

Thinking in Systems

Mental Models for Change

Adam Mullen, Wolluhka Ventures

01 Background and
Sources

02 System
Foundations

03 Problematic
System Behaviors

04 Targeting Change
in a System

05 Closing Thoughts

Agenda

Background and Sources



For the last 12+ years, I've been heavily involved in change management, process improvement, knowledge management, and program design in the enterprise operations space.

Recently, I've been focusing on applying concepts from systems thinking to examine management dynamics, decision flows, and process interactions to aid in identify leverage points for targeted change

Systems thinking

Interconnections, groups, and dynamics

The primary source for the systems thinking concepts in this session come from *Thinking in Systems* by Donella H. Meadows

Systems thinking offers a lens to examine complexity through:

- The relationships among elements
- The elements and groups functioning within a larger context
- Identifying broad patterns across system networks

I highly recommend the book, especially if you establish policy or sponsor change efforts

System Foundations

01 Inputs & Outputs

02 Stocks

03 Flows

04 Feedback Loops

05 System Goal(s)

**Basic elements of
any system**

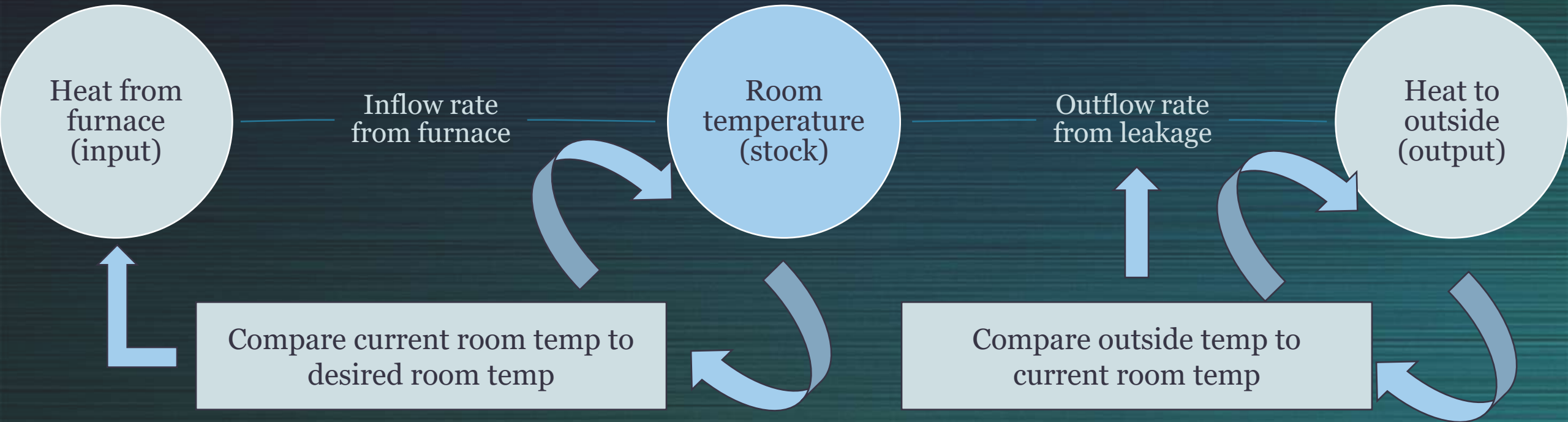
Stocks and flows: the bathtub



A bathtub is a good example of a basic system with stocks and flows

- At the outset, the stock (water level) is zero
- Open the faucet (increase flow rate) and the stock (water level) is affected
- However, unless you also plug the drain (decrease drain rate), the stock (water level) will not rise
- If the flow rate and drain rates remain untouched at this point, the tub eventually overflows

Feedback loops and a goal: the thermostat



A thermostat's goal of keeping a room at a desired temperature is affected by two feedback loops

- On a merely cool day, the temperature difference between inside and outside is small, so heat leakage (outflow rate) is relatively low and the room temp (stock level) changes slowly
- On a very cold day, the leakage is much greater, the room temp changes quickly, and the furnace needs to activate more often to achieve the goal of the desired room temp
- Note that improving inflow or outflow rates also affects furnace activation (i.e. insulation, cleaning)

Problematic System Behaviors

Unintended consequences in systems

Potentially problematic patterns

Systems are designed – whether intentionally designed or otherwise – to produce the results they produce.

However, the results aren't always what we want, need, or expect. Some common 'traps' that develop in systems include:

- Policy Resistance
- Drift to Low Performance
- Success to the Successful
- Rule Beating
- Tragedy of the Commons
- Escalation
- Addiction
- Seeking the Wrong Goal

We'll examine three of these system patterns in more detail



Policy Resistance happens when system actors try to pull the system state toward a particular goal, which affects the other actors in the system who are trying to maintain their own system goals. The result is resistance and increased effort in maintaining a result that dissatisfies both sets of actors.

Approach this problem by bringing all impacted actors together to seek out mutually satisfactory ways for all important goals to be realized (or realign on broader, more inclusive system goals)



Drift to Low Performance happens when performance standards are unduly influenced by past performance, particularly if past performance is poor and/or there is a negative bias in perceiving past performance. Current performance standards are then lowered or relaxed, and goals erode.

Approach this problem by keeping performance expectations based on an absolute, rather than relative, standards. You could also consider reversing the reinforcing loop to support upward drift.



Success to the Successful happens when the winners of a competition are systematically rewarded with the means or advantage to win again. This creates a reinforcing feedback loop where eventually the winners take all and non-winners are completely removed.

Approach this problem by implementing the means to 'reset' the dynamic, limit the rewards going to the winners, alter advantages/disadvantages of users, or otherwise level the playing field

Targeting Change in a System

Piecing together the puzzle

Applying a systems lens to your work

This first step is *perceiving* the system dynamics present where you work. Start the exploration with people you trust to share insights honestly, then:

- Compare your mental models of how the systems and subsystems work, including what you believe about the goal(s) or purpose(s)
- Discuss where you suspect feedback loops are present, if there are incentives associated with them, and if change is warranted
- Focus on parts of the system that are important, even when activities, outcomes, or measures are not quantifiable
- Communicate openly about the intent of the effort, and practice being a learner before being a leader

Also: leverage systems thinking concepts to stress test and hone your other change efforts

01 Paradigm
Adjustment

02 System Goal
Adjustment

03 Changing Self-
Organization

04 Changing System
Rules

05 Changing
Information Flows

The most effective
ways to intervene in a
system

01 Paradigm Adjustment

02 System Goal Adjustment

03 Changing Self-Organization

04 Changing System Rules

05 Changing Information Flows

Examining and influencing the mindset or paradigm out of which the system arises.

What patterns of thinking led to the current system's goals, structures, rules, delays, and parameters?

01 Paradigm
Adjustment

02 System Goal
Adjustment

03 Changing Self-
Organization

04 Changing System
Rules

05 Changing
Information Flows

Examining and influencing the goal(s) or purpose(s) of the system.

What can we learn or infer about the system's purpose based on the behavior it exhibits today?

01 Paradigm
Adjustment

02 System Goal
Adjustment

03 Changing Self-
Organization

04 Changing System
Rules

05 Changing
Information Flows

Examining and influencing the system's ability to add, remove, evolve, or otherwise change its own structure.

How is the system's self-organizing behavior being encouraged or discouraged, and where could self-organization best support the system's purpose?

01 Paradigm
Adjustment

02 System Goal
Adjustment

03 Changing Self-
Organization

**04 Changing System
Rules**

05 Changing
Information Flows

Examining and influencing the incentives, punishments, and constraints of the system (separate from constants like standards).

Are the system's incentives producing the desired behaviors, and are those behaviors supporting the system's purpose?

01 Paradigm
Adjustment

02 System Goal
Adjustment

03 Changing Self-
Organization

04 Changing System
Rules

05 Changing
Information Flows

Examining and influencing the structure of who does and does not have access to information within the system.

How is information cascaded and exchanged within the system, and does it support (or hinder) progress toward the system's purpose?

Closing Thoughts

Thank you!

Adam Mullen, MBA, CSSC-CSSBB

Wolluhka Ventures

[linkedin.com/in/mullenadam](https://www.linkedin.com/in/mullenadam)

Extras



Tragedy of the Commons happens when there is a commonly shared resource that every user benefits from, but the cost of use (and abuse) is split among all users. This weak feedback loop fails to alert individual users of the failing state of the resource, and with each user acting toward their own goals, there is little incentive to self-regulate. This dynamic continues until the resource is depleted.

Approach this problem by illustrating the consequences and/or impact of overuse. This can be started by strengthening (or creating) feedback loops where each user feels this consequence and/or by regulating access to the resource



Escalation happens when the state or level of one stock is determined by trying to surpass the state of another stock, and vice versa. This creates a reinforcing feedback loop for both stocks that perpetuates until one system collapses.

Try to avoid this problem in the first place, but if you're already in this dynamic, explore options that interrupt the feedback loop (i.e. refusing to compete) or consider negotiating a non-escalatory system



Shifting the Burden to the Intervenor (Addiction) happens when a solution to a systemic problem reduces or masks the symptoms but does not affect the root cause of the underlying problem. When the solution reduces the system's capacity to self-maintain, more (and more) solution is required to intervene, and a destructive reinforcing feedback loop is created.

Approach this problem by avoiding topical (superficial) solutions, especially if they weaken signal flows. Work to enhance or restore the system's ability to solve its own problems and remove the intervening solution



Rule Beating happens when the rules meant to govern a system lead to user behaviors that adhere to the letter, but not the spirit, of the rules. As these behaviors spread, the system becomes distorted, and its function is compromised.

Address this problem by designing rules that redirect users' creative efforts toward achieving the purpose rather than minimum viable compliance



Seeking the Wrong Goal happens when system goal(s) are defined inaccurately or incompletely, and the system dynamics produce outcomes that are not wanted or intended. This is particularly powerful when goals are strongly associated with feedback loops.

Approach this problem by identifying and specifying goals and indicators that reflect the real health and value delivery of the system. Be extra careful when goals signal effort instead of outcomes.