

Expanding Evaluator's Systems Thinking Competencies

AEA Summer Institute

June 6th and 7th, 2022

Afternoon Session

Introductions

- Name
- Job Title/Company
- What drew you to this workshop? Why are you interested in systems thinking?



A little bit about me...



Evaluation Services
(J.E.S.S) LLC



Learning Objectives

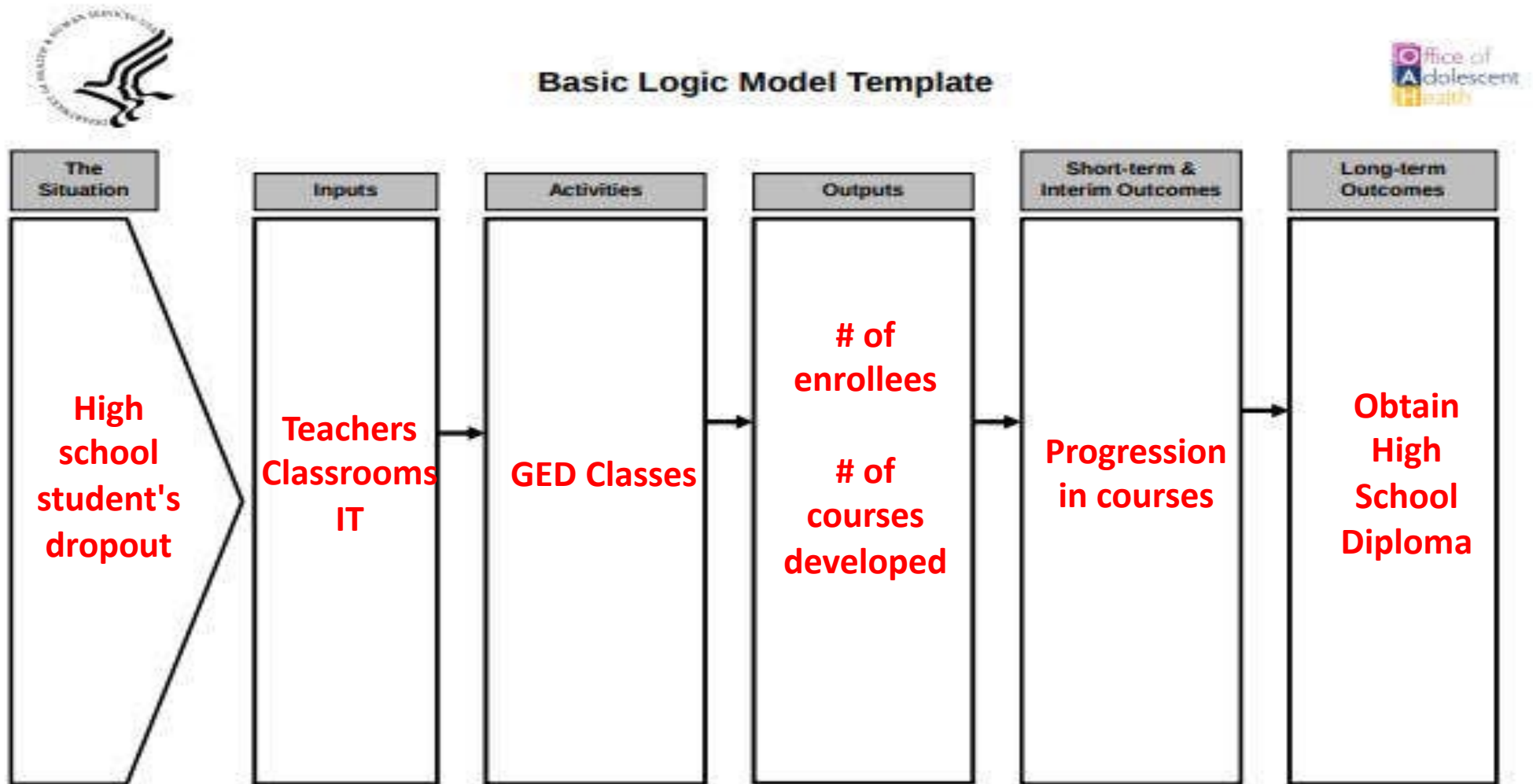
- In this workshop, you will learn:
 - What traditional program evaluation approaches miss when evaluating complex interventions
 - The benefits of systems thinking, and how the systems properties of interdependence and emergence aid in evaluating complex interventions
 - How systems thinking properties and principles are integrated into the three steps of Systems Evaluation Theory (SET)

The Challenge

Evaluating a simple intervention

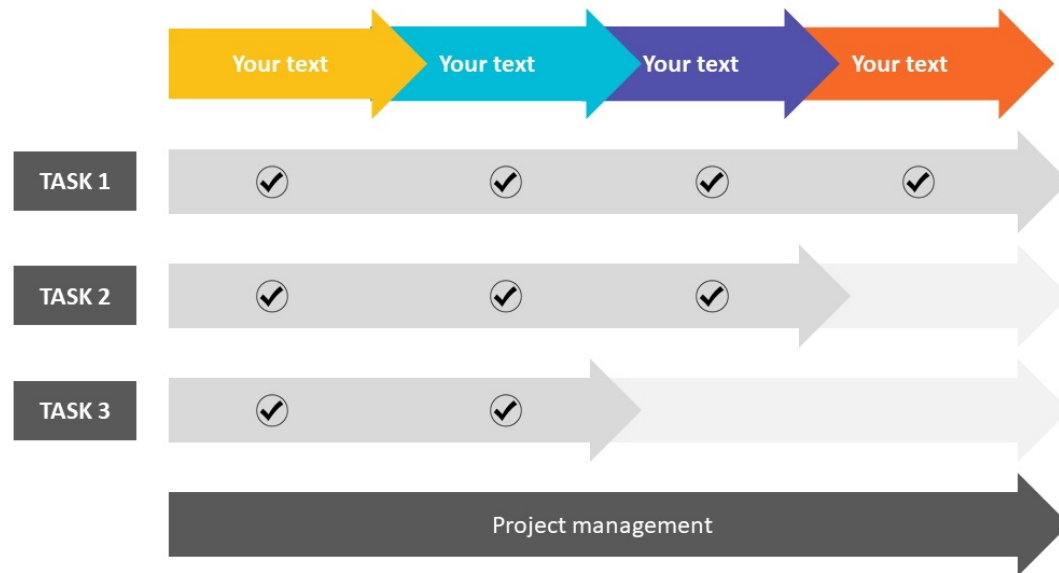


The intervention logic model



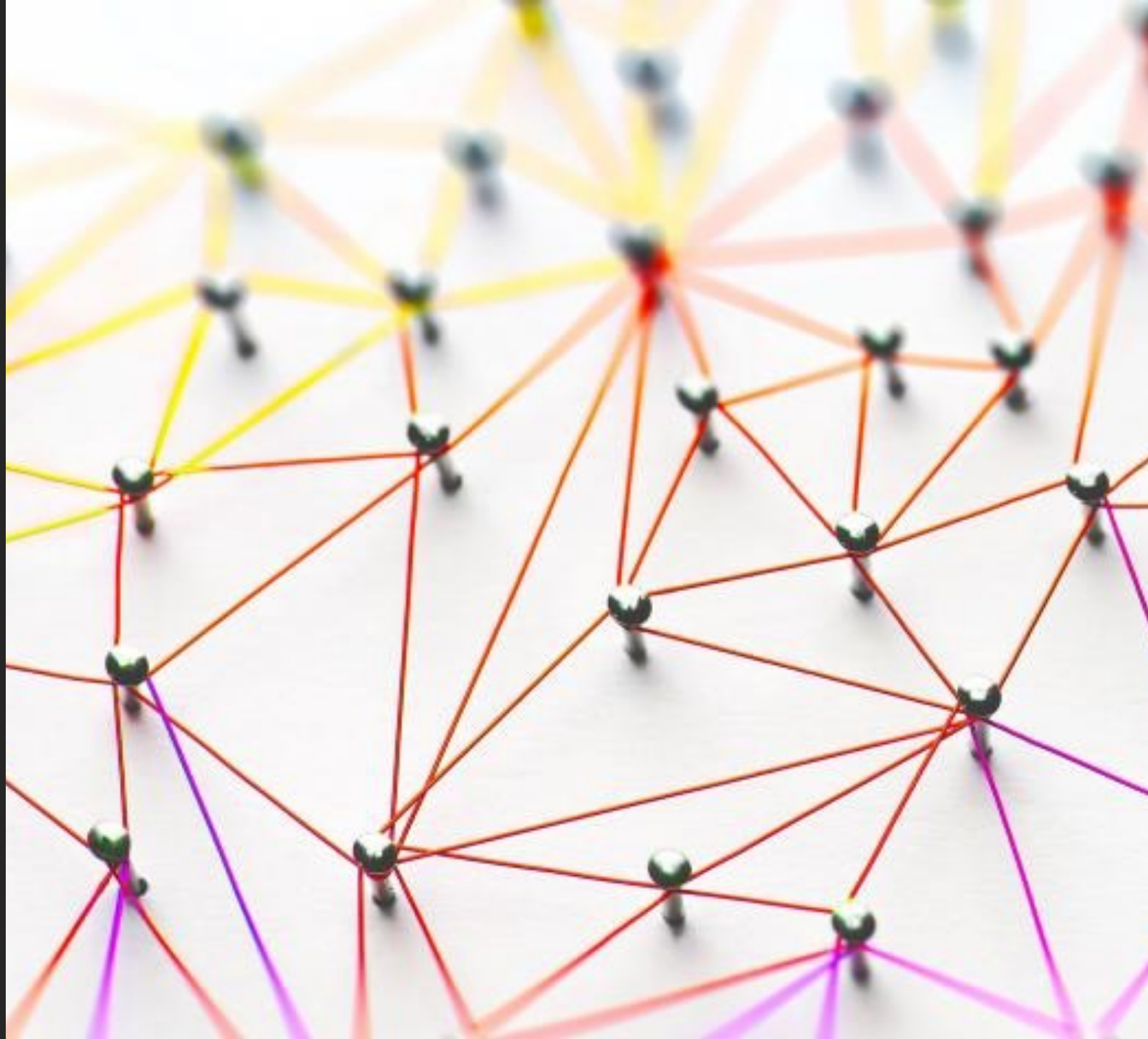
Process Evaluation Questions

Process implementation checklist PowerPoint



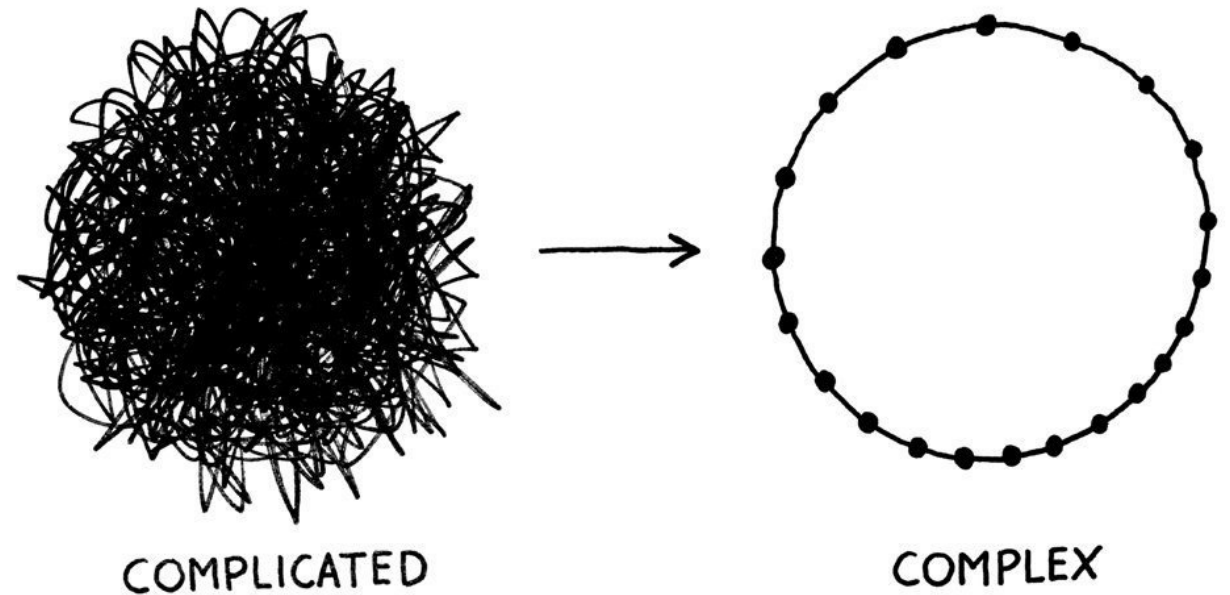
- Were teachers well trained?
- Was all the course content covered?
- Did students complete all the assignments?

What if the
intervention
is more
complex?



A quick aside: What is meant by a complex intervention?
How does it differ from being complicated?

- Our field is very inconsistent and careless in using the terms complex and complicated.
- We will use the term complex to mean many parts working together.
- We will use the term complicated to mean difficult.



Housing Density



Job Skills



Safe Parks



HUD HOPE VI Neighborhood Revitalization



Neighborhood
Businesses



Tax incentives



Childcare



Finish High School



**Now
what?**

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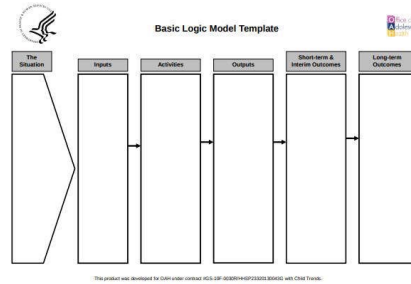
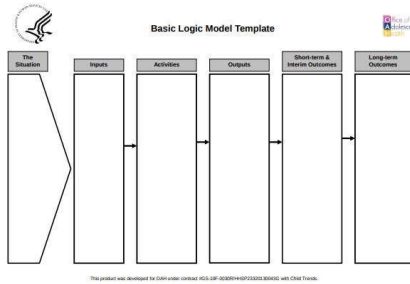
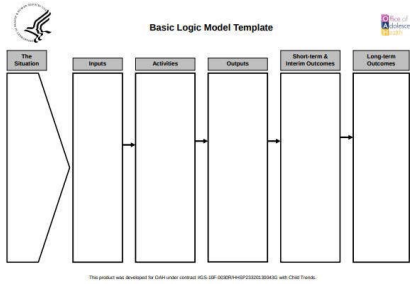
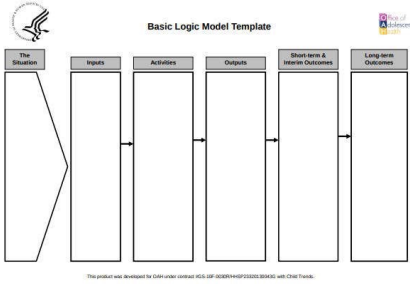
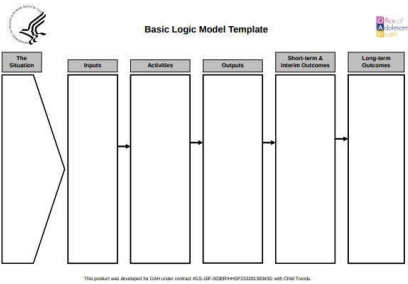
Tax Incentive



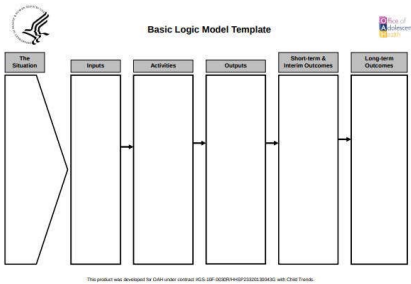
Job Skills



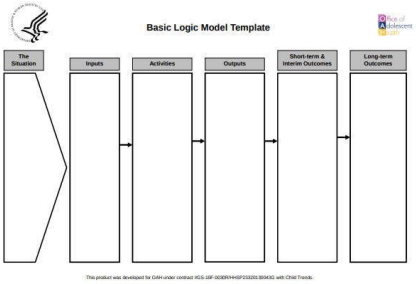
Neighborhood Businesses



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Housing Density



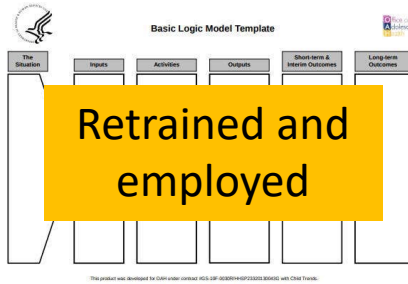
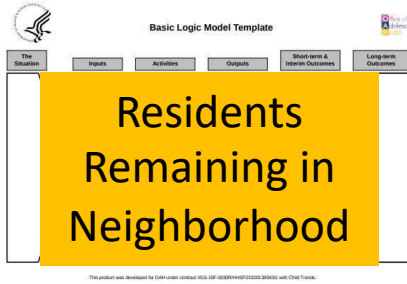
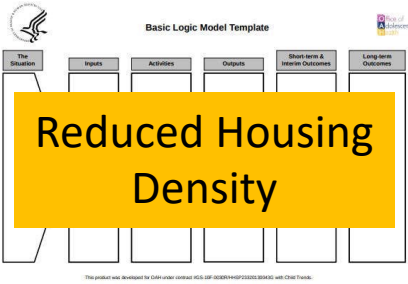
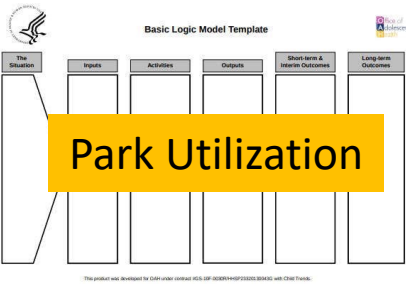
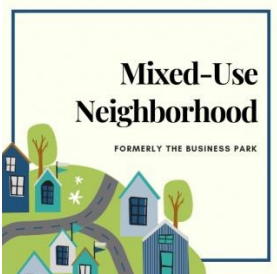
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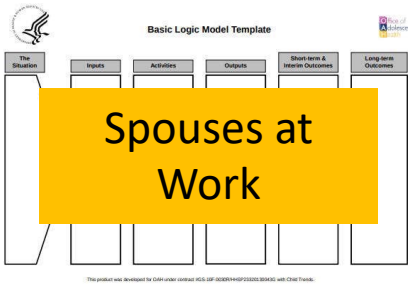
Job Skills



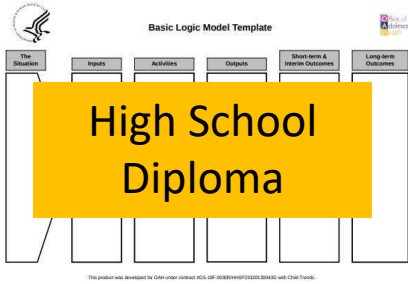
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What does
this approach
miss?

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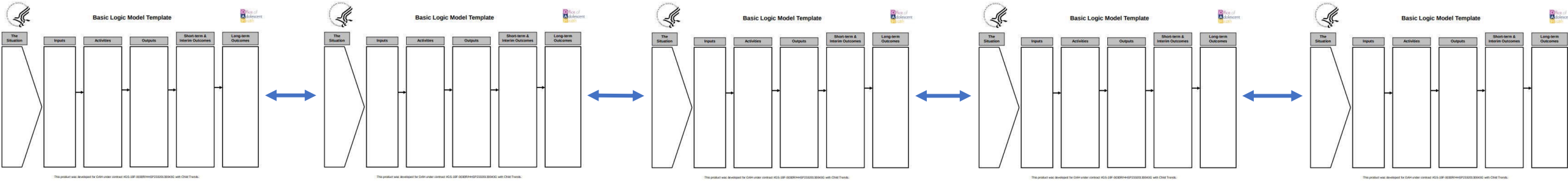
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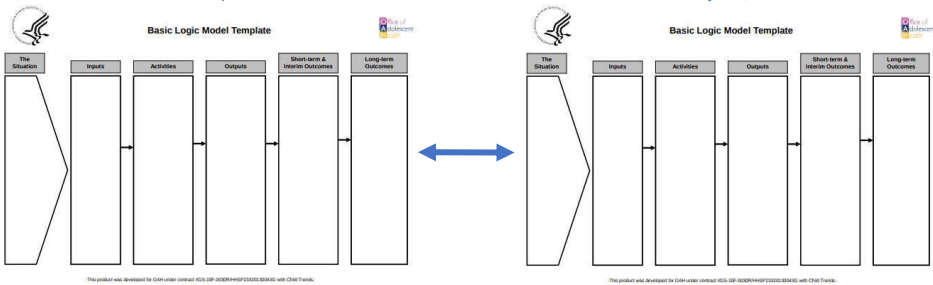
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Basic Logic Model Template

Inputs	Activities	Outputs	Short-Term Outcomes	Long-Term Outcomes

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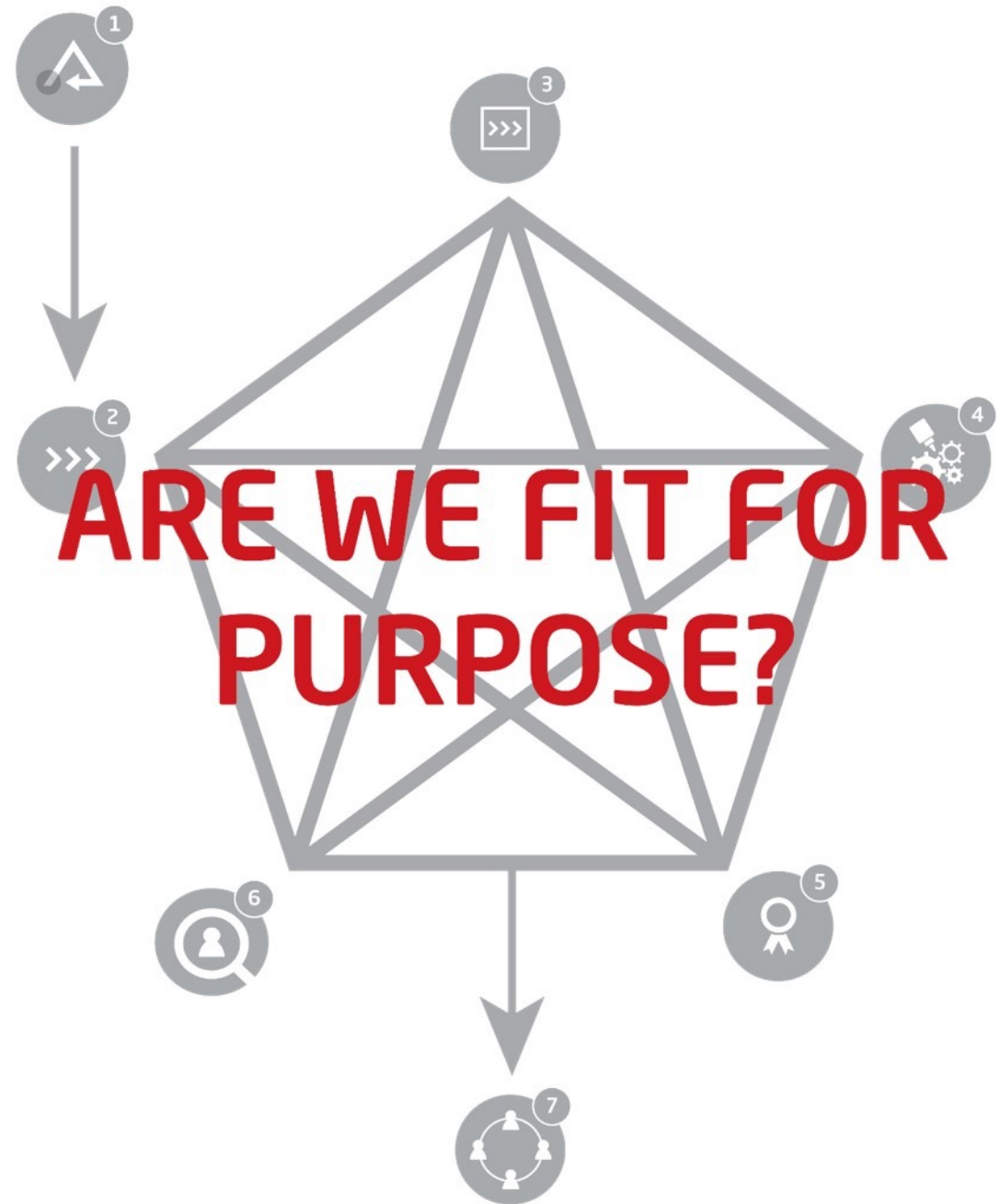
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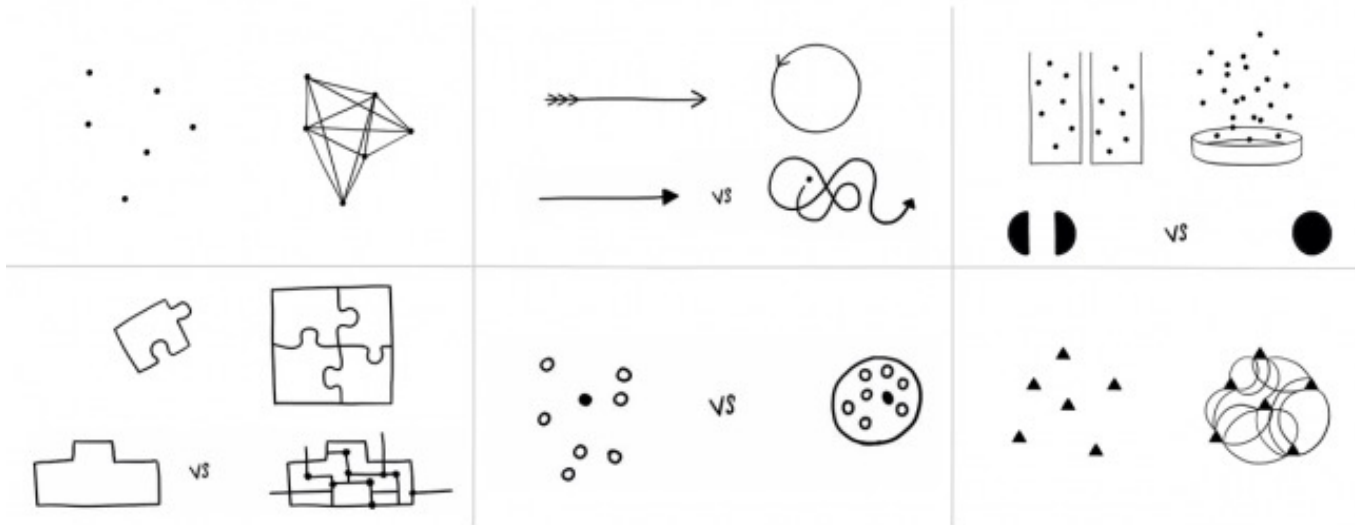
Basic Logic Model Template

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So, what is
the solution?



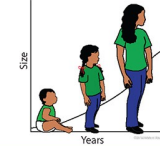
SYSTEMS THINKING



Seeks to understand the big picture



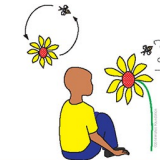
Observes how elements within systems change over time, generating patterns and trends



Recognizes that a system's structure generates its behavior



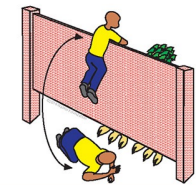
Identifies the circular nature of complex cause and effect relationships



Makes meaningful connections within and between systems



Changes perspectives to increase understanding



Surfaces and tests assumptions



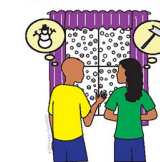
Habits of a Systems Thinker



Considers an issue fully and resists the urge to come to a quick conclusion



Considers how mental models affect current reality and the future



Uses understanding of system structure to identify possible leverage actions



Considers short-term, long-term and unintended consequences of actions



Pays attention to accumulations and their rates of change



Recognizes the impact of time delays when exploring cause and effect relationships



Checks results and changes actions if needed: "successive approximation"



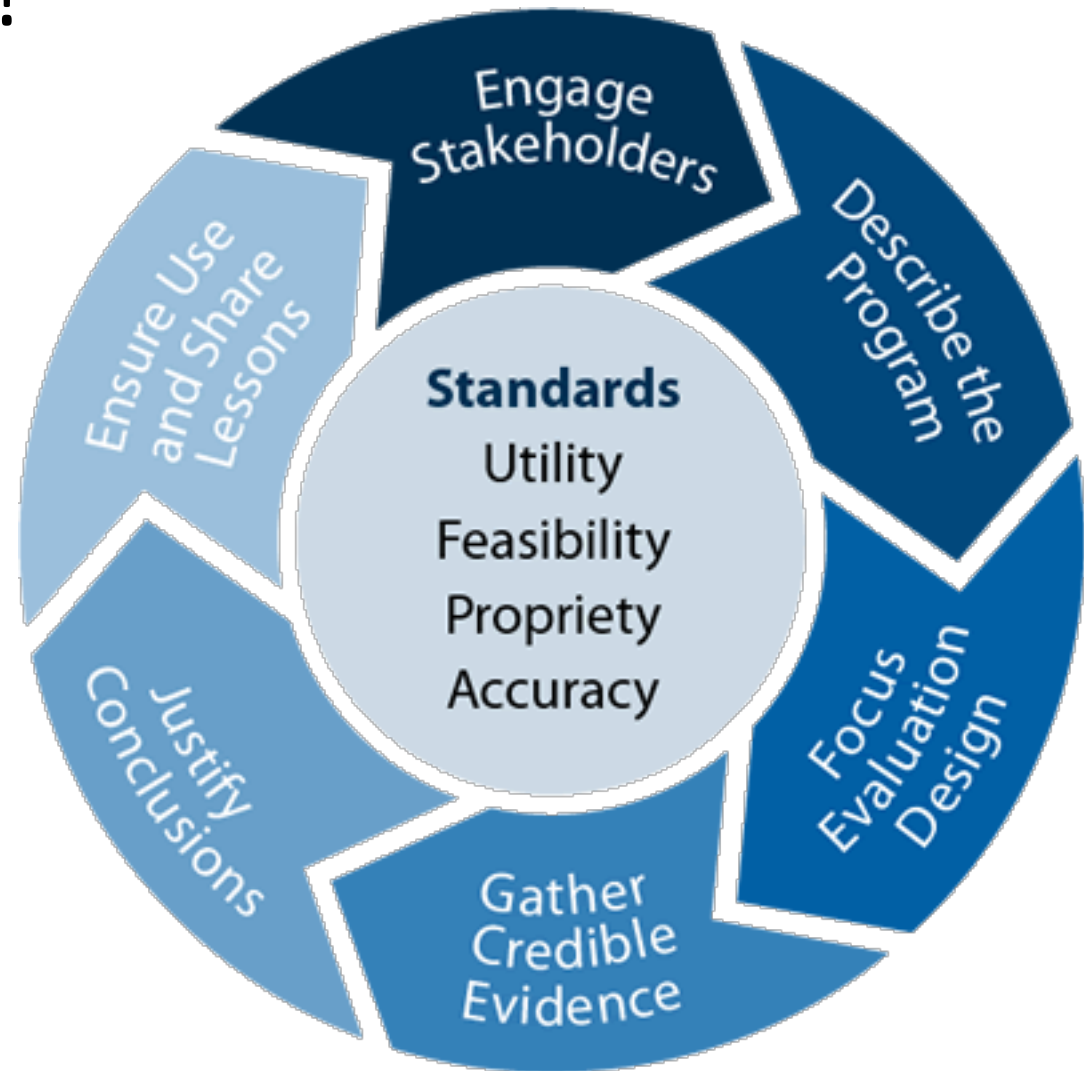
Benefits of Systems Thinking

- Systems thinking shifts the focus of the evaluation and changes the types of questions (both process and outcome related) that we might ask
- Ensures we are relevant and responsive to context
- Increases the likelihood that our findings will be perceived as credible by stakeholders (i.e., reflects the intervention reality), and will be used.

So how do we start integrating systems thinking into evaluation practice?

Start with a definition!

- Describing the evaluand is a good first step in any evaluation
- One of the things about which the evaluation community is in agreement





How would you define a system?

- An integrated whole whose essential properties emerge from the interdependence between its parts (Ison, 2008).

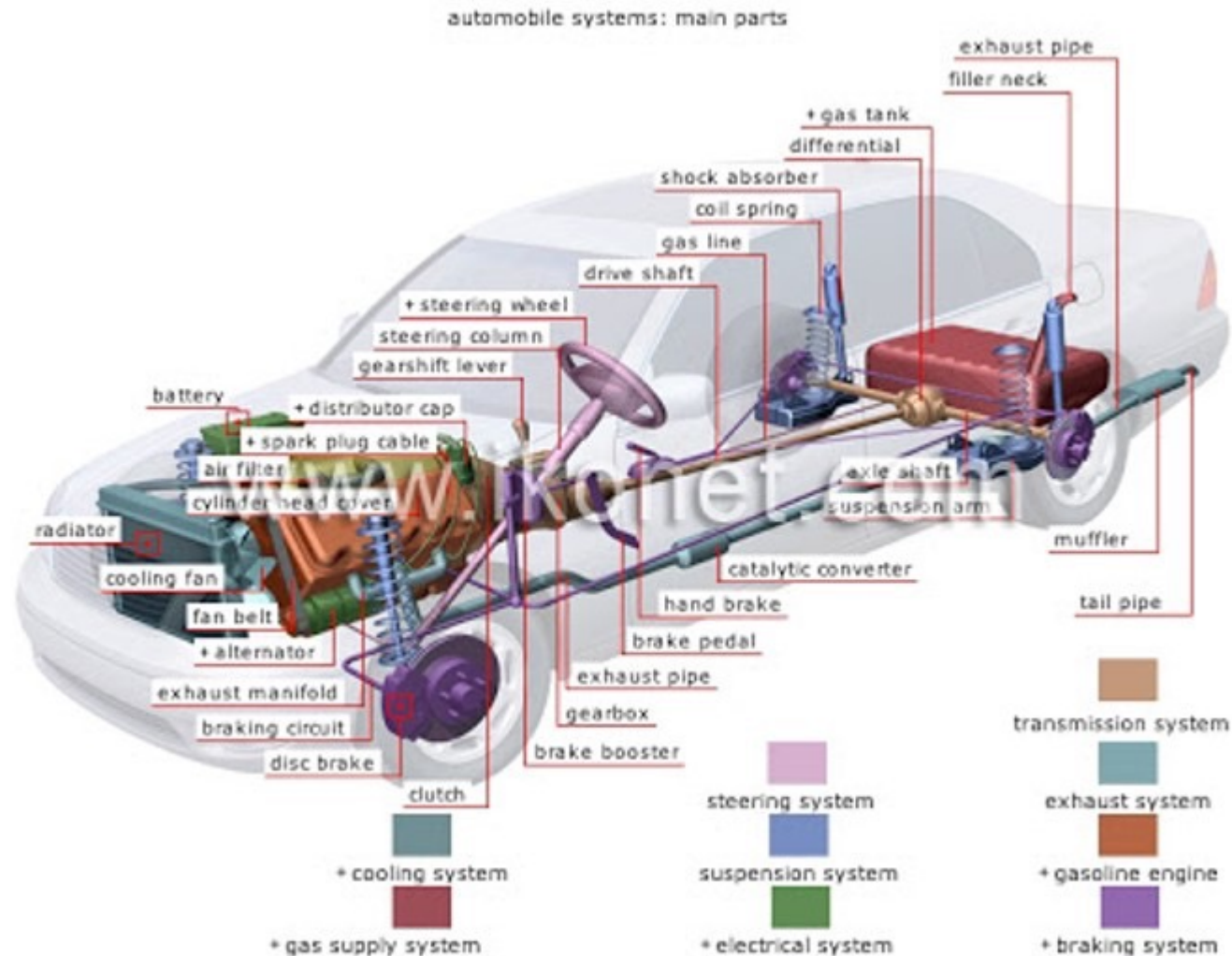


System parts

- System parts include a set of plans, resources, authorities, agencies, and their associated human resources (Jackson, Faith, & Willis, 2012).



Illustrating parts, interdependence and emergence



Meet the system test?

- All parts are needed in the car for the essential system property (i.e., moving you from point A to point B) to emerge.
- If a single part is missing, then the car won't run as well or at all, so the essential system property may not emerge.



What is the value added of applying the system definition in evaluating complex interventions?

- Interdependence adds a quality to the “bunch of stuff” (i.e., complexity) that can now be evaluated. (operational)
- Emergence gives the “bunch of stuff” (i.e., complexity) a purpose that can now be evaluated. (functional)



Safe Parks



Housing Density



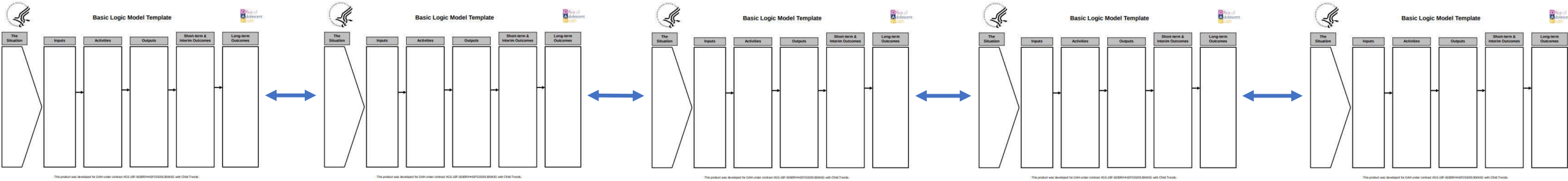
Tax Incentive



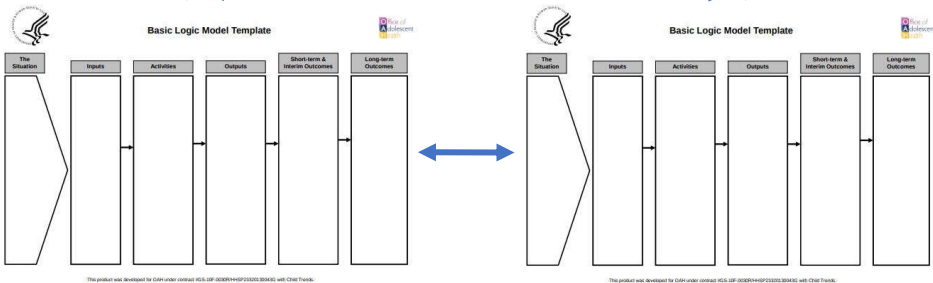
Job Skills



Neighborhood Businesses



Childcare



Finish High School

Housing Density



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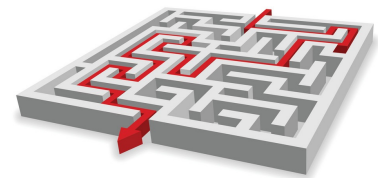
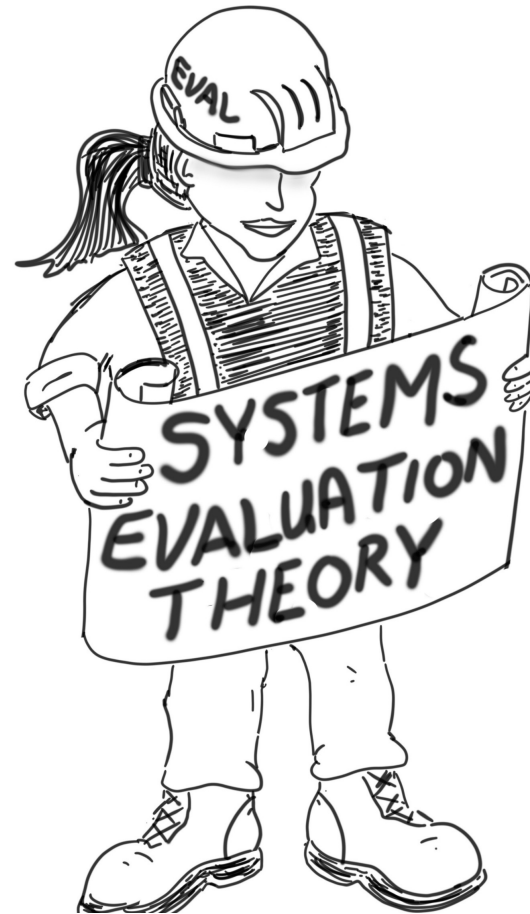
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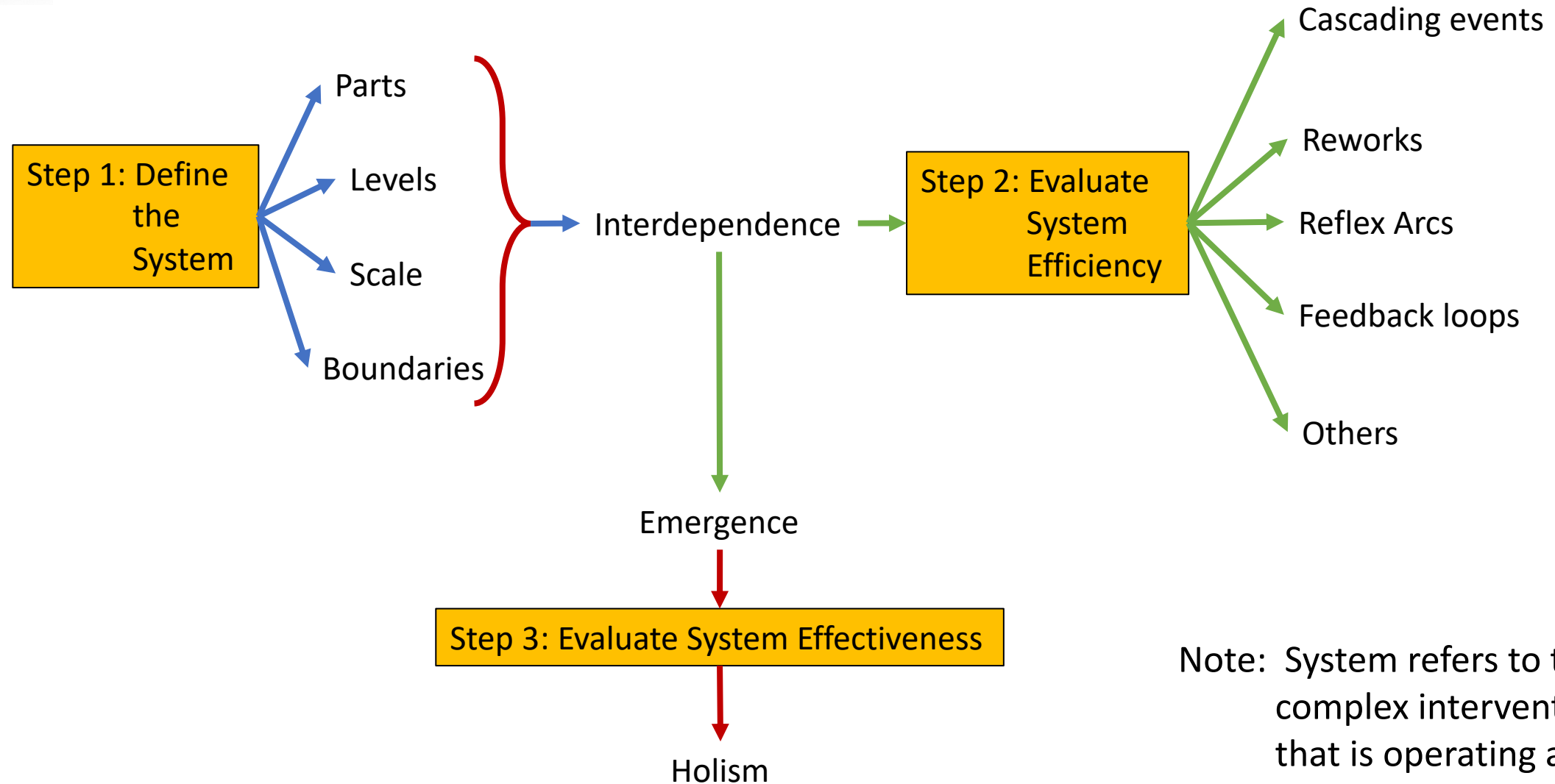
SET: A better tool for the job

- A blueprint for how to do a systems evaluation that is aligned to an understanding of the system properties
 - Step 1. Define the system.
 - Step 2: Evaluate interdependencies (the equivalent of a process evaluation).
 - Step 3: Evaluate emergence (the equivalent of an outcome evaluation).



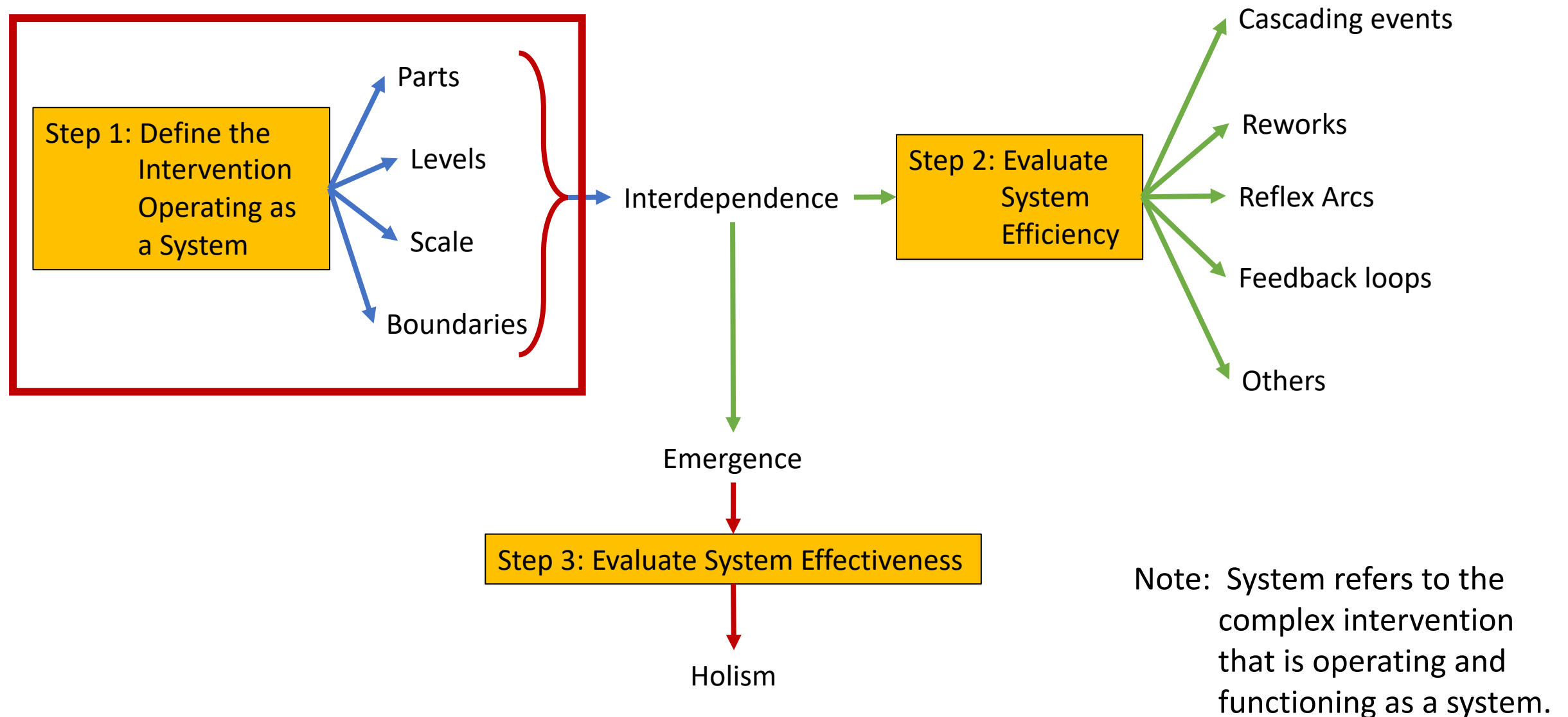


Rationale of Systems Evaluation Theory (SET)

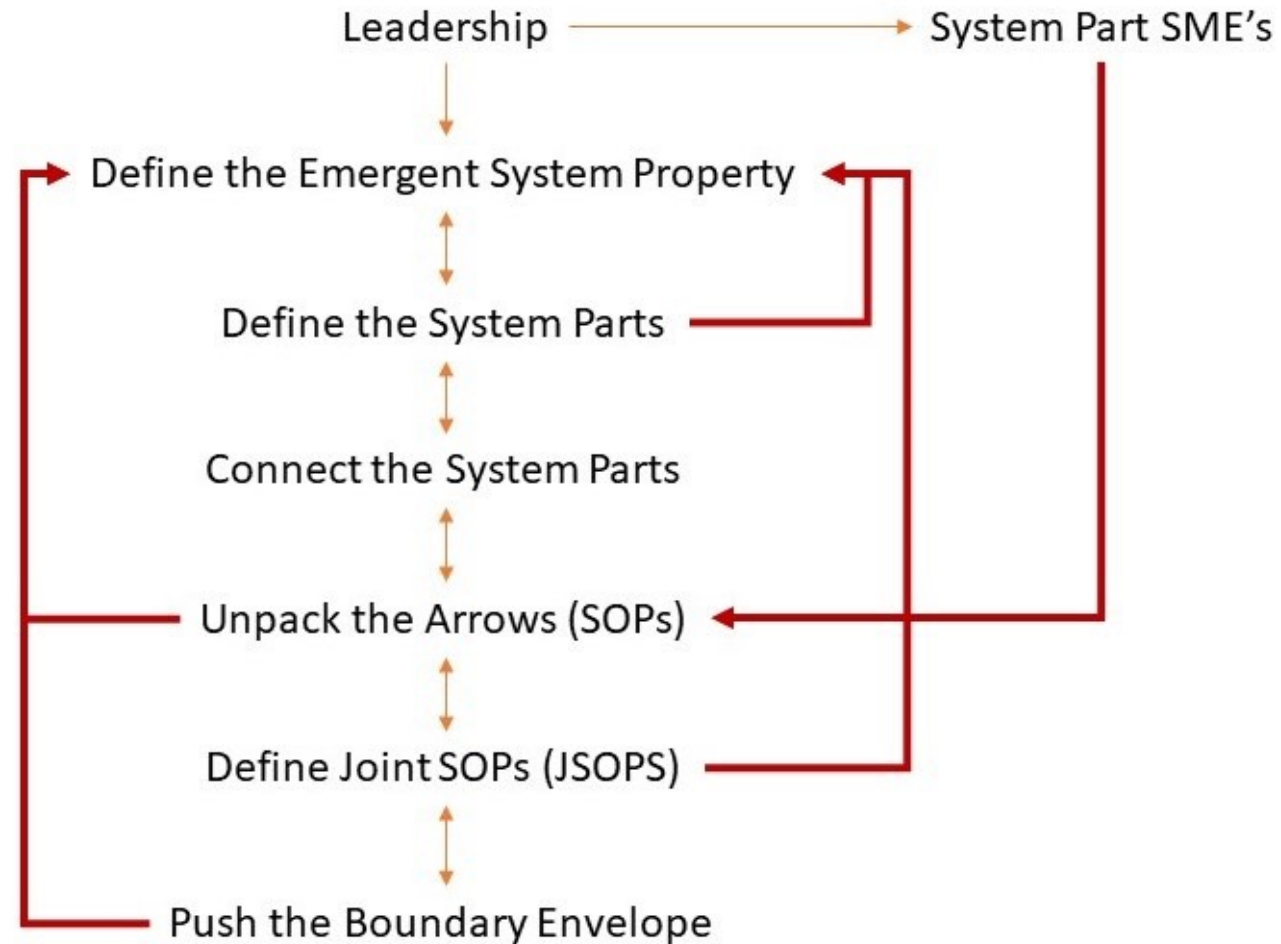


Note: System refers to the complex intervention that is operating and functioning as a system.

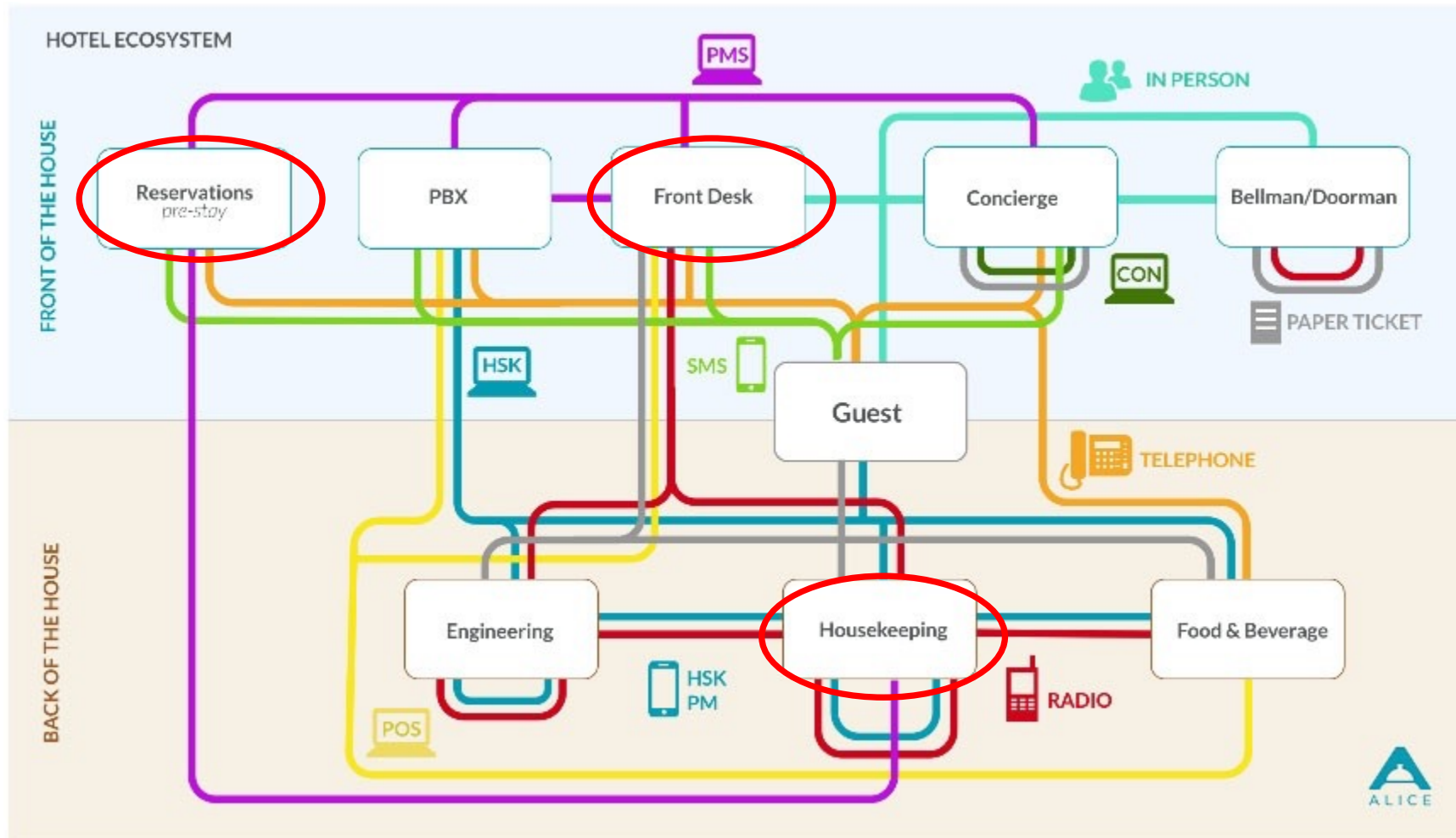
Rationale of Systems Evaluation Theory (SET)



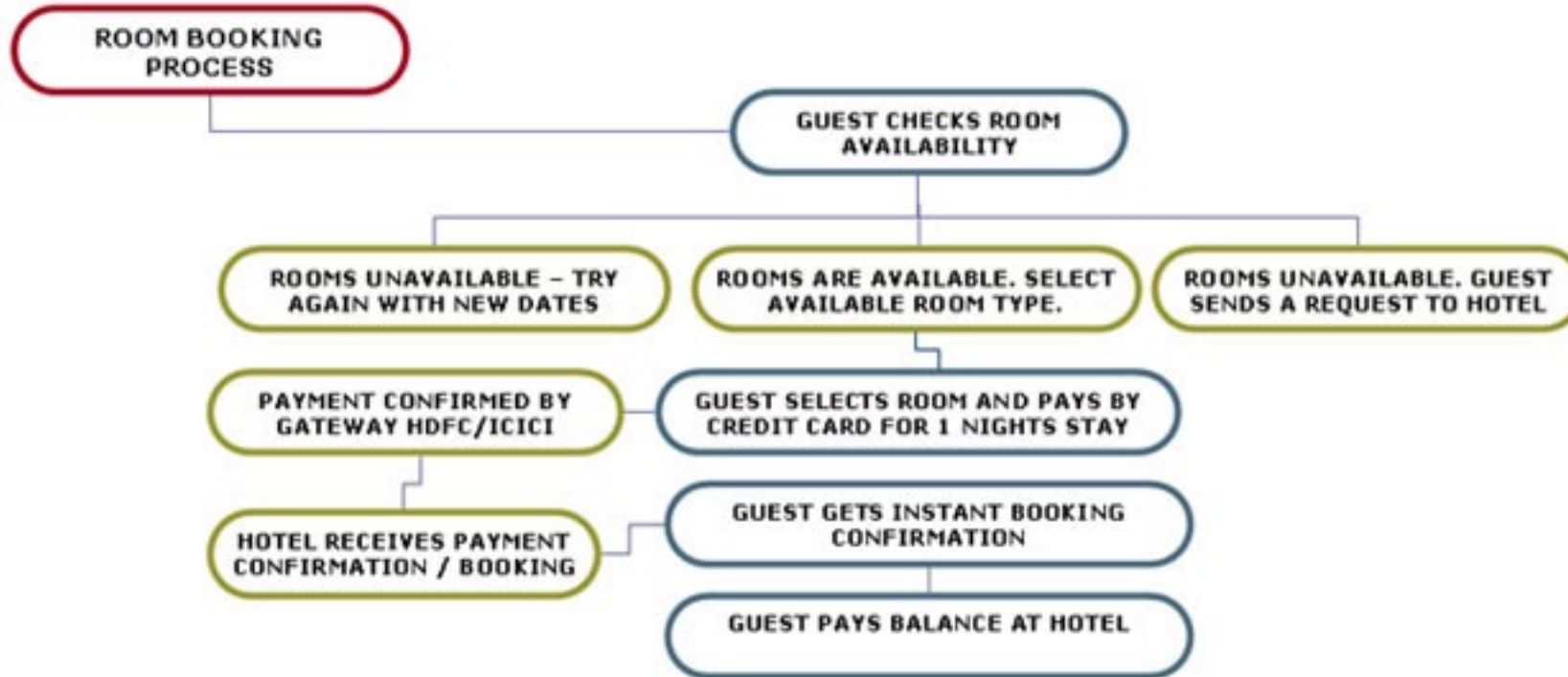
SET Step 1: Define the System



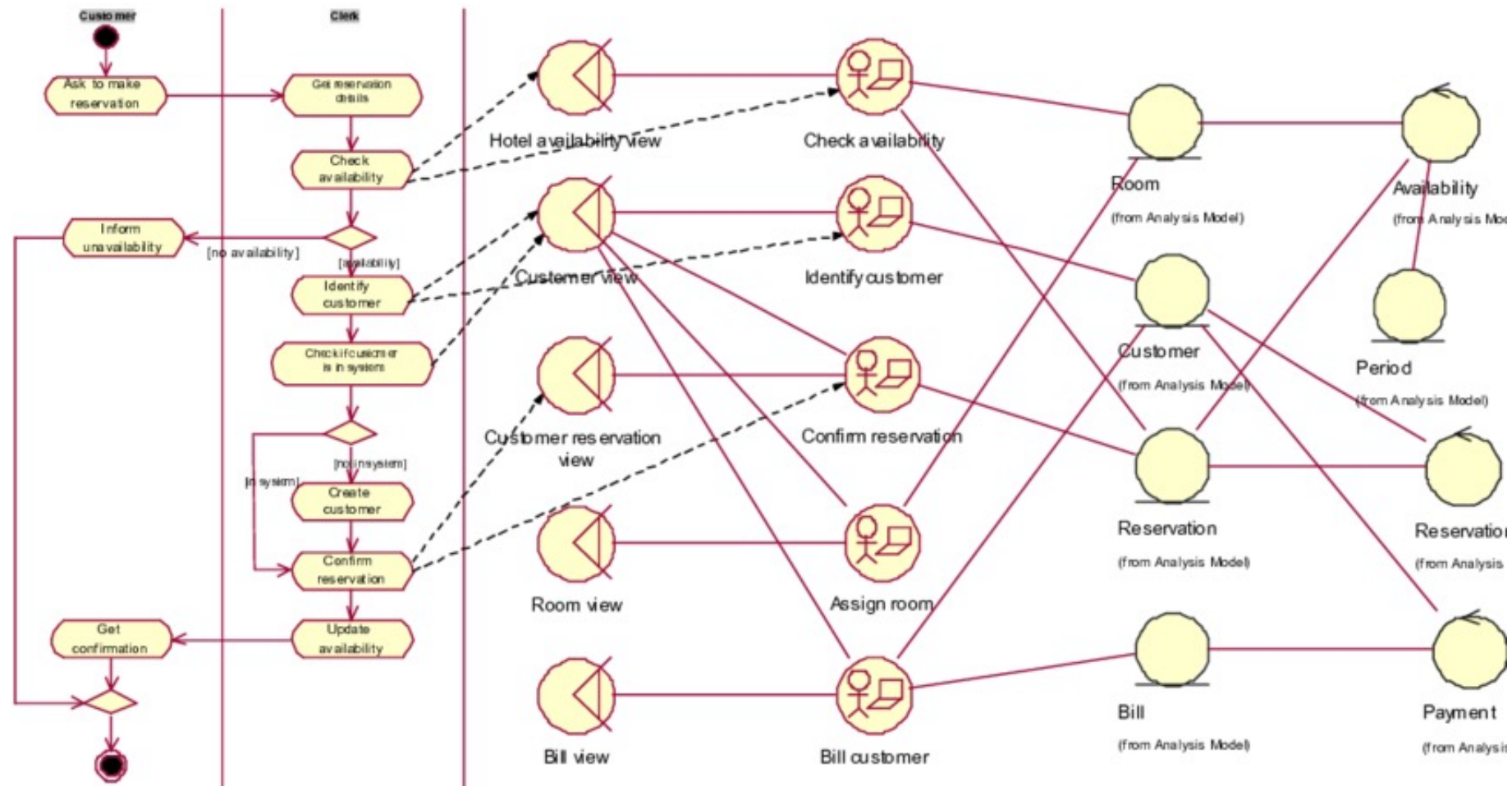
A Relevant Example: A Hotel System



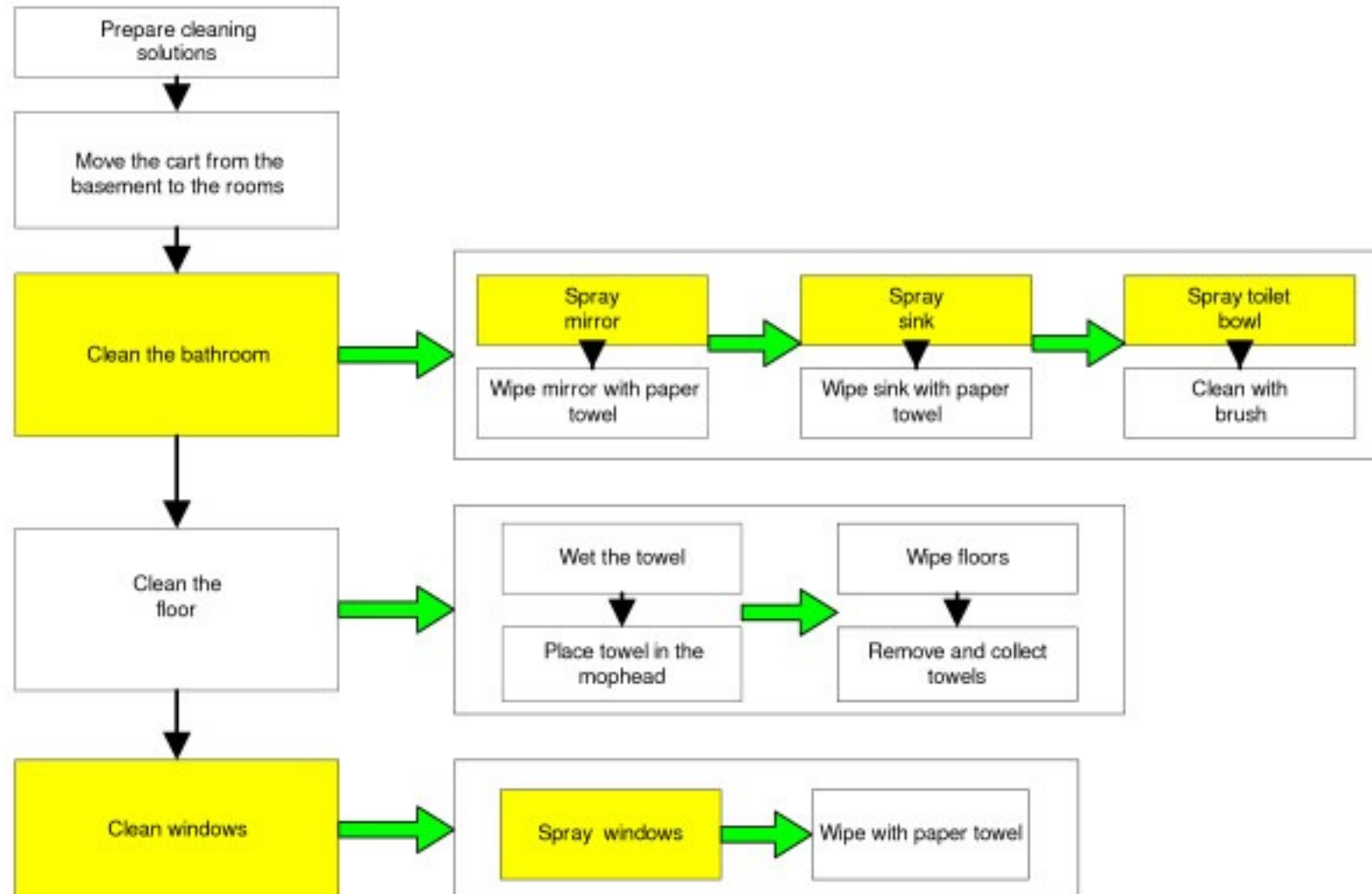
One System Part SOP: Reservation System



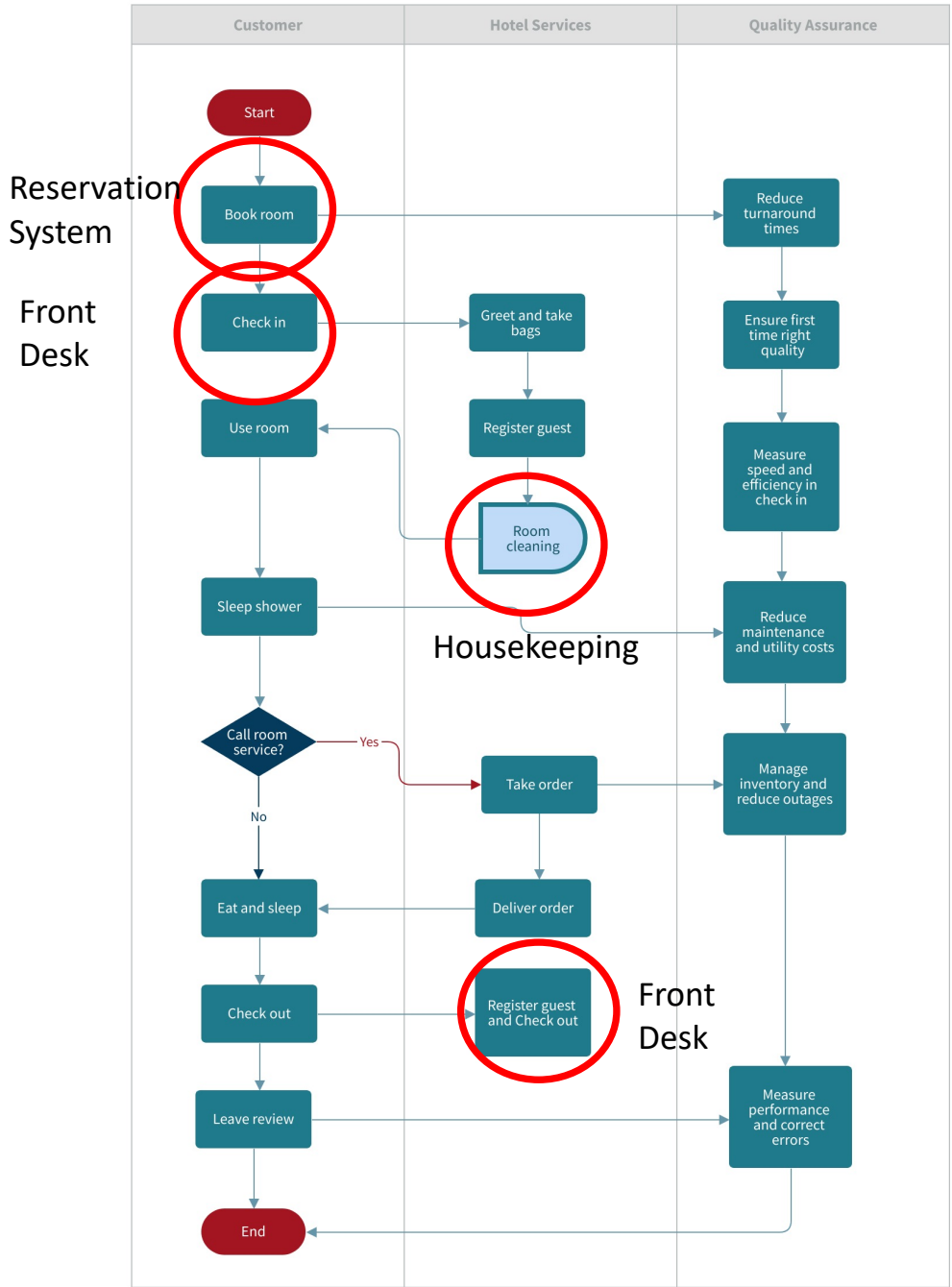
One System Part SOP: Front Desk



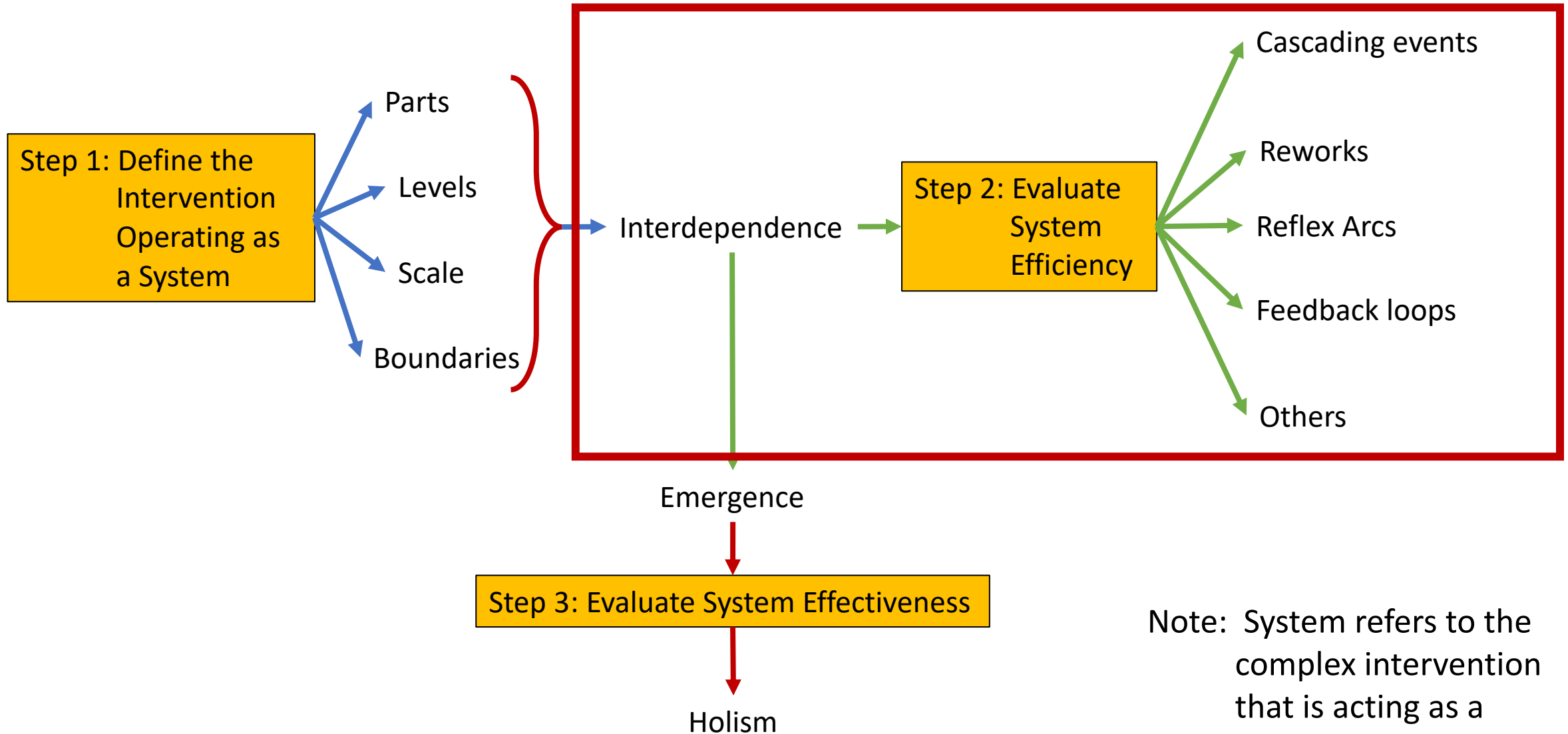
One System Part SOP: Housekeeping



Pull folks
together:
JSOP



Rationale of Systems Evaluation Theory (SET)



Note: System refers to the complex intervention that is acting as a system.



SET Step 2: Evaluate System Efficiency

- To evaluate a system's efficiency is to evaluate its interdependencies



SET Step 2: Key System Principles

- The systems principles of feedback loops, cascading events, and reflex arcs (to name a few) provide a lens through which the SOPs/JSOPs created in SET Step 1 can be evaluated

Feedback Loops

The return of information about the status of a process.



RALPH RENGER

Illustrating the evaluation of system feedback mechanisms using system evaluation theory (SET)

This article describes how system evaluation theory (SET) guided the evaluation of cardiac care response systems efficiency in seven rural United States. Specifically, the article focuses on the approach and methods used to evaluate system feedback mechanisms; one key factor affecting system efficiency. Mixed methods were applied to evaluate five criteria of system feedback efficiency: frequency, timeliness, credibility, specificity, and relevance. Examples from the cardiac care response system evaluation are used to illustrate each of the evaluation criteria. The discussion contrasts the role of the evaluator in system versus program evaluation, notes the post-hoc support of SET system attributes in affecting system efficiency, and offers additional consideration in evaluating system feedback mechanisms.

Systems thinking is gaining attention in the evaluation literature as an approach for addressing limitations associated with some of the artificialities of theory driven program evaluation (Williams & Hummelbrunner, 2010). For example, systems thinking is helpful in adding context to logic models that may unintentionally oversimplify the context of programmatic assumptions (Gamel-McCormick, 2011).

System thinking is also an important element in the evaluation of modern day systems. Ericson (2011) defines a modern day *system* as:

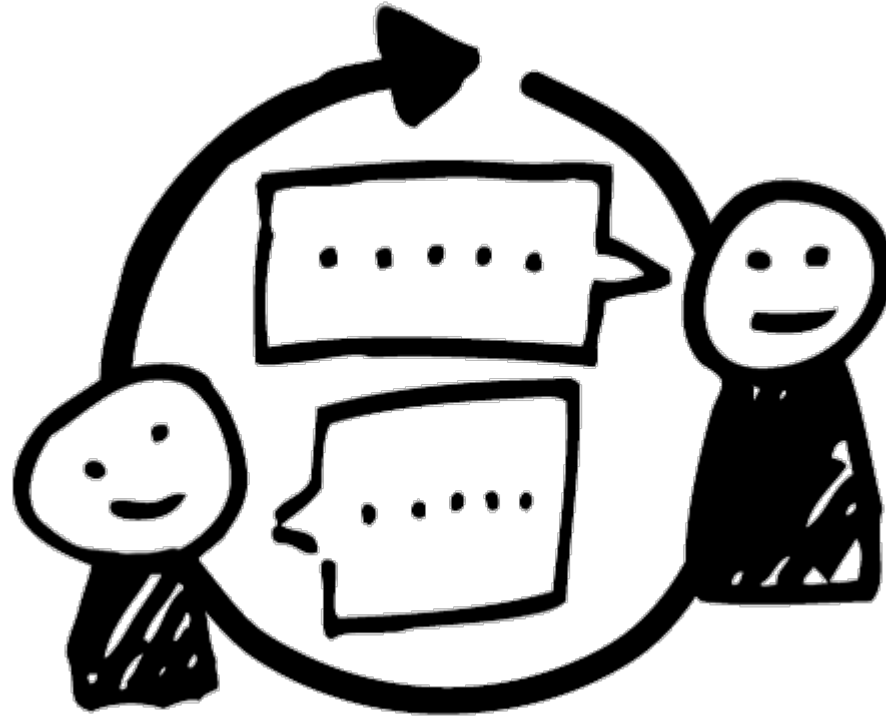
An integrated composite of components that provide function and capability to satisfy a stated need or objective. A system is a holistic unit that is greater than the sum of its parts. It has structure, function, behavior, characteristics, and interconnectivity. Modern day systems are typically composed of people, products, and environments that together generate complexity and capability. (p. 402)

Under this definition a program may be a system component, but itself is not a system (McDavid, Huse & Hawthorn, 2013).

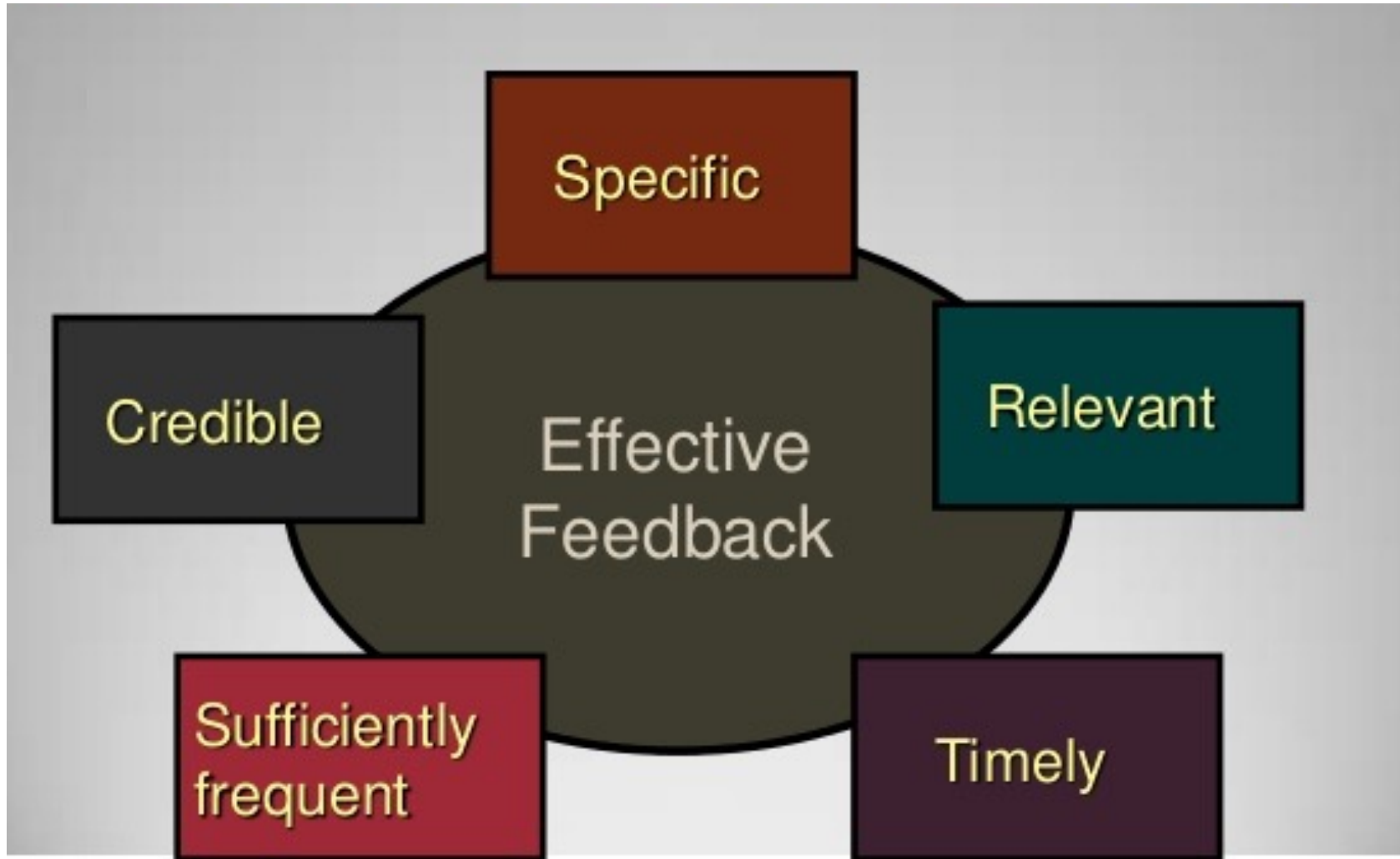


Ralph Renger is a Professor and Director of the Division of Evaluation at the Center for Rural Health, University of North Dakota.
Email: ralph.renger@med.und.edu

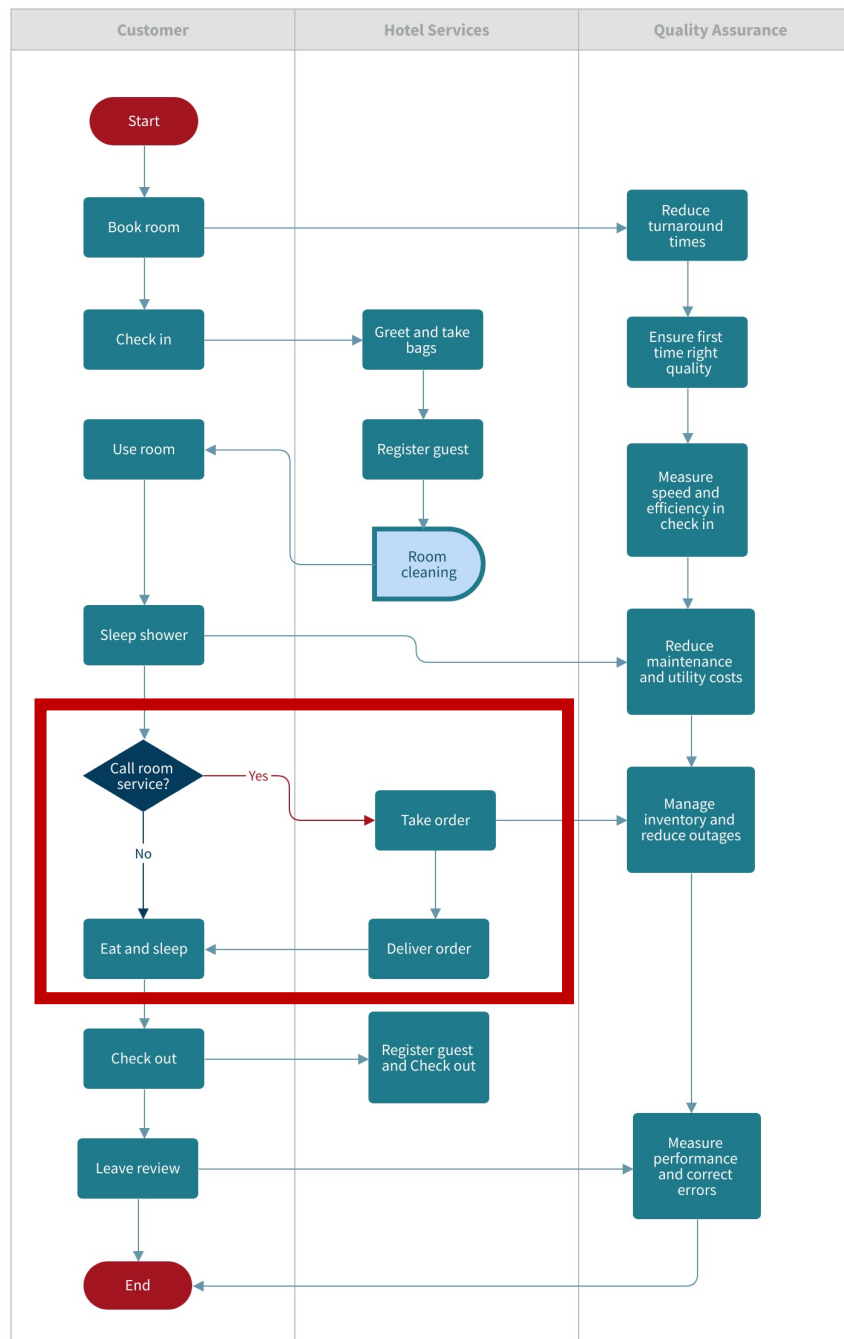
First evaluation decision point: Is the feedback loop being closed?



Second evaluation decision point: Quality of the feedback?



Spot the Feedback Loop



Cascading Failures



ACADEMIC ARTICLE Evaluation Journal of Australasia Vol 17 | No 2 | 2017 | pp. 29–36

RALPH RINGER | JIRINA FOLTYSOVA | SKYLER IENUSO | JESSICA RINGER | WAYNE BOOZE

Evaluating system cascading failures

This article shares methods used to evaluate system cascading failures. A cascading failure occurs when a problem is passed from one subsystem to a downstream subsystem creating a domino effect that undermines system efficiency and effectiveness. First, the basics of system evaluation theory (SET) are reviewed. Then drawing on different examples from the evaluation of emergency response systems the article describes how a) standard operating procedures (SOPs) can be used to locate possible system cascading failure trigger points, and b) mock exercises and secondary data are used to evaluate these trigger points. The discussion highlights the need to expand SET's conceptualization to include within subsystem cascading failures in addition to between subsystem cascading failures. The extent to which program evaluation methods can be adapted for use in system evaluation is also discussed.

Methods for evaluating system cascading failures

Many evaluators are exploring the value of system thinking to improve program evaluations (Renger, Wood, Williamson & Krapp, 2011; Williams & Hummelbrunner, 2010). The basic premise is systems thinking is a way to address the artificialities of many theory driven program evaluation approaches (Williams & Hummelbrunner, 2010). For example, system thinking is thought to better capture the complex context in which a program operates thereby addressing the limitations of oversimplified program logic models (Gamel-McCormick, 2011). The goal of evaluators applying system thinking is to produce more meaningful and usable program evaluations (Patton, 2008; Williams & Hummelbrunner, 2010).

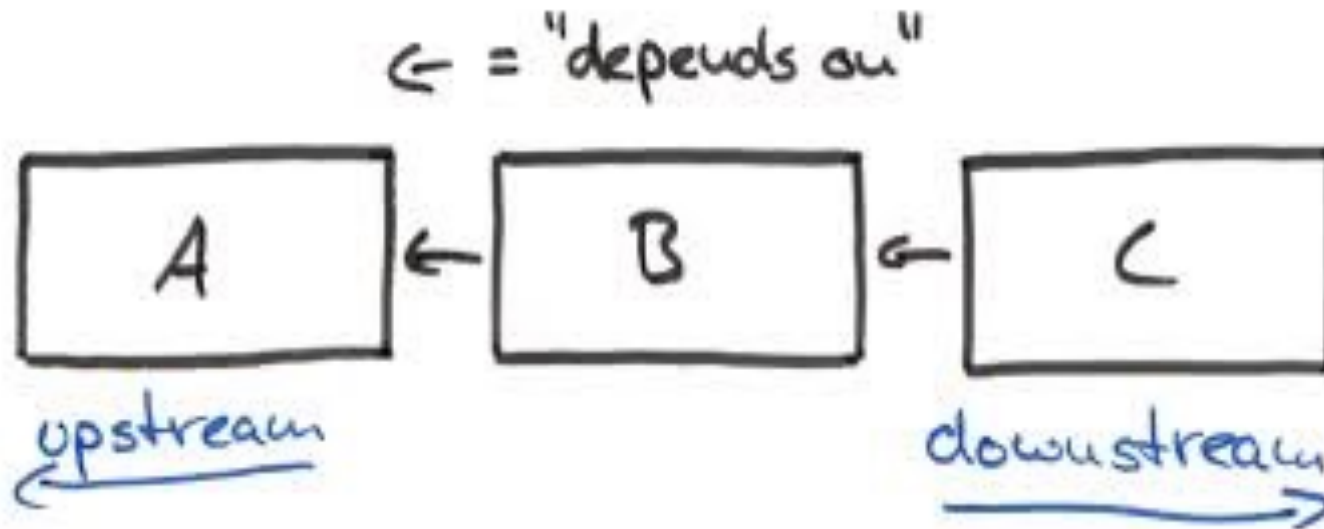
However, Renger (2015; 2016) notes another evaluation branch is emerging within theory-driven evaluation that is using systems thinking to evaluate modern day systems. Renger (2015) published the SET to guide evaluating modern day systems.¹ SET employs both system thinking and system theory to meet the emerging stakeholder demand to evaluate entire systems, of which a program may be one component.

SET suggests evaluators follow three basic steps in conducting a system evaluation: i) define the system,

ii) evaluate system efficiency, and iii) evaluate system effectiveness. Defining the system also consists of three steps to capture the detail necessary for evaluating system efficiency and effectiveness. The first step is defining the system boundaries (Renger, 2015; Williams & Hummelbrunner, 2010). This step is critical in establishing the evaluation scope and resources (e.g. stakeholders to include) (Williams & Hummelbrunner, 2010). Once system boundaries are established it is then necessary to identify subsystems which are contributing to the common system goal(s). The third step then details within and between subsystem relationships, also known as the SOPs (Nickols, 2000).

Explicit documentation of the SOPs is critical to understanding how each component of the system and interaction between them is supposed to operate.

Once the system is defined, the second SET step is to define system efficiency. Central to this step is operationalizing system efficiency. All system components should work toward the same efficiency goal. For example, Renger (2017) applied SET to evaluating points of dispensing (POD). In this example, the purpose of a POD is to deliver mass immunizations/vaccinations in a public health crisis. A POD consists of numerous interdependent stations (e.g. registration, medical dispensing) all designed



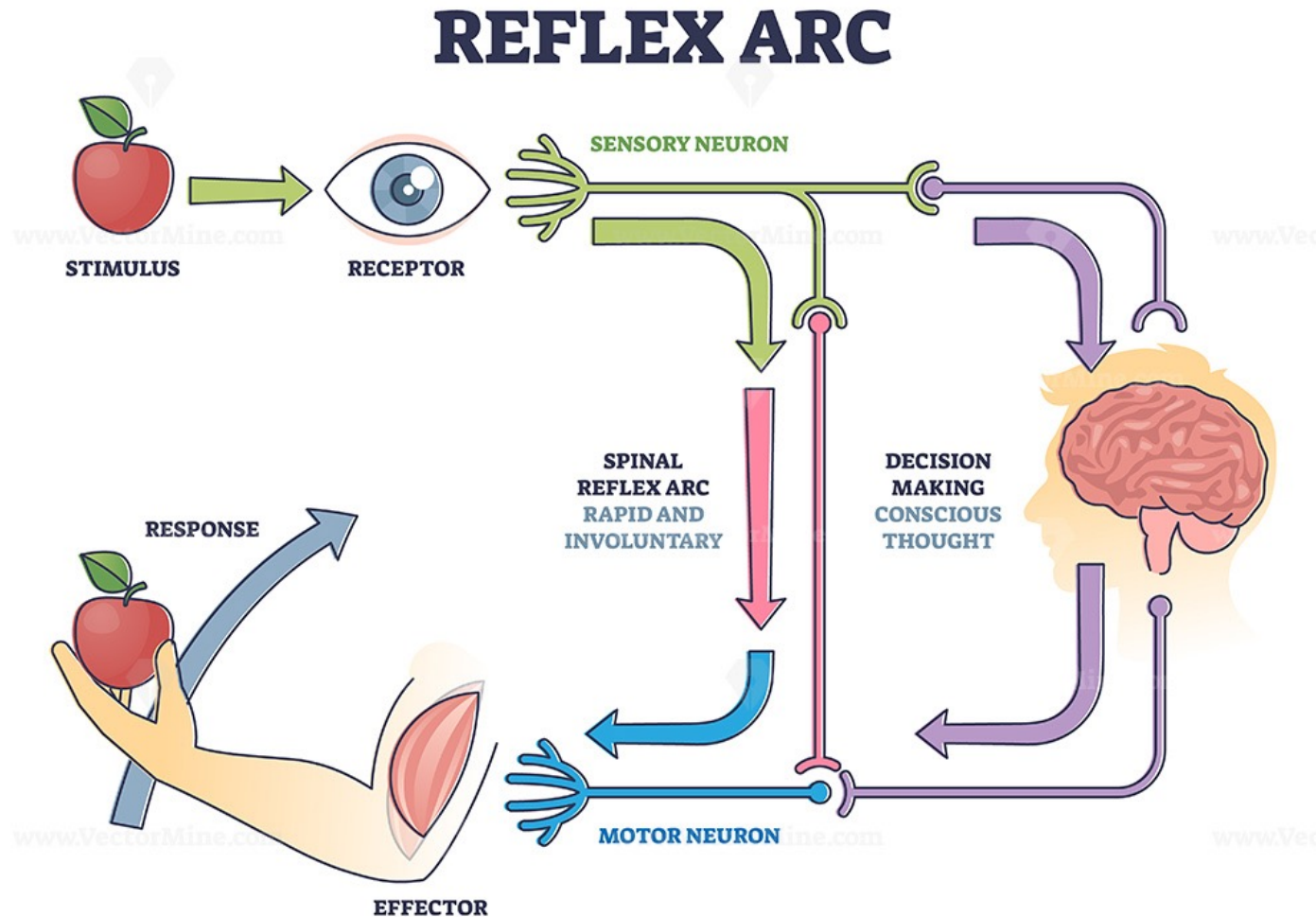


What are Some Examples of Cascading Failures in a Hotel System?



What are Some Examples of Cascading Failures in the COVID-19 Pandemic?

Reflex Arcs



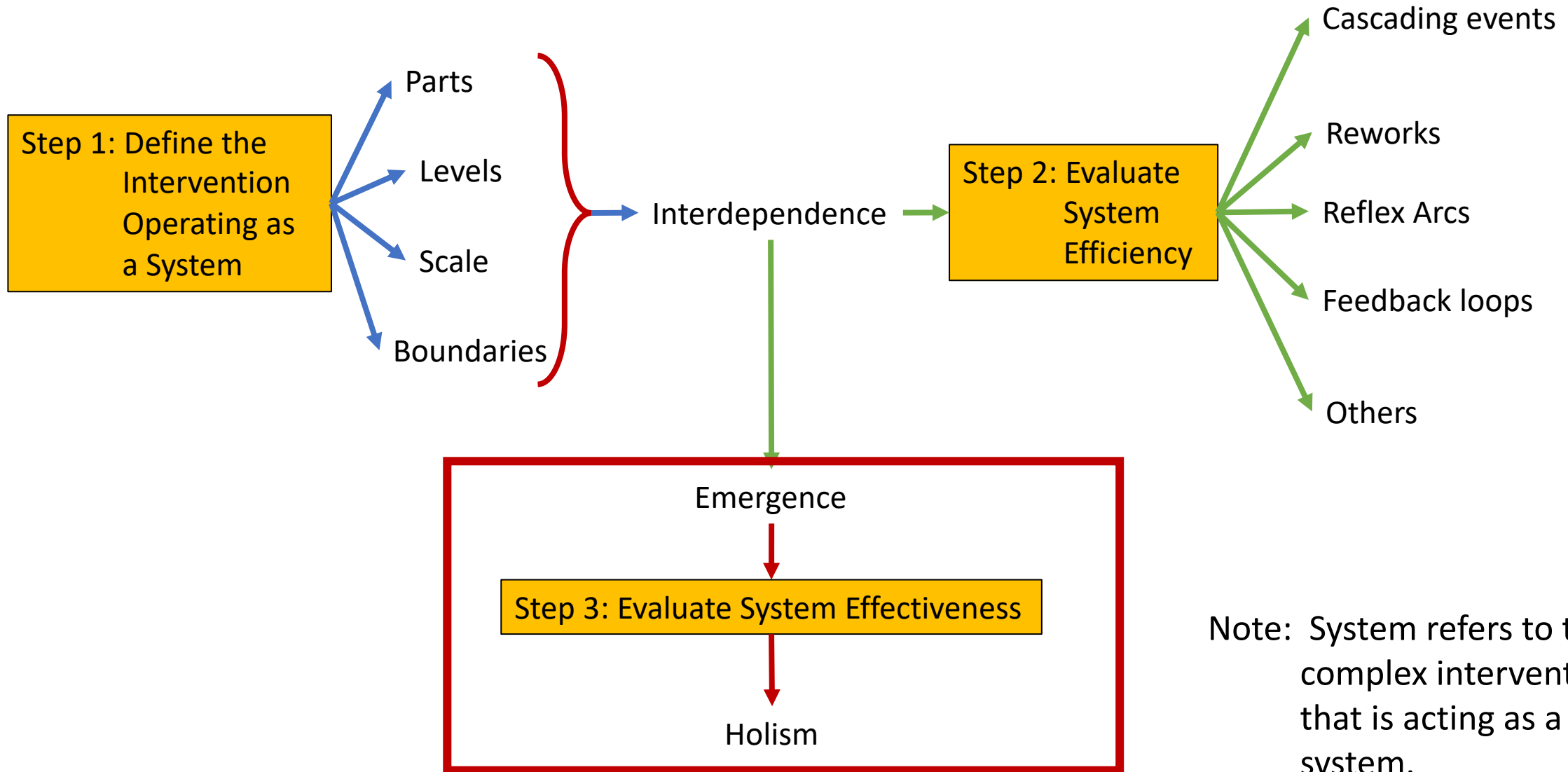
- In practice: To what extent can processes be handled at the lowest level as opposed to being passed up the system for processing; which causes delays.



What might be some methods for evaluating SOPs (interdependencies)?



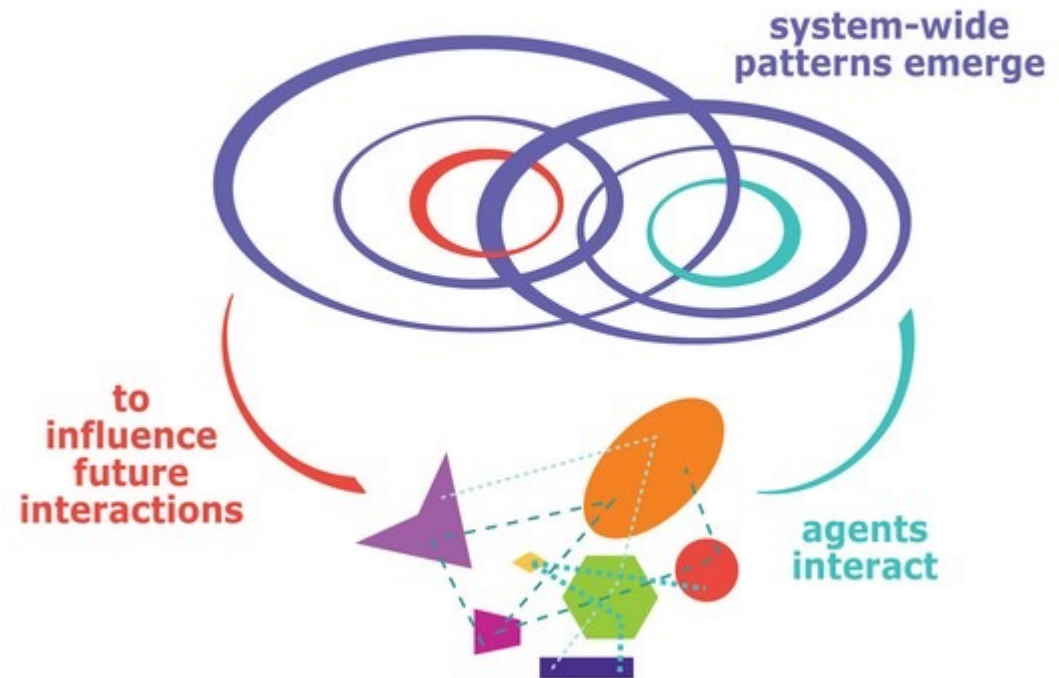
Rationale of Systems Evaluation Theory (SET)



Note: System refers to the complex intervention that is acting as a system.

SET Step 3: Evaluating System Effectiveness

- To evaluate a system's effectiveness is to ask whether the interdependent parts were successful in allowing the essential system property to emerge.



A pitfall of evaluating emergence

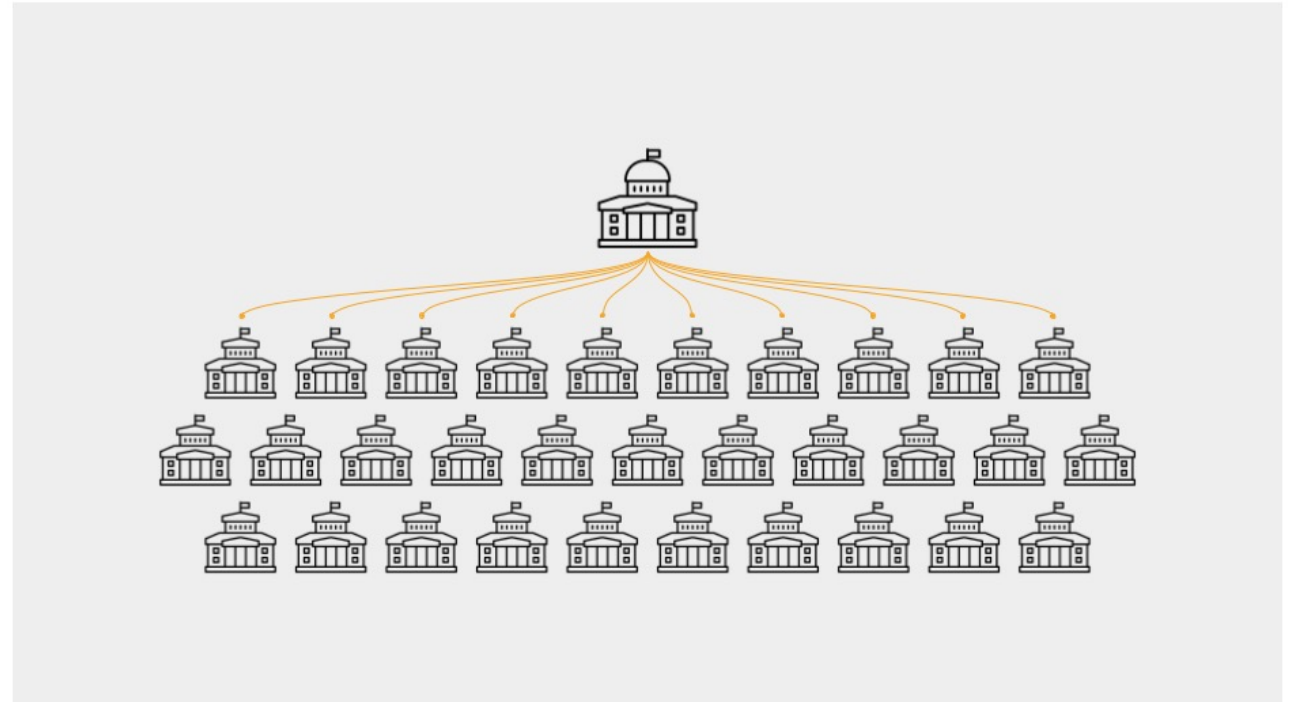
- It does not make sense to evaluate the effectiveness of individual system parts because they are “interdependent”.
- The emergent property is a “product” of the interaction of parts. (Ackoff). It’s not summative!

Stepwise Regression

- How it works (typically) - assume k independent variables
- Step 1: All possible models: $E(y) = \beta_0 + \beta_1 x_k$ are fit ←
 - Chooses most significant x_i
- Step 2: All possible models: $E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_k$ are fit ←
 - x_1 is the variable that was selected in Step 1
 - Chooses most significant x_i from the remaining x 's
- Continues until no other x 's can be added at specified alpha level.

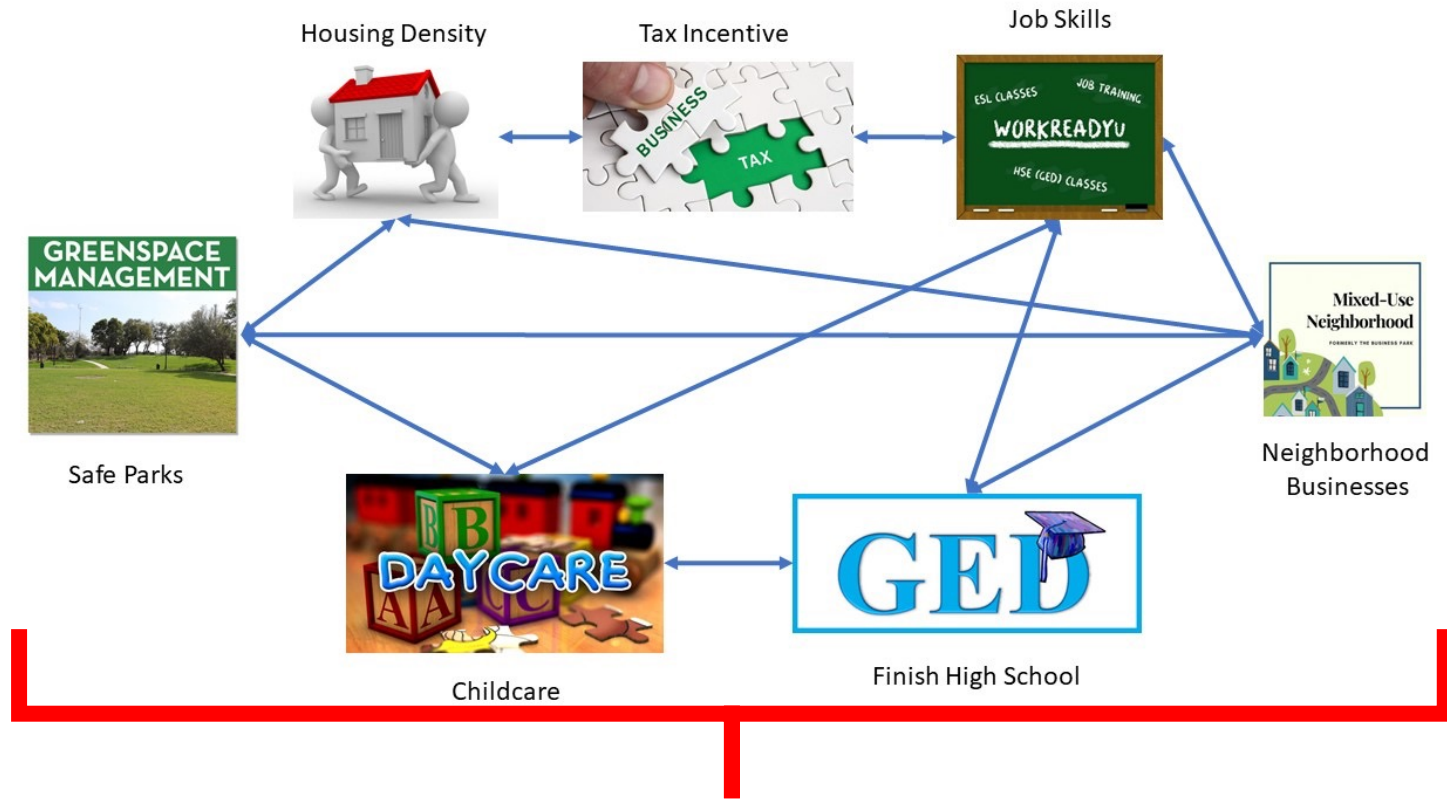
Who is responsible for collecting data on the emergent property?

- Those overseeing the system (complex intervention).
- Mark Friedman (RBA): community level indicators.
- Not individual system parts.



HUD HOPE VI

- Survey of all participants by external evaluator.



The Benefits of Systems Thinking & SET

- Systems thinking:
 - Helps reframe evaluations and changes the types of evaluation questions asked
 - Helps ensure we are relevant and responsive to context
 - Increases the likelihood that our findings will be perceived as credible by stakeholders (i.e., reflects the intervention reality), and will be used
- SET
 - Is a practical operationalization of systems thinking
 - Interdependence adds a quality to the “bunch of stuff” (i.e., complexity) that can now be evaluated.
 - Emergence gives the “bunch of stuff” (i.e., complexity) a purpose that can now be evaluated.

Questions?



If you want to learn more . . .

Book Coming Soon!

*Systems evaluation theory
(SET): A blueprint for
practitioners evaluating
complex interventions
operating and functioning
as systems.*

Website: justevaluation.com

Contact:
Jessica@justevaluation.com

