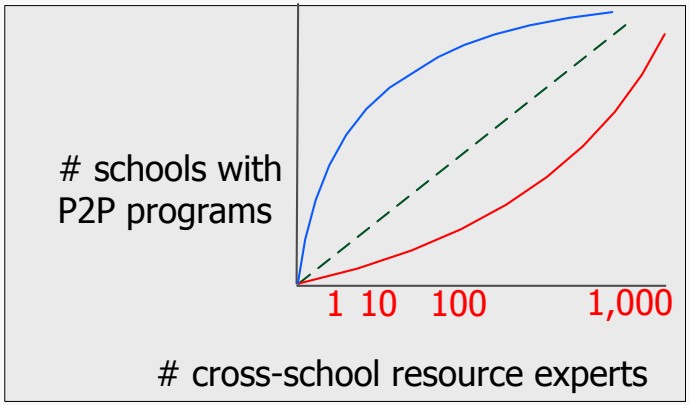
- Methodology?
- Program theory?

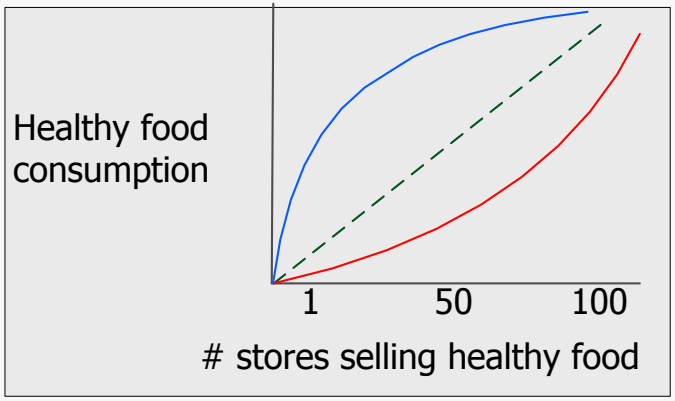


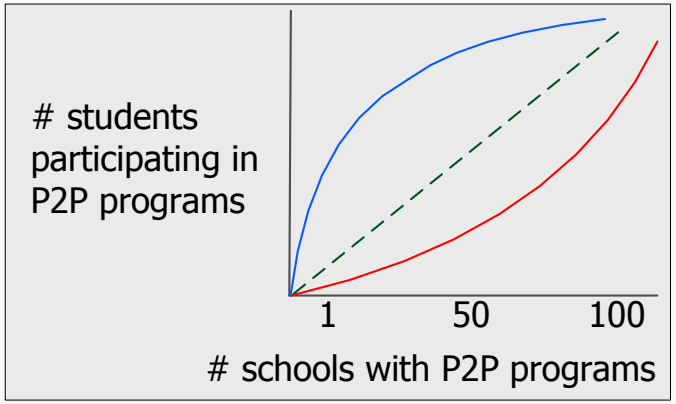
- Left to evolve by itself, which pattern describes how the size of one parameter relates to the other?
- What is the ideal relationship to achieve the desired effect?











Exercise # 2 Pick some or all of the example

Consider the implications of:

- Log and symmetric relationships between magnitude of impact and strength of intervention
- Phase shift behavior in rates of change in program impact
- How amount of change in one program descriptor scales with the other

For:

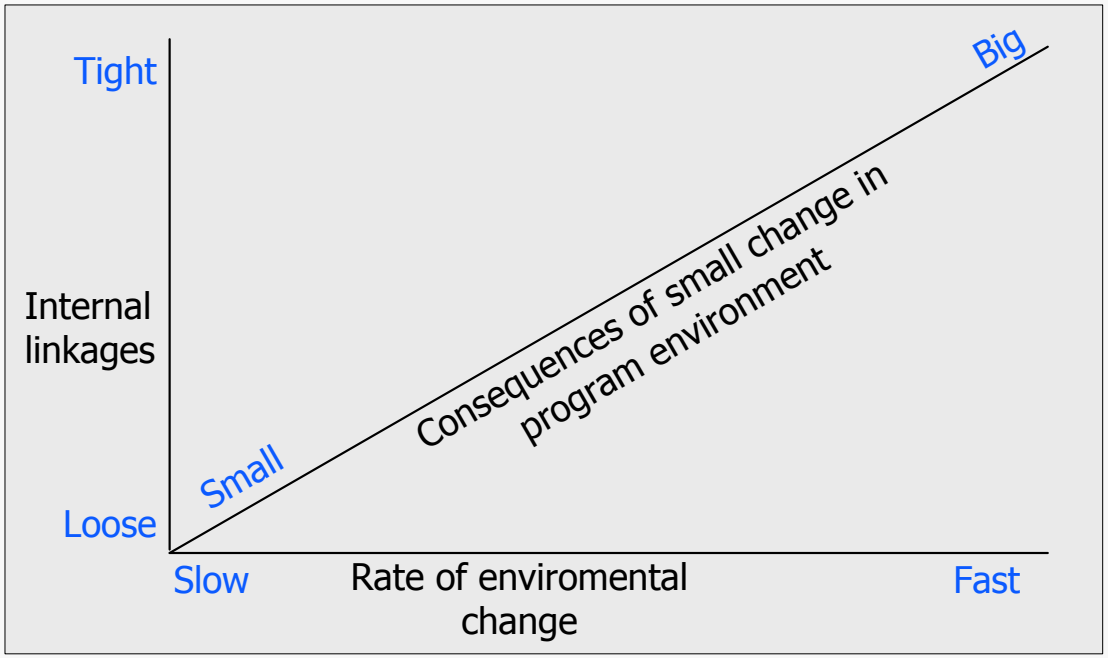
- Program theory
- Methodology
- Data integration and recommendations

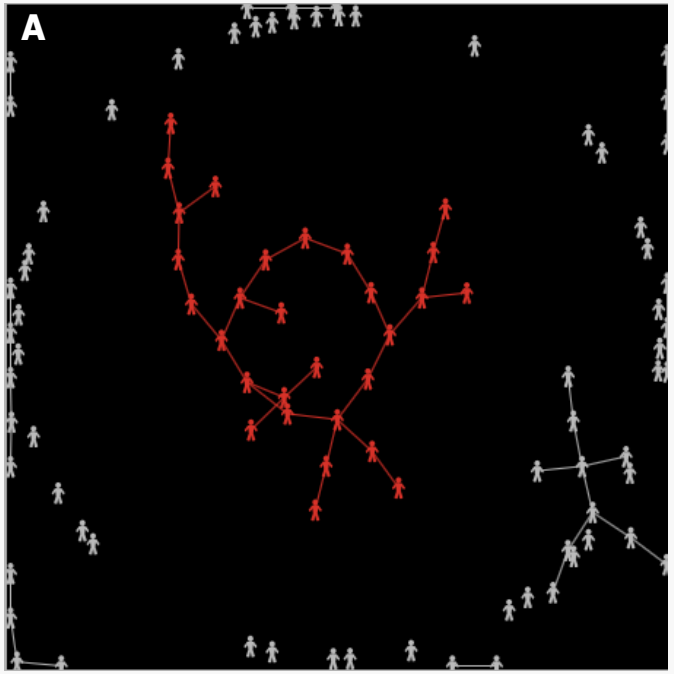
Figure it out and report back to us.

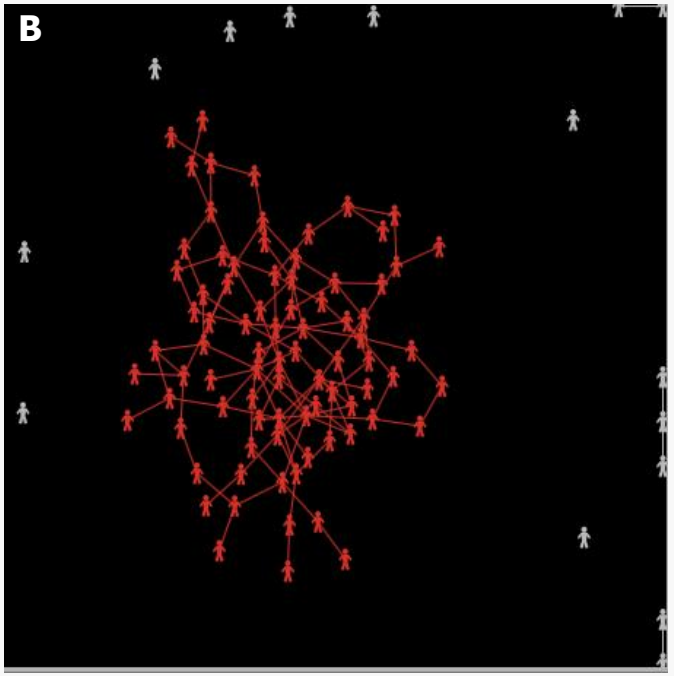
Lecture/Exercise #3 – Adaptability to change

- Internal linkages
- Rate of change in environment
- + and - consequences of small changes

Is organization **A** or **B** best suited for different points on the graph?







Exercise # 3 Pick some or all of the example

Consider the implications of:

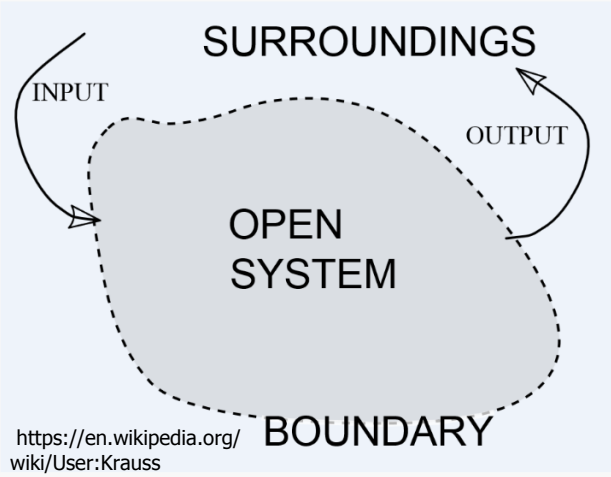
- Internal linkages in the service delivery organization
- Rate of changes in the environment
- Consequences of small changes for the program

For:

- Program theory
- Methodology
- Data integration and recommendations

Figure it out and report back to us.

Now that we know some complexity-related behaviors of systems, what does a system look like?



https://en.wikipedia.org/wiki/User:Krauss

Wikipedia

- Input
- Output
- Control
- Feedback
- Environment
- Boundary and interface
- Processor (transform input into output

Business Dictionary

- Inputs
- Outputs
- Feedback
- Homeostasis
- Environment
- Organized structure, inter-related parts to achieve a goal
- Characteristics that cannot be understood in terms of the parts

http://www.businessdictionary.com/definition/system.html

Systems Evaluation Protocol

- Causal pathways that have effects
- Need to take multiple perspectives
- Evaluation as a feedback mechanism
- Local and global contexts, e.g. county, city, state
- Boundaries – what is in and out of scope for the program
- Complexity from agents interacting through simple rules
- Symbiosis, co-evolution between program and evaluation
- Continuum from highly predictable to highly unpredictable
- Evaluation as a way to help programs as organisms that evolve and adapt
- Part/whole relationships – fit of program in its organizational context
- Consider program ontogeny (individual development) and phylogeny (species evolution)

https://core.human.cornell.edu/research/systems/protocol/