

Evaluation Community of Learning, Inquiry, and Practice (ECLIPS) Approach and Webinar Example

Evaluators of science, technology, engineering, and mathematics (STEM) education projects participated in a community of practice called the Evaluation Community of Learning, Inquiry, and Practice about Systems (ECLIPS). They learned and applied three systems concepts to evaluations they were engaged in. (See Parsons, Moore, and Jessup, in press, for more information about the ECLIPS process.) The study was funded as an exploratory study through an NSF *Promoting Research and Innovation in Methodologies for Evaluation* (PRIME) grant (#1118819). The primary goal of the 18-month ECLIPS study was to determine if STEM evaluators could learn and apply the systems concepts meaningfully to an evaluation that was already underway as well as gain knowledge about systems that they could apply in their future work. Monthly webinars and two annual meetings were the primary means for providing content about system. This document provides a list of the webinars and meeting topics along with an example of an agenda, PowerPoint slides, and assignment for a webinar.

Key words: evaluation capacity building, communities of practice, learning, STEM evaluation

Example of ECLIPS Webinars

Monthly 90-minute webinars and two in-person meetings were our main vehicles for developing evaluation capacity. Each webinar and meeting was carefully designed to include a combination of activities that supported four features: developing relationships among the participants; building content knowledge; applying systems concepts and tools; and monitoring of learning to evaluate the ECLIPS process. The balance of these four purposes varied from webinar to webinar based on application of adult learning theory.

Over the life of the project, the webinars and the in-person meetings addressed the topics as shown in Table 1. We created a detailed agenda for each webinar that noted the allotted time for initial check-in, content presentations by facilitators, interactive question and answer sessions, sharing by the evaluators of their work based on assignments we had given, reflections on the webinar, and assignments for the next month's webinar.

Following Table 1, we include an agenda, the PowerPoint slides, and a related assignment for one webinar. These examples illustrate how the webinars were configured and how assignments were

used to strengthen learning of system concepts. See Parsons, Moore, and Jessup (in press), for a full description of ECLIPS.

Date	Webinar/Meeting Primary Topics¹
Sept 2011	Orientation to ECLIPS Community and Project
Oct 2011	Orientation to Systems Concepts
Nov 2011	Community Building and Deepening System Concepts (In-Person Meeting)
Dec 2011	Generic System Structures
Jan 2012	Applying Generic System Structures
Feb 2012	Viewing Evaluation Purposes and Evaluator Roles from a Systems Perspective
Mar 2012	Complex Adaptive Systems
Apr 2012	Why Multiple System Dynamics Matter in Evaluation
May 2012	Seeing, Understanding, and Influencing Patterns in Complex Systems
June 2012	Rethinking Logic Models and Representations of Program Theory
July 2012	Integrating Systems Concepts into An Evaluation
Aug 2012	Creating Complex System-Oriented Logic Models
Sept 2012	Reflections on ECLIPS Work through Value Creation Stories
Oct 2012	Applying Systems Concepts to STEM Education intractable Problems (In-Person Meeting)
Nov 2012	Culturally Responsive Evaluation and Its Relationship to Systems Theories
Jan 2013	Sharing ECLIPS Learning with Others
Mar 2013	Principles Related to Collective Learning
May 2013	Social Network Analysis
Nov 2013	Progress in Applying Systems Concepts to Evaluation

Table 1. ECLIPS Webinars and In-Person Meeting Topics

¹ The event was a webinar unless otherwise noted.

May 18, 2012 ECLIPS Webinar 1:25 - 3 pm ET

Seeing, Understanding, and Influencing Patterns in Evaluation Data in Complex Systems

Facilitators' Agenda

Pre-Webinar

We asked everyone to look for patterns in their house, natural environment, and city so they could start getting the feel for looking at patterns in data.

The overall goal for this webinar is to help people develop skill in describing/seeing patterns in such a way that they can identify possible ways to change the pattern if the pattern is not going in a desired direction, the desired outcome/direction is not being achieved or is not moving in the desired direction fast enough.

Webinar Agenda

1:25-1:30 **Welcome, Check-in, and Updates** (slide 1 with participants' pictures)

Remind people to mute/unmute line by entering *6.

Beverly will start things off with check-in.

Check-in: (slide 2) take about 30 seconds to share one thing that has happened since last we spoke.

Any announcements to include here?

Beverly ends check-in by putting up **slide 3** with today's topic: *Seeing, Understanding, and Influencing Patterns in Evaluation Data in Complex Systems*

1:30 **Overview of Webinar Agenda** (slide 4 and 5)

Beverly: Here is an overview of today's webinar (slide 4)

Today we are bringing together the concept of patterns with the concepts of system conditions and dynamics within the projects we are evaluating. We will be practicing a way to analyze evaluation data to provide richer and more useful

information to PIs to 1) help explain what is happening in their project/situation and 2) provide insights into how they can continue to improve their work to achieve their desired results.

Disclaimer: The methods that we are discussing are new ones that evaluators, researchers, and others are in the midst of trying to figure out. There is widespread recognition now of the notion of complex adaptive systems and that they function differently than controlled organized systems. Remember this is an exploratory project. We are working with you to help develop more examples of how these concepts can be applied to evaluation in practical ways. The approach we are presenting today is still under development.

We will be practicing **SEEING, UNDERSTANDING, AND INFLUENCING** patterns. Those three activities are different. Recognizing that difference is part of the process we'll be working on today.

The **learning outcomes** (slide 5) for today and actually for the next couple of webinars are to develop:

- Skills in analyzing evaluation data about isolated events, behaviors, and results to **see** patterns in evaluation data
- Skills in identifying boundaries, relationships, and perspectives at a deeper systems level that provide **understanding** of systemic patterns that can potentially be shifted to achieve a more desirable direction/accomplishment
- Skills in working with project/center PIs or other leaders to identify leverage points to **influence** systemic patterns in a desired direction.

Developing skills take practice. That's what we are going to be doing today and over the next couple months.

1:35

Seeing Patterns in Complex Adaptive Systems

Beverly provides a reminder of how CAS work using slides 6-7.

Recall that we talked about CAS as being a collection of individual agents who have the freedom to act in unpredictable ways, and whose actions are interconnected such that they produce system-wide patterns. Those patterns emerge and then those patterns in turn influence the behaviors of the agents again. This gives us this continually shifting process of pattern formation. We can't hold it steady like we often attempt to do in some of our ways of designing logic models and in using certain statistical processes that assume linearity or stability.

Finding ways to analyze and understand patterns in these more dynamical situations is what we are working on now. It involves using both the left and right sides of your brain, weaving together that intuitive feel with hard data. Rigor comes about through triangulation, multiple perspectives, and conversations during the analysis process.

1:40 **Common Place Pattern: Seeing, understanding, and influencing Patterns**
(slide 9)

Pat leads this section.

At the heart of looking at situations from a systems perspective is seeing patterns across time and/or locations.

Pat gives a general overview of the patterns that were submitted (a pattern in the patterns). (We sent the set of patterns out prior to the webinar.)

She then takes the pattern of the furniture collection in Alyssa's neighborhood and works through the process of understanding the pattern. Begin by referencing what Alyssa has already done to **see** the pattern.

Refer to **slide 10** as/when seems appropriate.

A. See a pattern

1. We observe events, results, and behaviors. They may come as isolated or disconnected entities.
2. As we continue to observe, we start to see a pattern.
3. We describe that pattern as best we can. Think about similarities, differences and connections that we are seeing. Write it down; draw it.

B. Understand the pattern

1. The pattern can be viewed as a subsystem. What is the system "doing"/"achieving"?
2. Is the pattern one that is desired/acceptable? If it's acceptable/desirable, we might stop here unless our intention is to be able to describe this pattern to others for their emulation or use in other ways.
3. If the pattern is not desired, we want to understand what is creating that pattern. To do so, we look at it as a system. By describing the system as boundaries, relationships, and perspectives, we now have conditions that we can possibly adjust. Ask and list:
 - a. What **boundaries** might we say delineate the system and what boundaries exist within the system? How open or closed are the boundaries?
 - b. What **relationships** exist within the system? Consider dimensions that define their complexity (e.g., numbers of people involved, nature of the exchange between them, the mechanisms by which they engage in exchange)?
 - c. What **perspectives** (purposes, worldviews, paradigms) exist within the system? What differences exist in these perspectives?

C. **Influence Pattern**

The next step is identifying some aspect of boundaries, relationships, and/or perspectives (or some combination) to shift to influence the pattern in the desired direction.

Keep in mind that when working in a CAS, if you change one of those you'll be changing the others. They are interconnected. Also keep in mind that as the evaluator, you are offering ideas to the PI (or other stakeholders) and they are the ones who will be making adjustments. (Yes, the evaluator is part of the system and influences the system but let's set that aside for the moment. We'll come back to that later.)

Look for what are the changes that are especially efficient while having a significant impact. Keep in mind characteristics of CAS that may be relevant here: (slide 11)

- Feedback is continually occurring; nature and amount affected by connections
- Emergence when system far from equilibrium
- Macro patterns
- Co-evolution
- Sensitivity to initial conditions
- Stretch and fold

[May want to define some questions to ask people here)

2:00 **Example of Seeing, Understanding and Influencing Patterns using Evaluation Data** (slide 8)

Marah has an example for us that illustrates this process in evaluation.

2:05 pm **SEEs Evaluation Example** (slides 12-15)

Marah leads this discussion.

Take the technology system infrastructure from David's project.

Here is what we have asked David to do:

We'll show the systems dynamics diagram you did last month. Then we'll have a slide that shows the parts of the Technology system infrastructure that you have listed below.

Technology System: Infrastructure includes, but not limited to:

1. school's computers, hardware, software
2. network, wires, security, electrical
3. personnel support, both IT and education technology instructors

4. professional development related to technology-based instruction
5. technology learning philosophies/mission statements at school
6. budgetary considerations for maintenance and ongoing support, upgrades, etc.

We'd like to have you verbally describe two patterns. Could you identify a problem that existed before the project began that was the impetus for addressing the technology infrastructure in the first place? If possible, describe as a pattern. Then can you describe a new pattern that seems to be emerging as the project moves forward? In doing so, we'd like to have you include how the data you've gathered related to some or all of these parts of the technology infrastructure are helping you see the pattern.

Then we'll have the whole group get involved in asking you some questions about the patterns and working out collectively what boundaries, relationships, and perspectives are relevant to the situation and how these might continue to be influenced if the pattern needs further adjustment.

Let's now look at how to analyze that pattern.

Go through the process above again of identifying boundaries, relationships, and perspectives. This time also look at the landscape diagram to look at ways to attend to the self-organizing versus organized dynamic. (slide 16)

2:35 **Review and Tools**

Beverly uses slides 17-22 to summarize what we've been doing and provide tools that they could try out over the next couple months.

2:40 **Q&A** as time permits

2:45 **Future Webinars/Events** (slide 23)

Beverly leads this.

- **Special session with Jonny Morell** (indicate date preferences) **Pat** describes (see slide 24) and gets feedback. Then Beverly goes back to slide 23.

- **June webinar:** Matt and Tarek – *Rethinking Logic Models*

Matt and Tarek will be leading the June to link this discussion of patterns to the idea of fuzzy logic models and other related ideas they have. Call on them to make any comments they wish about their plans.

- **July webinar:** Further work on Pattern analysis and system dynamics
- **August webinar:** Preparation for Fall
- **September/October webinars:** Include PIs? Find out what people think of this idea and what questions they have about how this would work?

2:59 **Adjourn** (slide 25)

ECLIPS Participant Responses for May 2012 Webinar

The following is a selection of the responses we received to the preparatory task for the May webinar.

The task was to observe patterns in three locations:

- In your house/apartment
- Outside in a natural setting
- In a city

Briefly describe the patterns in terms of similarities, differences, and connections that have meaning across time and/or location. Look for situations with different patterns of movement. You might have static patterns such as how pictures are arranged on a wall. You might have a linear movement pattern such as the pattern of the timer on the stove counting down to zero from a time that you had set. You might have nonlinear and somewhat predictable patterns such as how cars are moving down the street or birds are flying across a lake. You might find a pattern that is similar across all three of the locations (your house, nature, and a city).

Examples of Patterns

Patterns in My House

The entryway – we don't wear shoes in our house so they are often left in the entryway. The shoes in the entryway are often an indicator of what type of outfit was worn, the person's temperament, or the weather outside. When I get home in the evenings, I can tell who's home and if they have company. Often I can tell whether the kids have started their homework since they often drop their backpacks in close proximity to their shoes. We have a "system" that is loosely implemented. Shoes for the day are left in the entryway, extra shoes are on the shoe rack in the hallway (a certain number per family member), and the rest go in the wearer's bedroom. Shoes are organized on the weekend, but over time (usually by mid-week) the entryway is cluttered, and needs to be organized again.

Patterns of Movement in My House

The layout of the first floor of my house is such that you can go in a loop from the front entry to the dining room to the kitchen to the living room and back to the front entry. Often after dinner when my kids were little, they would chase each other around this loop while my husband and I continued sitting at the table talking. The kids thought it was great fun if either their dad or I would join in; sometimes the dog decided to run along as well. As they got older other activities

were added in at times, such as grabbing an ice cube from the freezer and trying to put that down the neck of someone's shirt. That tended to disrupt the flow of the movement around the loop as they tried to get away from each other.

Fast forward to last summer, when my son, his wife and their one year old moved in along with their two dogs. For the five months they were with us, there were gates at the doors between all of these rooms. Suddenly the movement changed. Adults could still get between all of these rooms but certainly not with any speed as it involved opening a gate to every room. The movement of my granddaughter and the dogs was limited then to whatever room we allowed them into at any given time. Although the basic layout of our house did not change, the addition of the various gates dramatically changed the pattern of movement through the house.

Outside: My Vegetable Garden

For the past three years, I have maintained a vegetable plot in my front yard. In the winter, I pore through seed catalogues and purchase seeds based on whether they've performed well for me in the past, whether I think they will do my Northwest maritime climate, whether I want to eat them, how hard they will be to care for, and a je-ne-sais-quoi factor (Does it have a fun name? Hard to resist something called "Drunken Haired Frizzy Lettuce"! Is the picture pretty?). I add compost to the soil in March and start planting spring veggie seeds in March/April (depending on weather). I weed, set up an automatic watering timer. Then I start harvesting. I plant summer veggies in May/June. Some of the spring veggies are spent and remnants removed for the compost bin. Some spring veggies continue amongst the summer veggies. By late fall, usually only a few veggies are left for overwintering (a few carrots, some onions, some kale).

City (my neighborhood in particular)

End of the academic year housing patterns. Early in the month, you start seeing mattresses, couches, side tables, and other types of furniture being put out for trash pickup. Postings for second hand furniture start to pick up on Craig's List, and ads for summer sublets are in abundance. By the end of the month, students begin to just discard unnecessary furniture. For the last few days of May/first few days of June the streets are congested, traffic is backed up with moving trucks. (I actually plan an alternate route to/from work in around this time in May and again in August & September for this very reason.) In a few days things are back to "normal," until August when the cycle is repeated in a similar fashion.

Pattern in Small Town

I live in a small tourist town. Traffic patterns are affected by time of day—as in most places. Morning and afternoon "rush hour" sees traffic congestion through the middle of town. During these times, those who don't need to drive directly through the middle of town tend to take on of two by-passes—1) the longer by-pass from the far south end of town to the far north end of town for those who are avoiding town at all; or 2) the road that by-passes just the very center of town, for those that need to be in town, but not right in the center. This causes increased traffic on these routes during these rush hour times.

The added complexity of tourism in our town adds a seasonal element to these traffic patterns.

During the summer, the town is sometimes doubled in size because of tourists and second-home owners. During this time period, full-time local residents avoid the main road through the center of town whenever possible. Not only does this have implications for traffic flow, but businesses that are in the center of town are affected.

Winter sees a very different pattern—while tourism equals that in the summer, it is related to the ski valley, which is on the far north side of town. Thus, increased traffic tends to happen during typical rush hour times—morning and evening, when people are heading out to or coming home from skiing. This tends to reinforce and amplify the fall/spring pattern of avoiding the main road during rush hours. These rush hours last longer—especially the evening rush, which goes well through the dinner hour during ski season.

Again, this affect on effect on traffic flow tends to affect other things as well—for example, local business, especially dining.

Welcome to Today's ECLIPS Webinar

The STEM Education Evaluators (SEEs)

Elaine Craft David Reider Lloyd Bingman Dave Hata Karen Peterman Ginger Fitzhugh

Siobhan Bredin Alyssa Na'im

The ECLIPS Facebook

November 2011

The Guides

Marah Moore, CoPI

The Resource Center Leaders (RCLs)

Jason Burkhardt

Lori Wingate

Tarek Azzam Veronica Thomas Jonny Morell Matt Keene

The External Review Panel (ERPs)



Check-in

What's happened since our last gathering that you'd like to share with the group (either personal or professional)?



ECLIPS Webinar May 18, 2012

Seeing, Understanding, and Influencing Patterns in Evaluation Data in Complex Systems



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Overview of Today's Webinar

- Check-in
- Patterns Submitted
 - Seeing Patterns
 - Understanding Patterns
 - Influencing Patterns
- Patterns in Evaluation
 - Seeing Patterns
 - Understanding Patterns
 - Influencing Patterns
- Future Webinars/Events



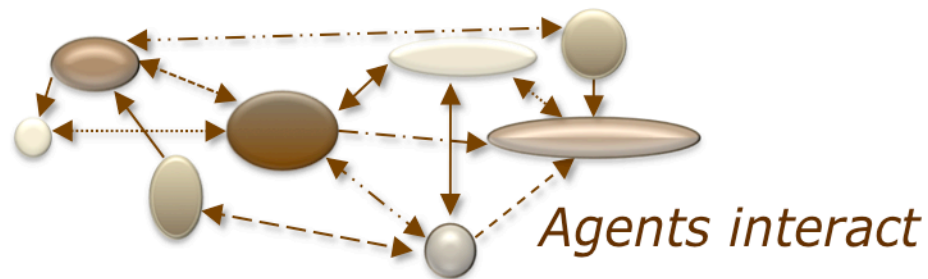
Learning Outcomes

- Skills in analyzing evaluation data about isolated events, behaviors, results to **see** patterns in evaluation data
- Skills in identifying boundaries, relationships, and perspectives at a deeper systems level that provide **understanding** of systemic patterns that can potentially be shifted to achieve a more desirable direction/ accomplishment
- Skills in working with project/center PIs or other leaders to identify leverage points to **influence** systemic patterns in a desired direction.



Complex Adaptive System (CAS) Self-organizing System

A collection of individual agents who have the freedom to act in unpredictable ways, and whose actions are interconnected such that they produce system-wide patterns.

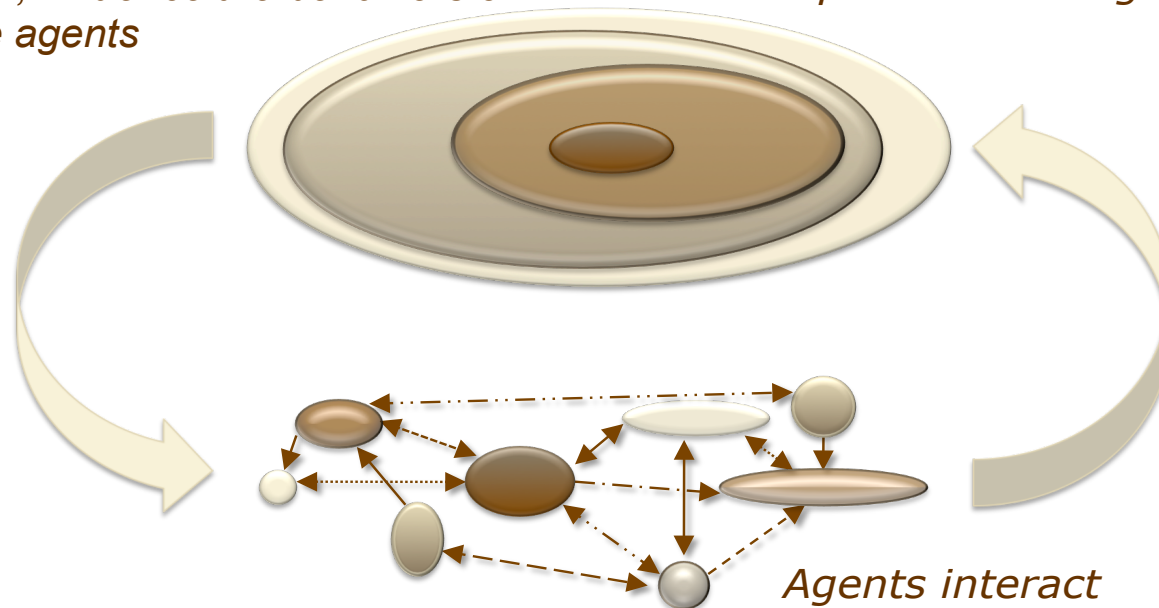


Courtesy of G. Eoyang,
Human System Dynamics Institute

Complex Adaptive System (CAS) Self-organizing System

Those system-wide patterns, in turn, influence the behaviors of the agents

System-wide patterns emerge



Courtesy of G. Eoyang,
Human System Dynamics Institute

Everyday Pattern Examples

- See handout



Pattern Analysis Process

- Observe events, results, behaviors
- Begin seeing pattern; describe it
- Pattern OK?
- Understand pattern through framing in terms of system conditions—boundaries, relationships, perspectives
- Look for ways to shift pattern
- Influence the pattern
- Follow changes in events, results, behaviors and pattern
- Repeat, repeat



Features of Self-organizing, Adaptive Dynamics

- Feedback
- Emergence
- Macro patterns
- Sensitivity to initial conditions
- Co-evolution
- Stretch and fold

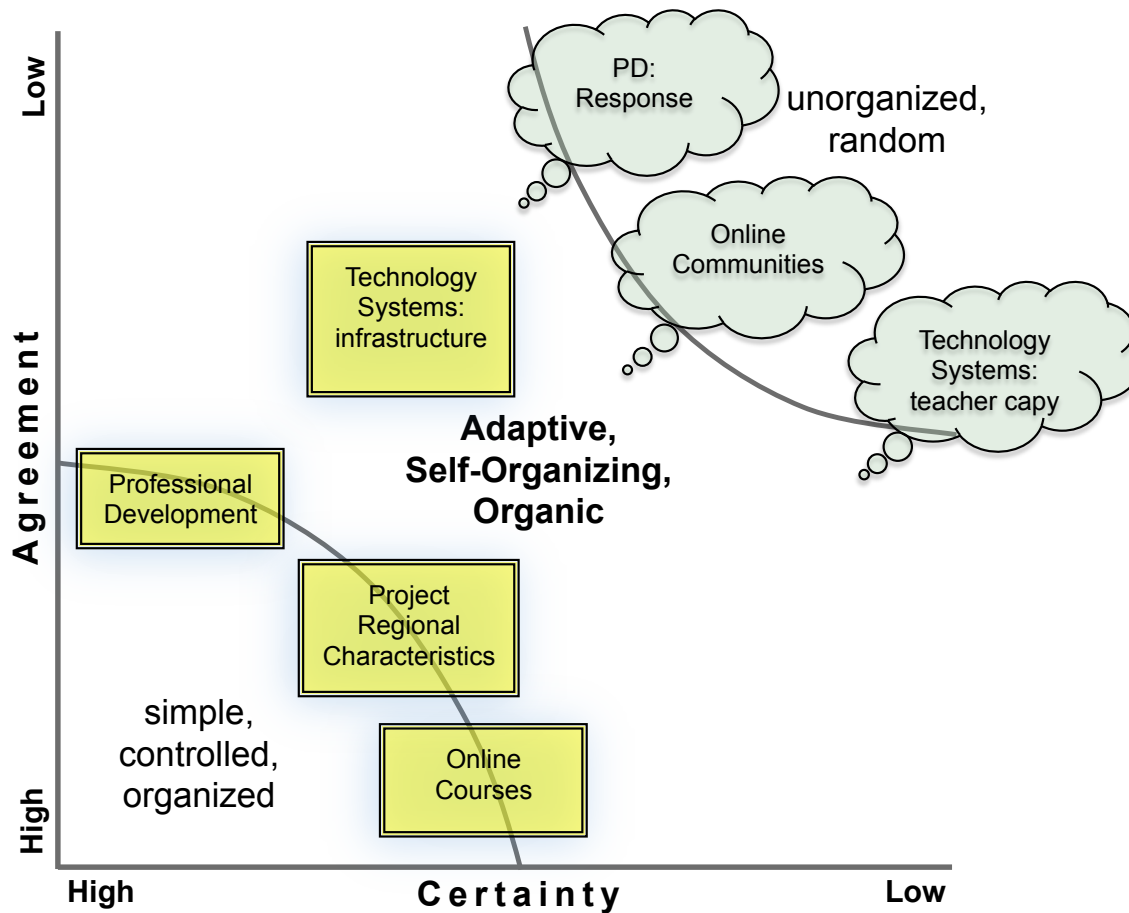
Evaluation Example

- Example from Outside STEM Field

Evaluation Example

- Example from David Reider's systems dynamics exercise

David Reider



Constructing a Pattern from Parts

Technology System Infrastructure includes:

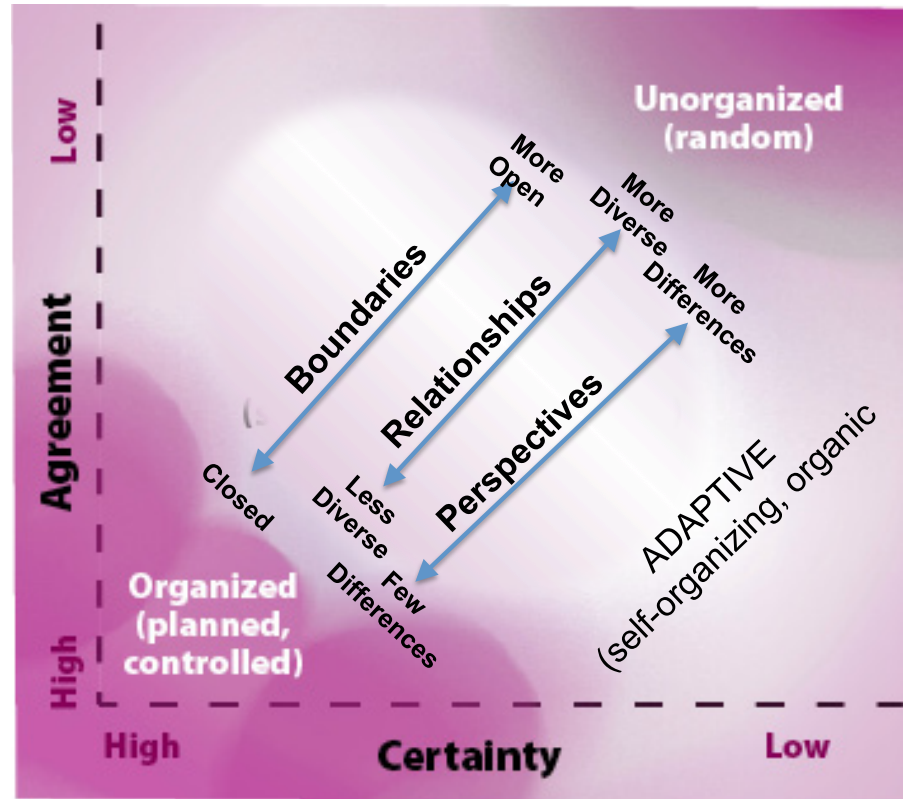
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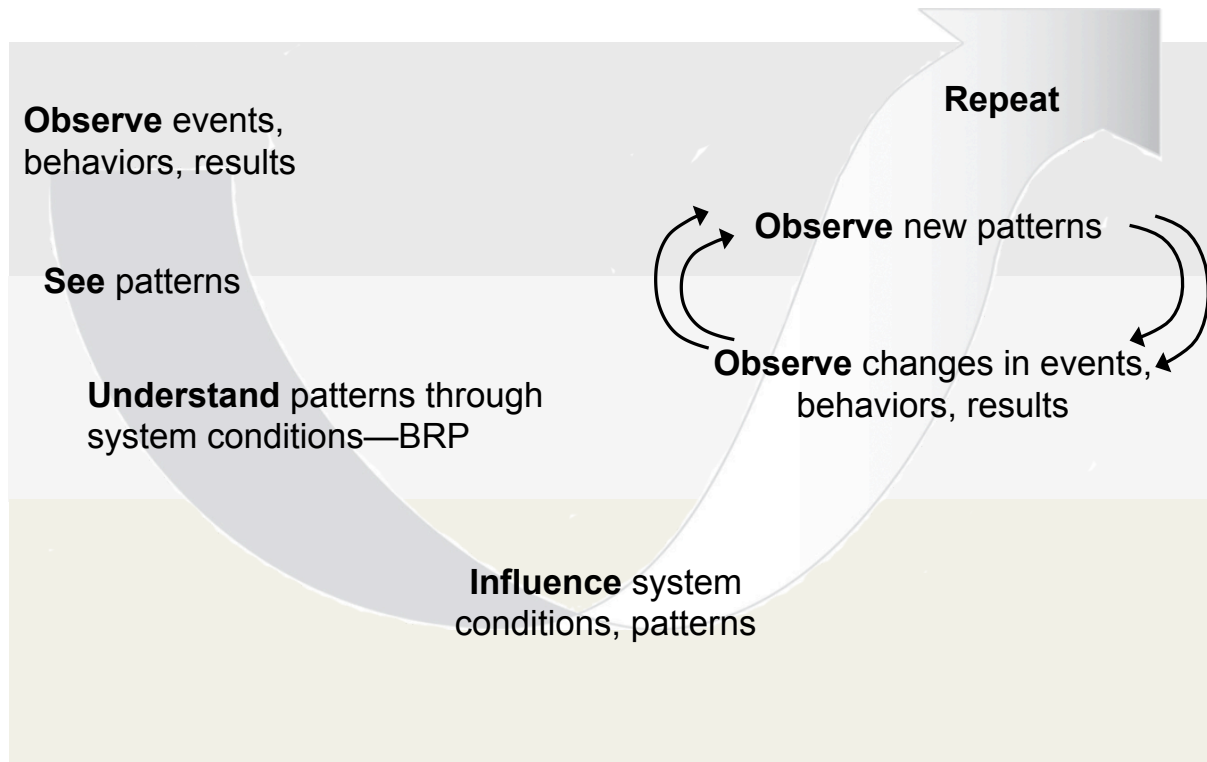


Pattern in Technology Systems Infrastructure (David's Example)

- **Boundaries:** What aspects of the technology system define (set boundaries around what is defined as) the infrastructure?
- What **Relationships/exchanges** exist within the technology systems infrastructure?
- What **Perspectives** exist within the technology systems infrastructure that seem to matter?

System Dynamics Related to Certainty and Agreement





B = boundaries; **R** = relationships; **P** = perspectives

Some Tools for Understanding Patterns and Seeking Ways to Influence Patterns



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Analyzing System Boundaries

Boundaries	Openness of Boundaries	Comments

Analyzing System Relationships

Relationships	Diversity/ Dimensionality of Relationships	Comments

Analyzing System Perspectives (Purposes, Worldviews, Paradigms)

Perspectives	Differences in Perspectives	Comments

Same and Different Analysis

Comparison _____

Same	Different



Future Webinars/Events

- Special session with Jonny Merrell (indicate date preferences)
- June webinar: Matt and Tarek – Rethinking Logic Models
- July webinar: Further work on Pattern analysis and system dynamics
- August webinar: Preparation for Fall
- September/October webinars: Include PIs



Session with Jonny

Evaluators often run into situations where programs act in ways, or have consequences, that nobody expected when the evaluation was begun. Sometimes when these surprises are detected the evaluation can be easily changed to accommodate new demands for information. But often the accommodation is weak because it is too late to implement data collection or analysis procedures. For the last few years Jonny Morell has been collecting case studies and working out approaches to help evaluators do a better job of anticipating and adjusting to surprise. His work is summarized in his recent book: *Evaluation in the Face of Uncertainty: Anticipating Surprise and Responding to the Inevitable*. If there is interest, Jonny will do a webinar that will provide an introduction and overview to the problem and its solutions.



