Systems Thinking and the Art of Seeing the Whole

Using Systems Thinking to Break Apart and Solve Complex Challenges Facing Your Organization

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We are continually faced with a series of great opportunities brilliantly disguised as insoluble problems.

— John W. Gardner

American political thinker,
Founder of Common Cause
b. 1912, d. 2002

Salt Pond Bay Sunset
St. John - U.S. Virgin Islands

Quiet Evening
Cruz Bay, St. John

In this island paradise . . . There are no songbirds! Why?

© 2011, Photograph by Jeff Russell

Feb. 1, 2003

What was the cause of the Columbia disaster?

Origin of a Disaster

Feb. 1, 2003

- **To keep NASA funded it needs to keep the public interested.**

- **NASA provides bonuses for on time delivery.**

- **Safety risks are weighed against political and economic risks to keep program viable.**

- **There is an unwillingness to raise problems that will raise red flags that might slow a project which might lead to political/economic consequences.**

- **After the launch . . . Those who saw the foam hit the shuttle were reluctant to push the issue . . . "I was afraid that I would lose my job!"**

Our Learning Outcomes . . .

1. Describe the unique characteristics of a system and what makes a system an integrated whole.

2. Explore system thinking as a suite of methods to better understand how to influence the system.

3. Discuss the key guiding principles of system thinking and apply them to your own organization.

4. Analyze and develop an understanding of a system by applying the Systems Hierarchy for Understanding and Action.

5. Practice a number of systems thinking tools.

6. Develop a plan for integrating the lessons from systems thinking into your daily practice.

Your Desired Learning Outcomes

◆ **What is your desired learning outcome?**

◆ **What is one question you'd most like to have answered by the end of our time together?**

In the Beginning . . .

◆ **For all of human history people have sought knowledge on how things worked.**

◆ **Early philosophers/scientists adopted a <u>mechanistic</u> view where to understand a complex thing one only needed to take it apart and examine each part.**

◆ **This approach led to a division of knowledge into specialties, each independent of each other and each with it's own theories and its own language.**

◆ **As a result of this compartmentalization, little effort was invested in understanding how the whole system worked together – especially in dynamic living systems.**

A New Way of Thinking . . .
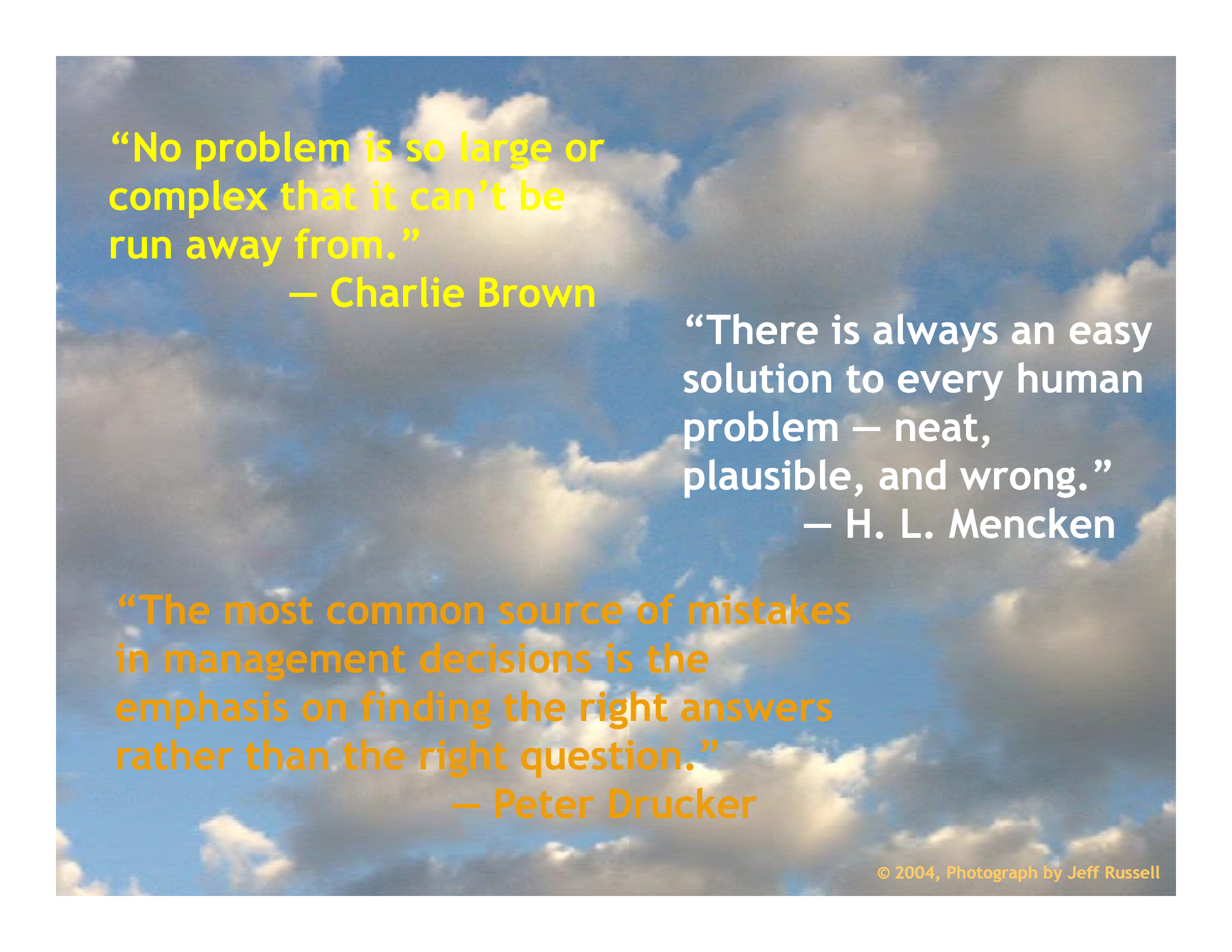
◆ **In the early 1920's, some thinkers realized that the** *relationships* **between the components of a living system were as important as the components themselves.**

◆ **This holistic understanding of the entire system (its components and the interactions of these components) demonstrated the value of integrating the disciplines.**

◆ **Systems thinking offered a way to explore the deeper structural underpinning of complex systems which, in turn, enabled us to more effectively influence the future behavior of the system.**

An Example . . . Achievement Gap

- **Mechanistic Approach** (reductive, looking at individual components in isolation): **Focus on . . .**
  - **Student testing**
  - **Teacher effectiveness**
  - **One-on-one tutoring**
  - **Offering educational options/alternatives**
  - **Other?**

An Example . . . Achievement Gap

- **Systems Approach** (holistic, examining the interdependencies, relationships, and patterns, exploring mental models): Focus on . . .
  - Public policy toward education
  - School funding systems
  - Teacher training
  - Parental involvement
  - Youth culture
  - Local poverty levels and effects on nutrition, etc.
  - Community attitudes toward race
  - Teacher accountability
  - Other?

"No problem is so large or complex that it can't be run away from."
— Charlie Brown

"There is always an easy solution to every human problem — neat, plausible, and wrong."
— H. L. Mencken

"The most common source of mistakes in management decisions is the emphasis on finding the right answers rather than the right question."
— Peter Drucker

Your Turn . . .

Identify the some typical actions that the <u>mechanistic</u> and <u>systems</u> approaches would take in tackling these challenges:

◆ **Wisconsin's structural deficit**

◆ **The home mortgage crisis**

Wisconsin's Structural Deficit

- **Mechanistic: ?**

- **Systems: Would involve examining . . .**
  - public policy (e.g., taxation, government expansion, determinate sentencing, education financing, etc.) over the past twenty years
  - the electoral process (winner takes all)
  - public attitudes toward the role of government in our lives and the level of trust in government
  - public attitudes toward people with special needs (e.g., elderly, low income children and families, etc.)
  - the level of cooperation/collaboration between the two political parties
  - the national economy and the Great Recession
  - ?

The Home Mortgage Crisis

- **Mechanistic: ?**
- **Systems: Would involve examining . . .**
  - public policy over the past fifty+ years (encouraging home ownership)
  - The American Dream! (the American Nightmare!)
  - the value of home ownership by individuals
  - the rise of buying on credit
  - "No money down!"
  - the financial system – bundling high risk mortgages and selling to the international market
  - rising property values over the past twenty years
  - The Great Recession
  - ?

What is a System?

◆ **A collection of components or parts that interact with each other.**

◆ **Each part plays a fundamental role in the functionality of the whole.**

◆ **Removing or changing one a part alters the outcomes of the whole.**

Russell Ackoff . . .

- **A whole that cannot be divided.**
- **Every part has properties that it loses when separated from the system.**
- **Every system has some properties <u>that</u> none of its parts do.**
- **A system's essential properties derive from the interactions of the parts.**
- **A system cannot be understood by analyzing the individual parts.**

Characteristics of a System

- ◆ **Every system has a purpose within a larger system.**

- ◆ **All of a system's parts must be present for the system to carry out its purpose optimally.**

- ◆ **A system's parts must be arranged in a specific way for the system to carry out its purpose.**

- ◆ **Systems change in response to feedback.**

- ◆ **Systems maintain their stability by making adjustments based on feedback.**

Systems Thinking . . .

- Discovering/exploring the **patterns emerging from the interactions** between the parts.

- Examining the *structural* **causes** of the outcomes that spring from the interdependencies and interrelationships between the parts.

- A mindset and set of tools/practices within a framework based on the belief that the **parts of a system can best be understood in the context of the relationships with other parts.**

- Focusing on **cyclical causes** vs. linear ones.

A Special Language

- It emphasizes <u>wholes</u> rather than parts, and stresses the role of interconnections.

- It emphasizes <u>circular feedback</u> (A influences B which influences C which influences A, etc.)

- It contains <u>special terminology</u>

  - Reinforcing processes (generates growth)

  - Balancing processes (maintains stability)

A Set of Tools . . .

- **Behavior Over Time (BOT) Charts**

- **Causal Loops**

- **Stock and Flow Diagrams**

- **System Archetypes**

Behavior Over Time Chart
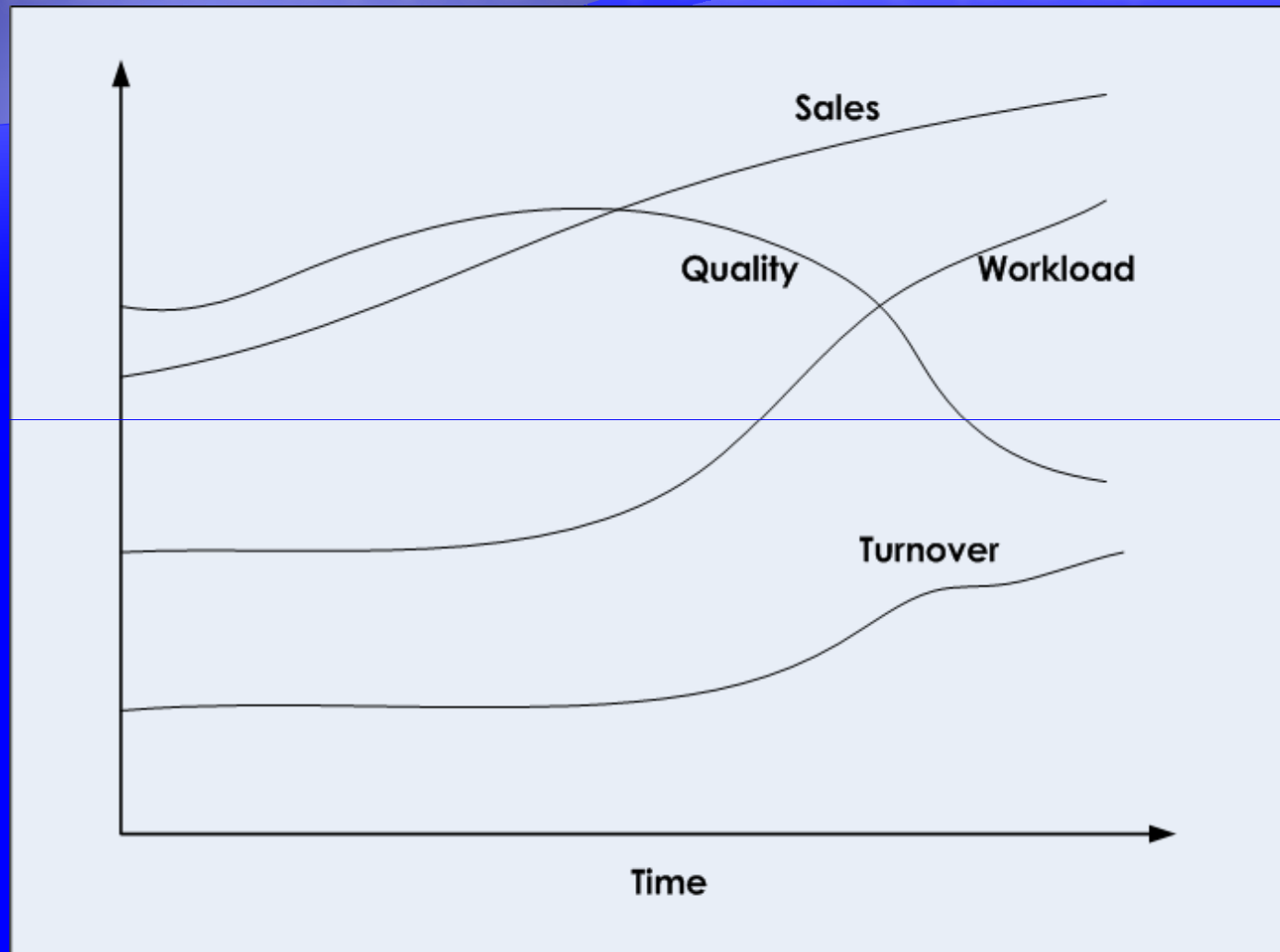
Causal Loop Diagrams
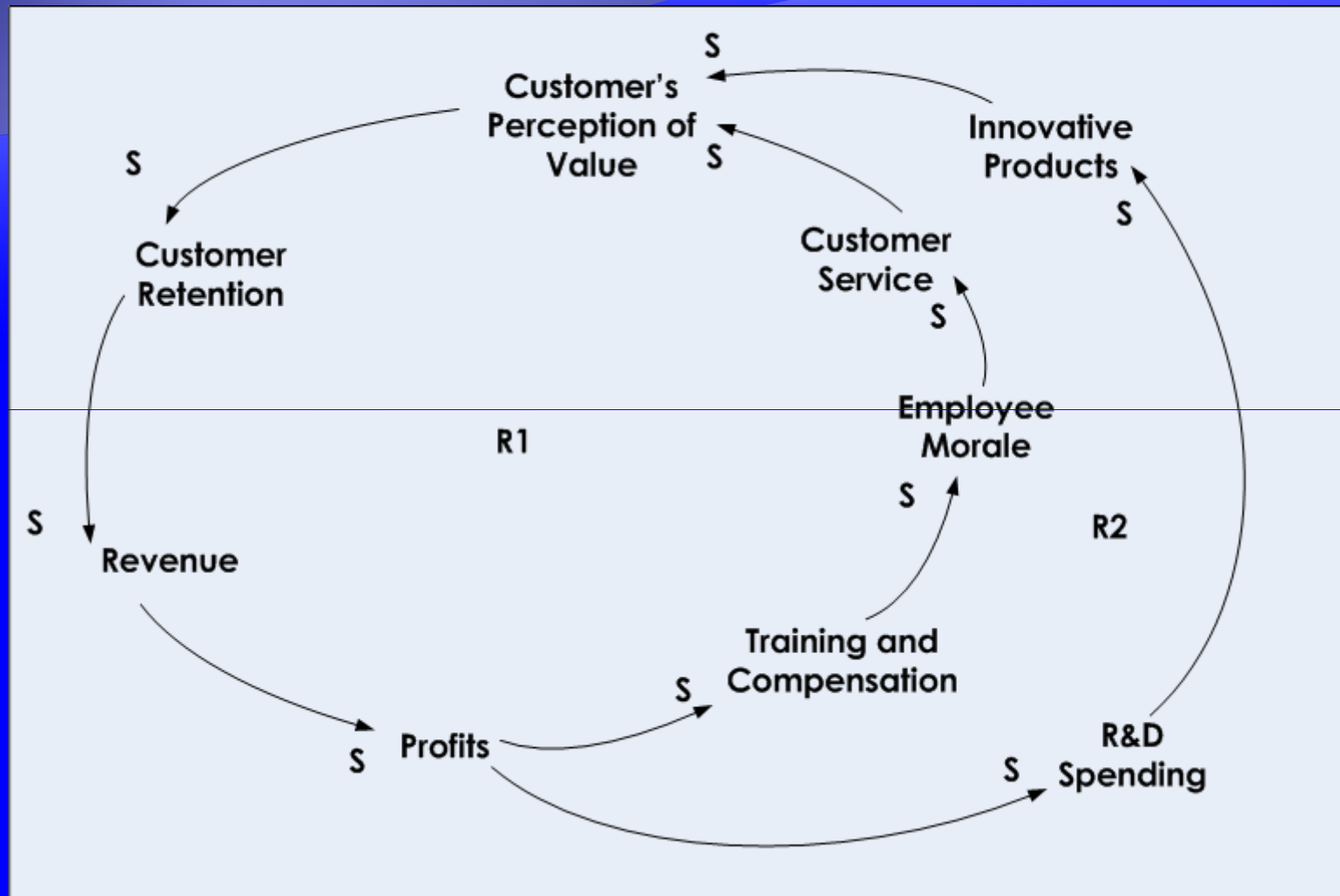
Stock and Flow
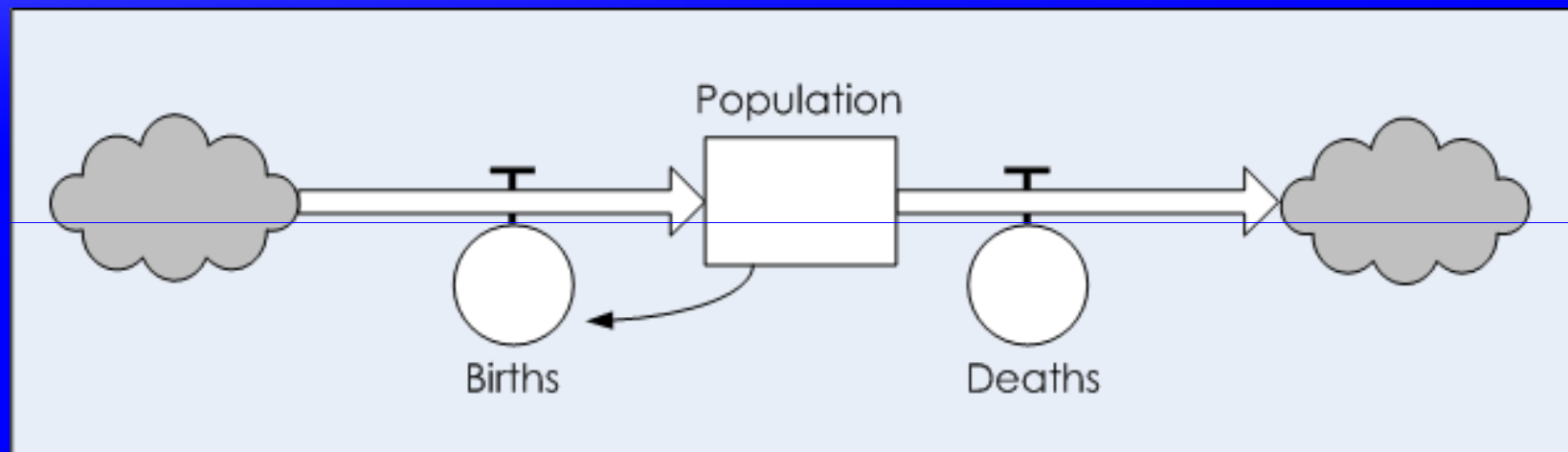
System Archetypes

- **Drifting Goals**
- **Escalation**
- **Fixes that Fail**
- **Growth and Underinvestment**
- **Limits to Success**
- **Shifting the Burden**
- **Success to the Successful**
- **Tragedy of the Commons**

Living Systems

◆ **Wolf/moose population of Isle Royale**

◆ **Lemmings in Scandinavia**

◆ **Our cardio-vascular system**

◆ **The rabbits in my back yard . . .**

◆ **Others?**

Mechanical Systems

- Thermostat in a house

- Flush toilet

- Cruise control in a car

- Fire suppression sprinkler system

- Other?

Mechanical/Human Systems

- **Riding a bike**

- **Driving a car**

- **Angry Birds!**

- **Operating a drill press**

- **Other?**

Social Systems

- **The labor market**

- **Crime**

- **Community population growth**

- **Long term care for the elderly**

- **A winning football team**

- **The Eurozone**

- **Other?**

Organizational Systems
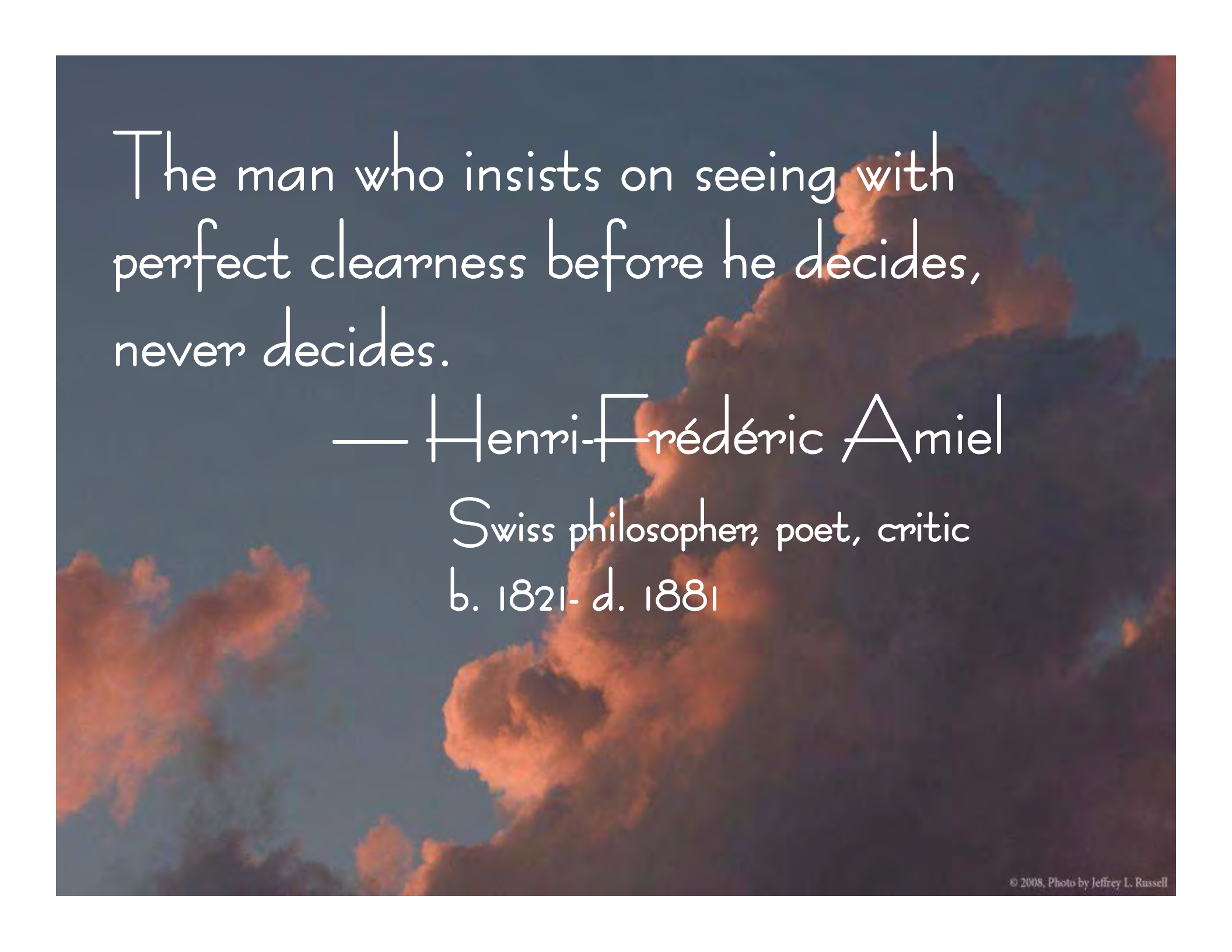
- ◆ **Information technology**

- ◆ **Profitability**

- ◆ **Innovation**

- ◆ **Research and development**

- ◆ **Business growth**

- ◆ **Manufacturing operations**

- ◆ **Other?**

An Open System
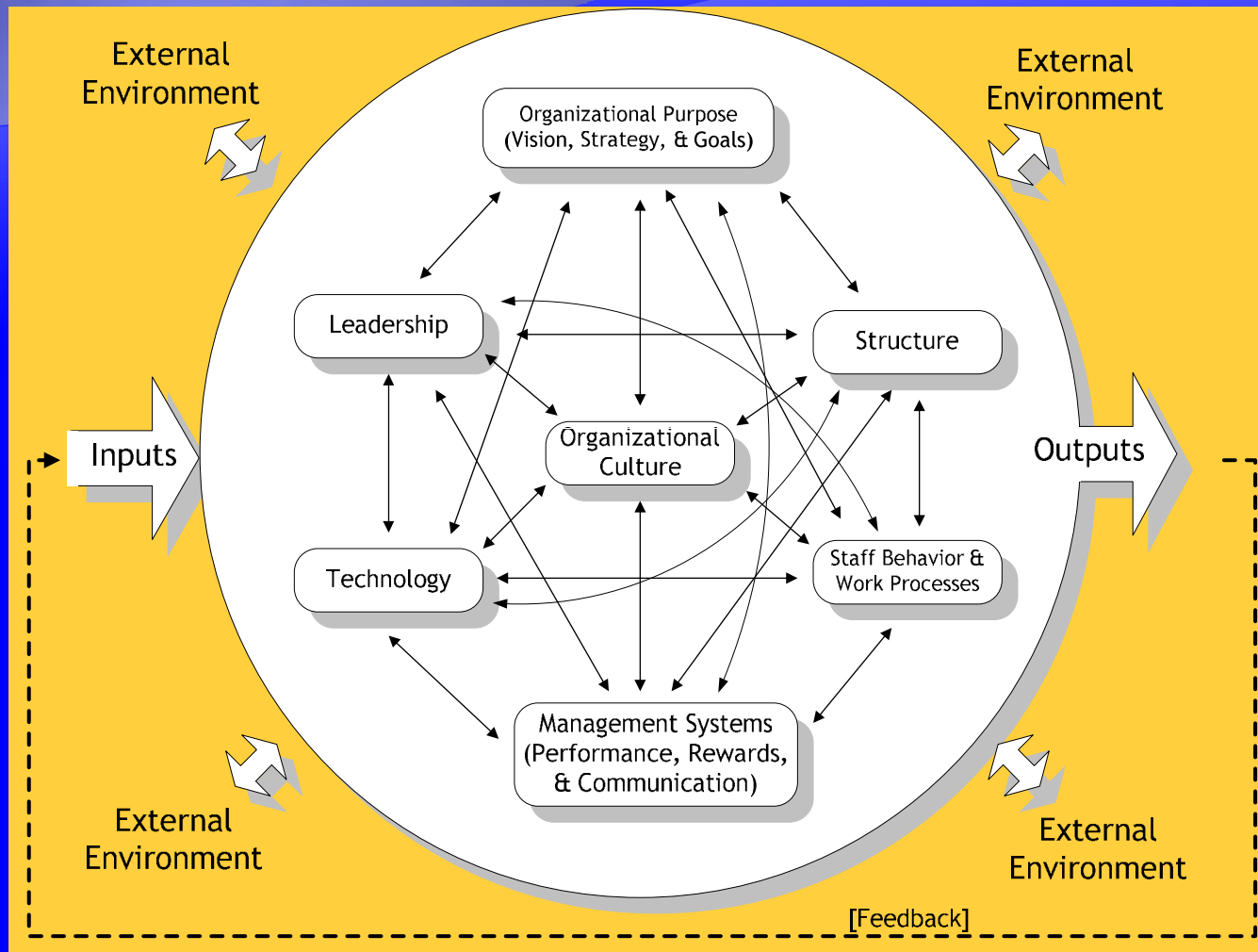
The Principles of Systems Thinking

- ◆ **Read the ten principles . . .**

- ◆ **Choose one or two principles where you can think of an example/case that validates this truth of the principle.**

- ◆ **Be ready to share and discuss . . .**

The man who insists on seeing with perfect clearness before he decides, never decides.

— Henri-Frédéric Amiel

Swiss philosopher, poet, critic

b. 1821- d. 1881

A Systems Approach to Understanding . . .

- Systems thinking has us first gathering data on events and, based upon these events, then look for the patterns.

- From these patterns, systems thinking asks us to look for the underlying structure driving the patterns.

- Once we see the structure, systems thinking compels us to examine the belief system that drives everything.

- With this awareness, we are then able to apply high leverage for effective action.

Systems Hierarchy

Level of Understanding	Mode of Action	Time Orientation	System Questions To Ask Ourselves
Events	*Reactive*	Present	What just happened? What is happening now? What are the key events or behaviors that define the presenting problem or challenge? What actions must we take now to deal with this problem/challenge?
Patterns of Events	*Reflective & Adaptive*		What TRENDS or patterns do we see occurring for each of these events/behaviors? Are these events part of a larger pattern that has been unfolding over time? What are the behaviors over time?
Systemic Structure	*Creative & Inventive*		Why is this happening? How do the trends and patterns influence one another? What are the systemic structures and interactions that create the dominant patterns? What is the network of relationships that create these patterns?
Mental Models	*Generative*	Future	What are the mindsets or ways of thinking that generate these structures? What is the "vision" and belief system that drives the structures? What NEW mental models or beliefs could help us create NEW structures/patterns/events that will move us closer to our goals?

Samish Bay Sunrise, Washington

An undefined problem has an *infinite* number of solutions!

It Begins with a Story . . .

- Discovering the underlying structure and the mental models behind it always begin with "the story."

- The story describes the present challenge with as much detail as possible (events).

- The story expands beyond the problem to identify the patterns over time (BOT charts).

- Look for the structures . . . And then ask "What belief system drives all of this?"

It's so much easier to suggest solutions when you don't know too much about the problem.

— Malcolm Forbes

American publisher
b. 1919, d. 1990

Acme Plastics

- ◆ **Provides hundreds of plastic components to the home building industry.**

- ◆ **Owned by an investment company. CEO is off-site at another company held by the firm.**

- ◆ **Competing in a price-sensitive industry.**

- ◆ **They are profitable . . . But not profitable enough.**

- ◆ **Managers and employees fear for the future.**

A wise man's questions contain half the answer.

— Ibn Gabirol

Jewish philosopher and poet

(c. 1021-58)

Examining Acme . . .

- **Read pages 12-13:**
  Events➜Patterns➜Structure➜Mental Models

- **Identify issues and questions you 'd like to explore with me.**

- **Be prepared to discuss in your group.**

- **As a group . . . Identify key issues and questions that you need more information about in order to find a systems solution . . .**
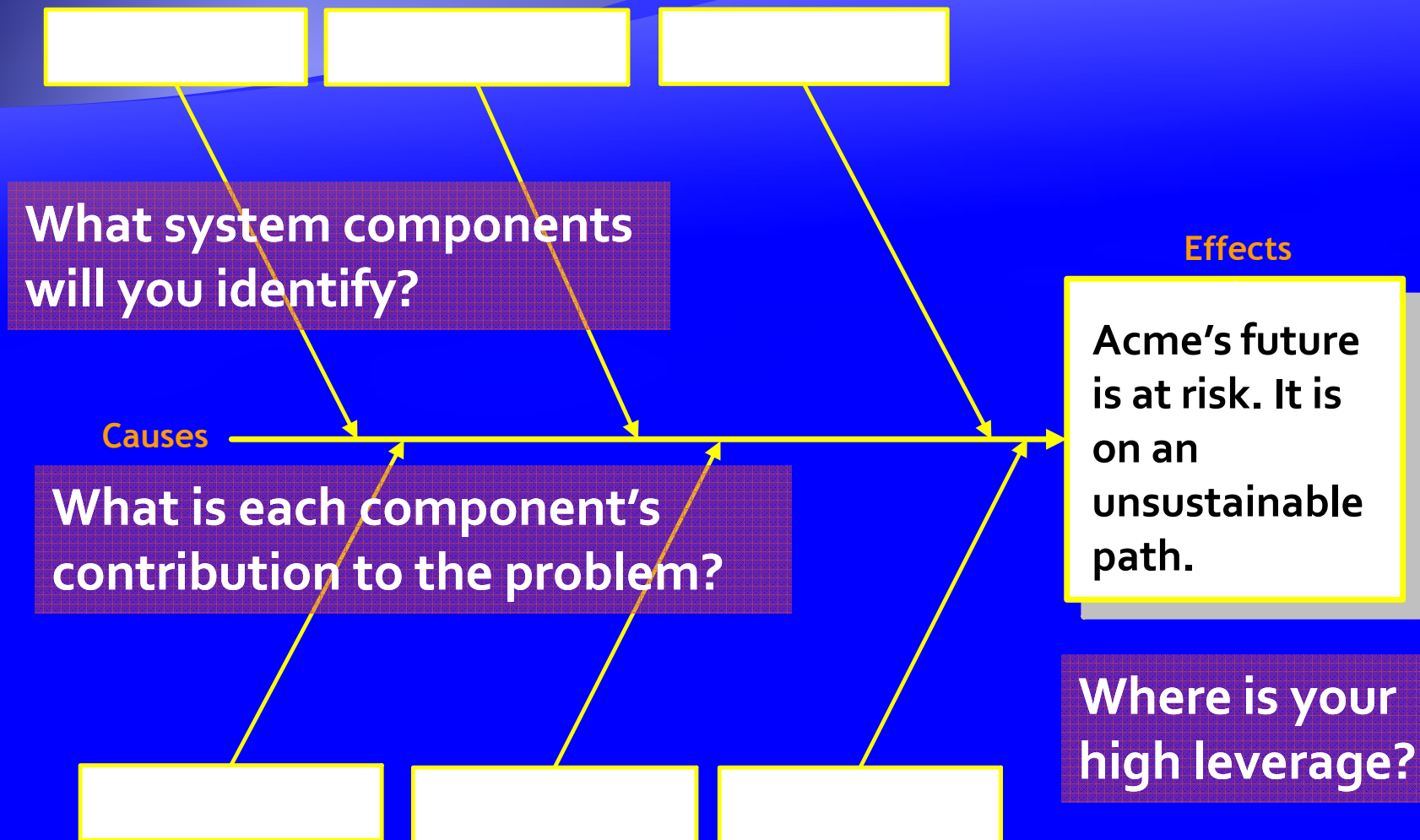
Systems Thinking Toolkit

- **Brainstorming**

- **The Magic of the Five Whys**

- **Cause➔Effect Diagram**

- **Affinity and Interrelationship Diagram**

- **Force Field Analysis**

- **Is/Is Not Matrix**

- **Mindmapping**
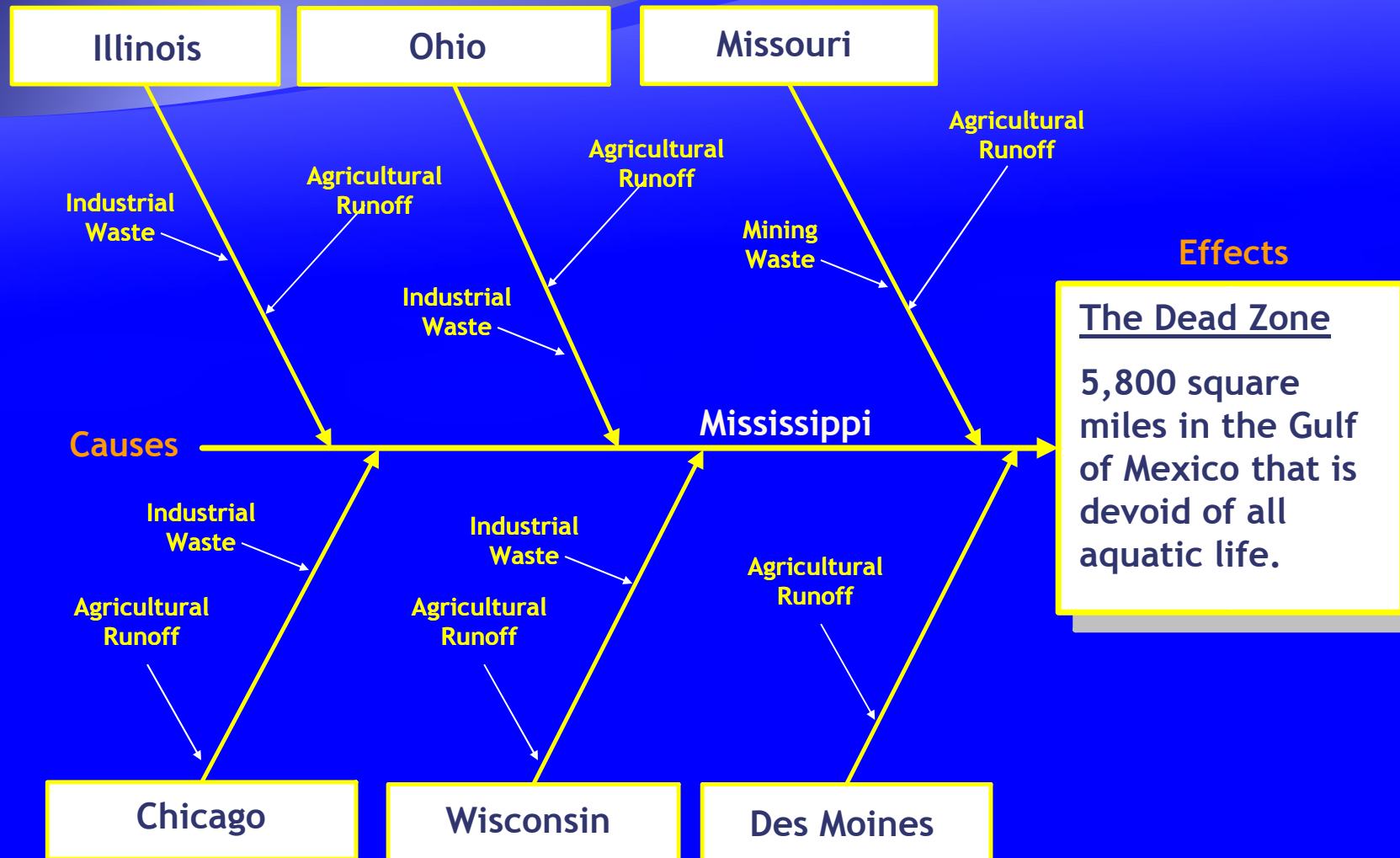
From Events to Vision . . .

Level of Perspective	Current Reality	Desired Future Reality	Gaps/Challenges Between Current & Desired	Action Steps	Progress Indicators
Vision What is our actual/espoused vision?					
Mental Models What are the beliefs and assumptions that sustain the structures?					
Systemic Structures What structures are producing these patterns?					
Patterns What are the patterns of behavior over time?					
Events What are the events that characterize the current/desired state?					

A Systems Approach to PS

1. **Events** – Define the Problem

2. **Patterns** – Tell the Story

3. **Structures** – Identify the Origins

4. **Mental Models** – What Drives Everything?

5. **High Leverage** – Where is Your Power?

6. **Take Action** – What is Your Strategy?

Kylemore Abbey
Connemara, County Galway

It is not the strongest of the species that survive, nor the most intelligent, but the most responsive to change.

— Charles Darwin
British naturalist
c. 1809-1882

Sometimes I lie awake at night, and I ask myself: "Where have I gone wrong?"

Then a voice says to me . . .

"This is going to take more than one night!"

— Charles M. Schulz
Charlie Brown in "Peanuts"

Boglands and Clouds
Connemara National Park

Thank You!!

Good luck with implementing your strategic thinking skills!

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