PLAYING WITH SYSTEMS

SDPMC : 9TH SEPTEMBER 2014

PAPER GAME

- Communicating to be understood

- Listening to understand

WHAT IS A SYSTEM?

…a group of interacting, interrelated, and interdependent components that form a complex and unified whole.

(Pegasus Communications)

…a set of things – people, cells, molecules, or whatever – interconnected in such a way that they produce their own pattern or behavior over time.

(*Meadows, 2008)*

In a systems approach to a problem, you start by realizing that there is no inherent end to a system. There is no such thing as a complete theory. The quest is to look at a problem more comprehensively. The resolutions come from rethinking how we deal with complexity.

(Peter Senge)

WHAT IS SYSTEMS THINKING?

Systems thinking is a way of understanding reality that emphasizes the relationships among a system's parts, rather than the parts themselves.
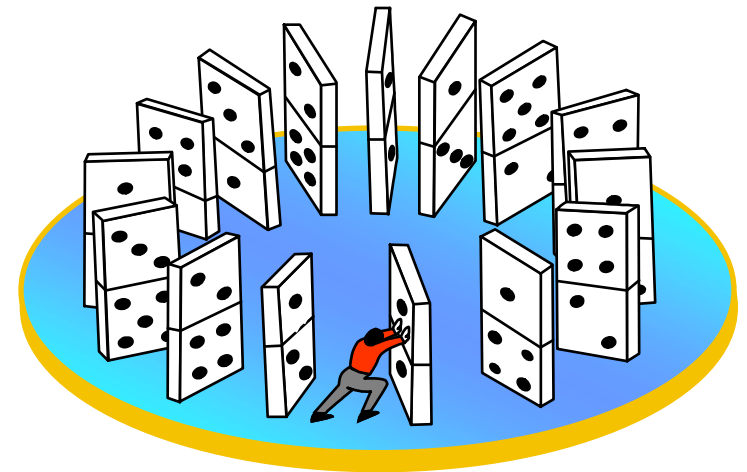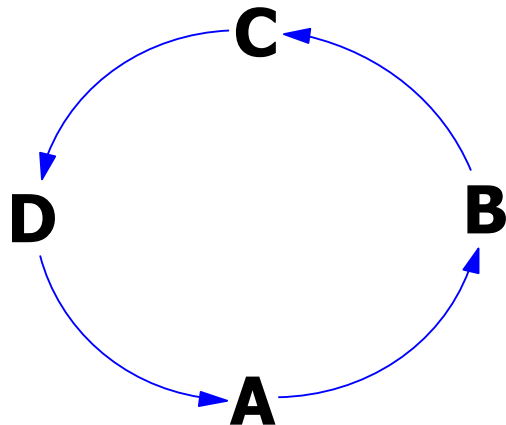
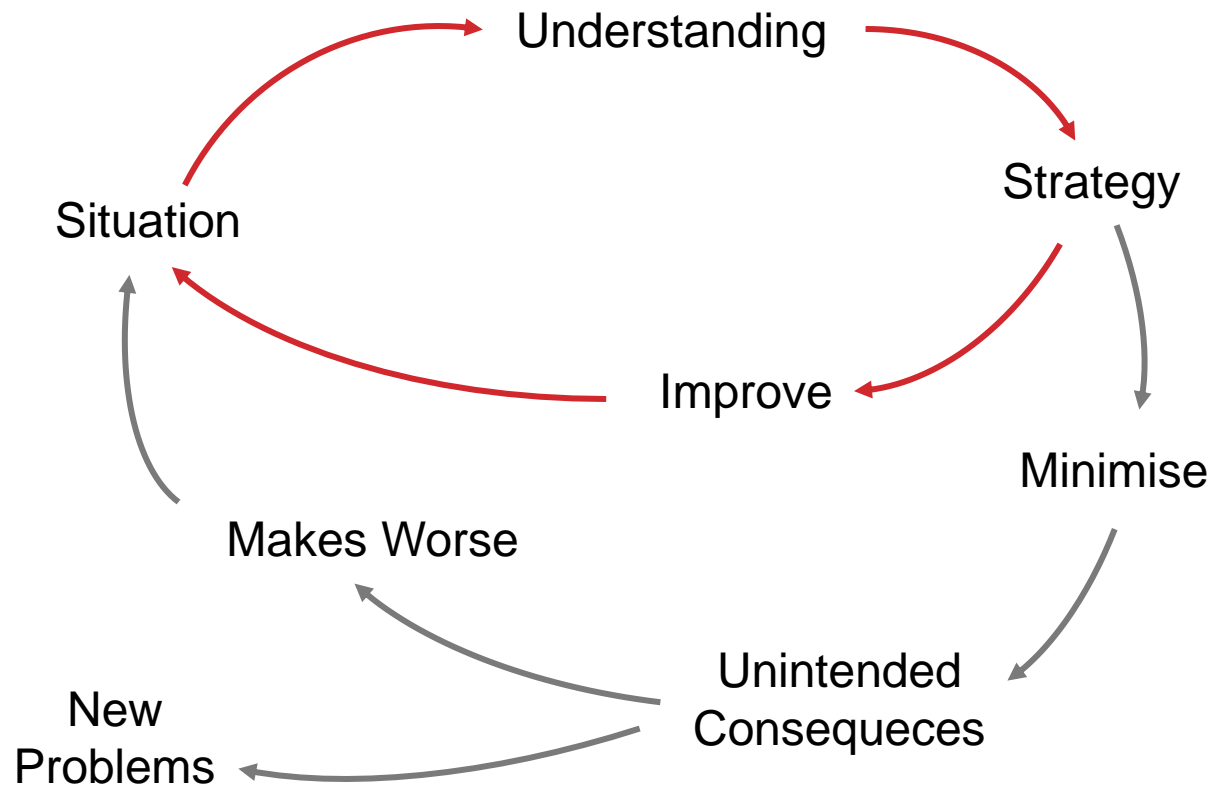(Pegasus Communications)

SYSTEMS THINKING:
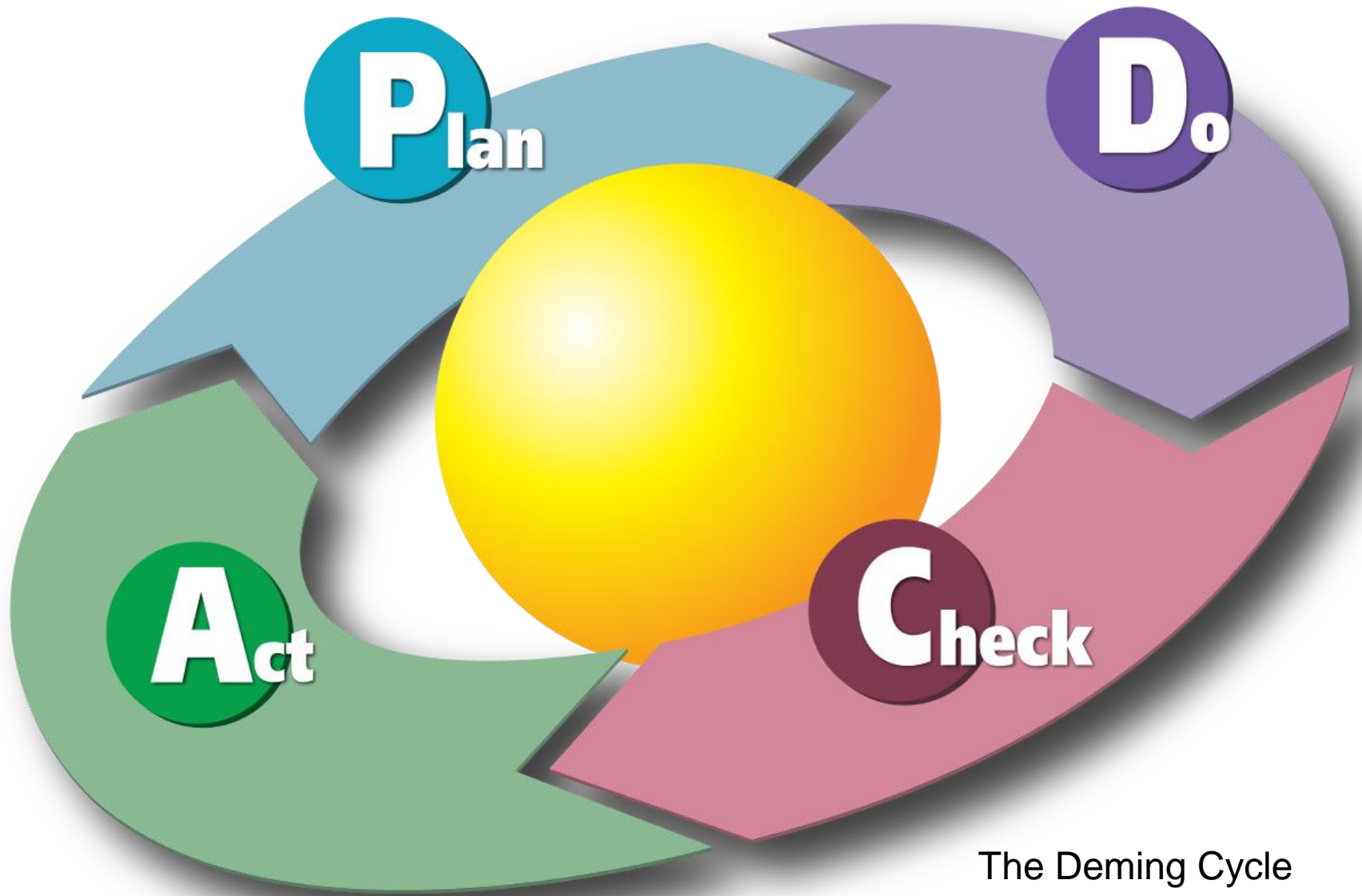## CAUSE & EFFECT

Typical Approach

If A → then B

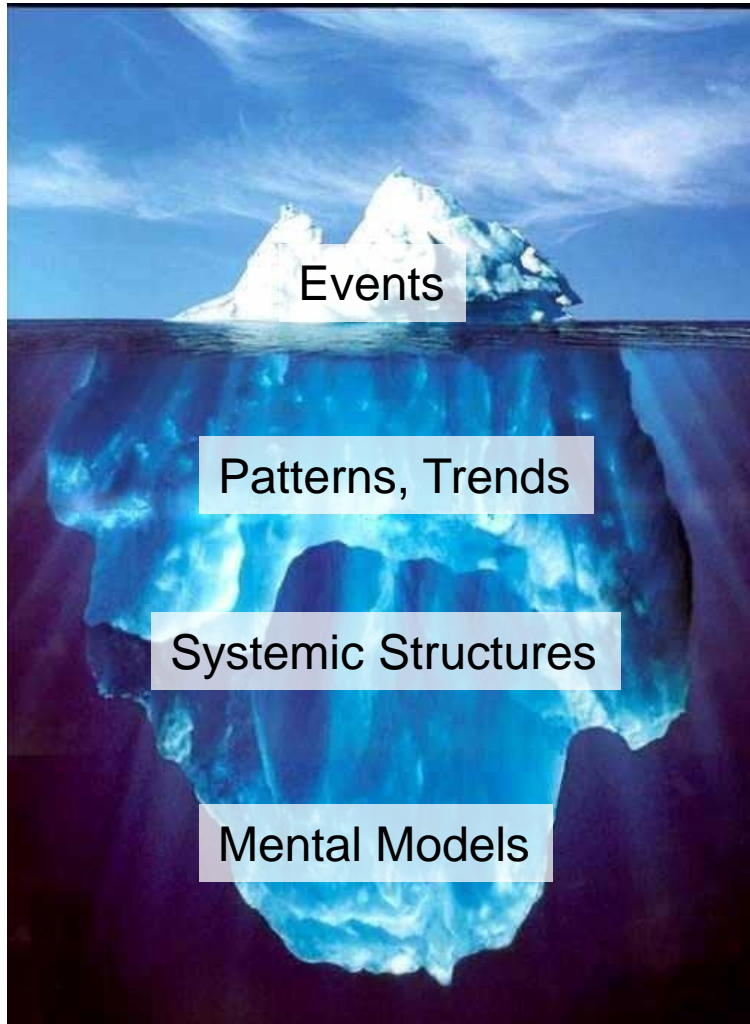Systems Thinking

C → B → A → D → C

SYSTEMS THINKING

The Deming Cycle

SYSTEMS THINKING

Way of explaining reality…

What just happened?

What's been happening?
Have we been here or some place similar before?

What are the forces at play contributing to these patterns?

What about our thinking allows this situation to persist?

TRIANGLES

CASUAL LOOP DIAGRAMS

A causal loop diagram (CLD) is a diagram that helps you visualize and understand how the different key parts and elements in a complex system interact.

Causal - refers to cause-and-effect relationship

Loop - refers to closed chain of cause and effect

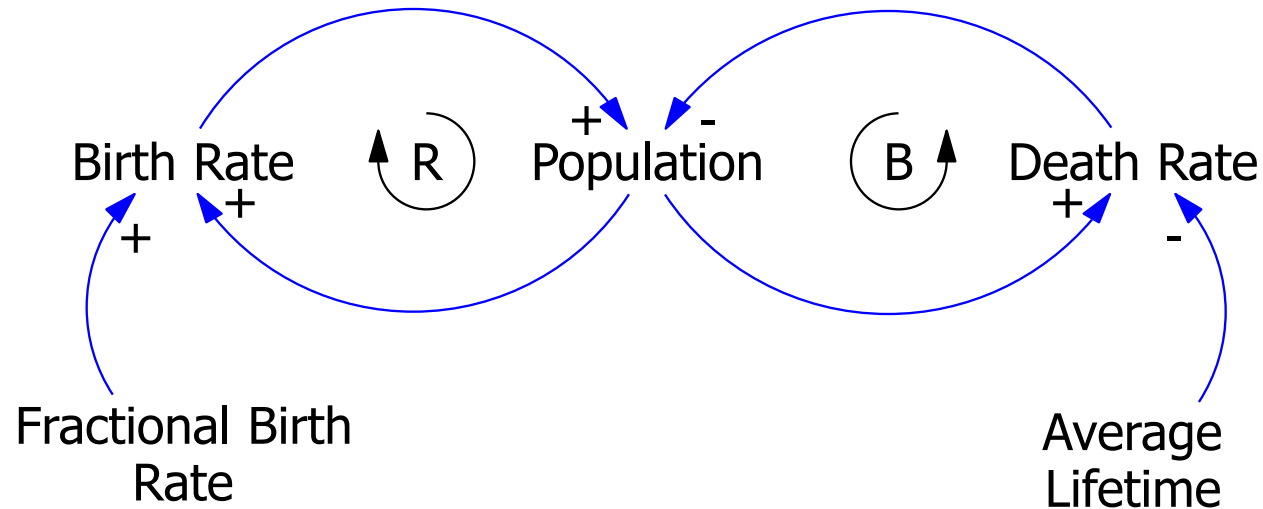# CASUAL LOOP DIAGRAMS: POSITIVE AND NEGATIVE CAUSATION?

If A goes up, then B goes up

If A goes up, then B goes down

If A goes down, then B goes up

If A goes down then B goes down

CASUAL LOOP DIAGRAMS

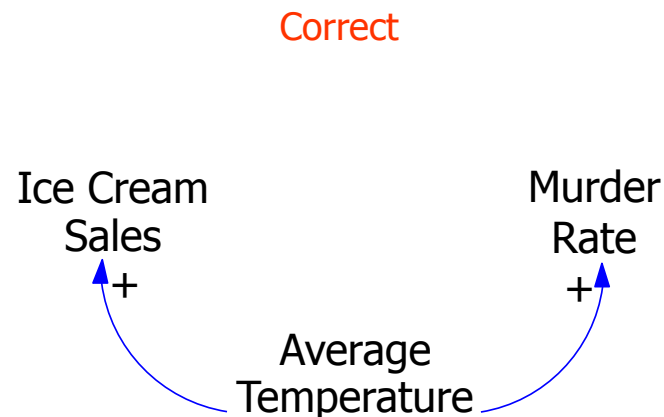Birth Rate (R) + Population - (B) Death Rate

+ + + -

Fractional Birth
Rate

Average
Lifetime

Loop identifiers:

(R) or (+) Positive (Reinforcing) Loop

(B) or (-) Negative (Balancing) Loop

Causal Link

Link Polarity

Indicator 1 + Indicator 2
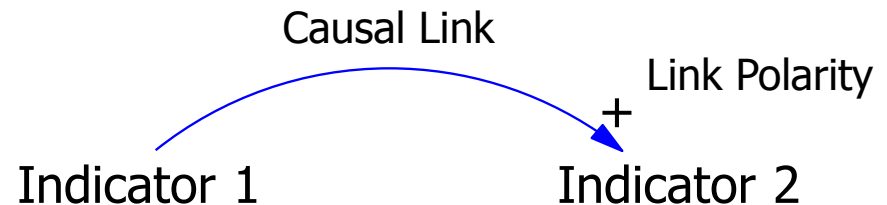
CASUAL LOOP DIAGRAMS:
CAUSATION vs. CORRELATION

Correlations do not represent the structure of the system.

Causal diagrams must include only (what you believe to be) genuine causal relationships.

Incorrect

Ice Cream Sales → + Murder Rate

Correct

Ice Cream Sales + ← Average Temperature → + Murder Rate
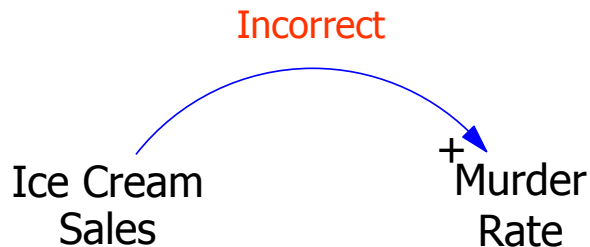
INDICATORS

An indicator can be defined as something that helps us to understand where we are, where we are going and how far we are from the goal.

Therefore it can be a sign, a number, a graphic and so on. It must be a clue, a symptom, a pointer to something that is changing.

Indicators are presentations of measurements. They are bits of information that summarize the characteristics of systems or highlight what is happening in a system.

LIVING LOOPS

LEVERAGE POINTS

Places within a complex system where a small shift in one thing can produce big changes in everything.

Points of power.

The Tipping Point

When Small Actions Have a Big Impact

Impact

Big I

Little A

Action
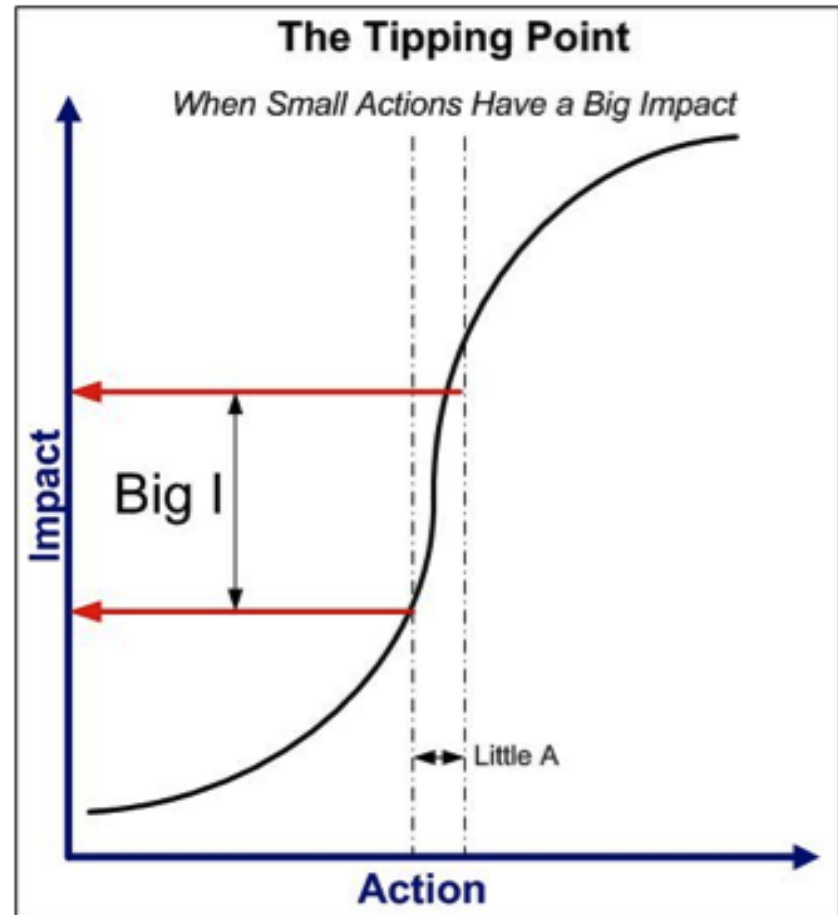
DRAW A SYSTEM MAP

POINT OUT IF THERE ARE *BALANCING* AND/OR *REINFORCING* LOOPS

WHERE TO INTERVENE IN A SYSTEM?
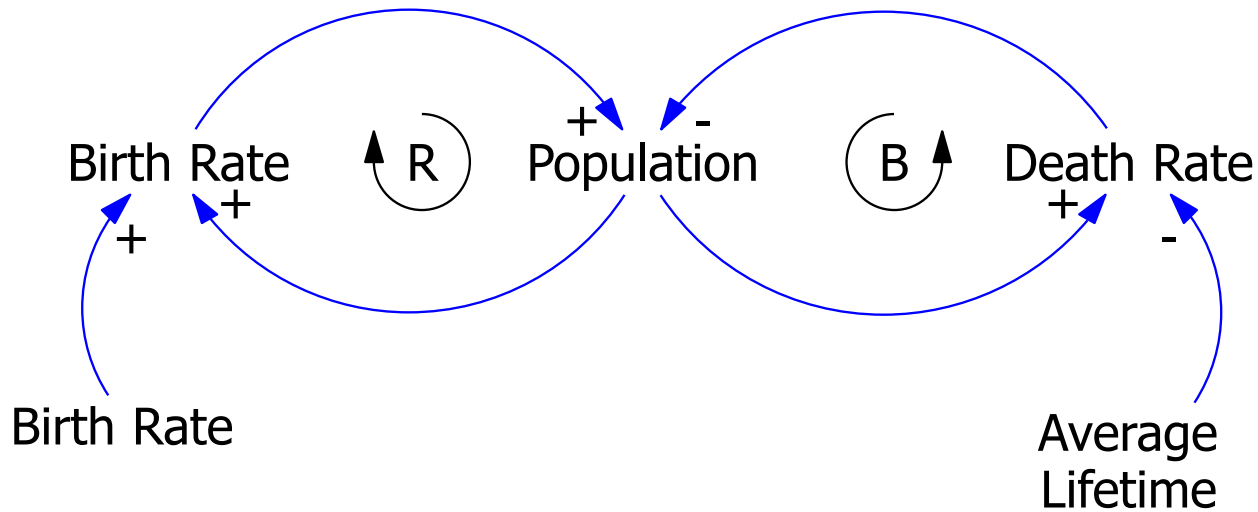
EXAMPLE: PENSION SYSTEM

WHERE TO INTERVENE IN A SYSTEM?

EXAMPLE: Swedish Pension System

INICATORS:
- Birth Rates
- Death Rate
- Population
- Average Life Expectancy
- Employment Rate
- Unemployment Rate
- No. of Pensioners
- Gross Domestic Product (GDP)
- Stockmarket (OMX)
- Public Expenditure
- Pension fund operation costs
- Asset allocation

WHERE TO INTERVENE IN A SYSTEM?

Birth Rate + R + Population + - B + Death Rate + -

Birth Rate

Average Lifetime

Employment Rate… Unemployment Rate… No. of Pensioners…

Gross Domestic Product (GDP)… Stockmarket (OMX)… Public Expenditure…

Pension fund operation costs… Asset allocation… others?

THIS WEEK

TOUR OF UPPSALA WED 10TH SEPT :
- Meet at the Domkyrkan entrance at 10:15
- Bring a bicycle
- Visit: *Pocket Park Fyrisån, Swappis, Valegården, Uppsala Kommun*
- Lunch will be at Valegården – bring some cash – 40kr.

PROJECT CAFÉ THURS 11TH SEPT CEMUS MULTISPACE

ASSIGNMENT 1 DEADLINE – LATE NIGHT ON SUNDAY 14TH SEPT
ANY QUESTIONS?

NEXT WEEK

LIVE REPORT FROM THE BALATON MEETING MON 15TH SEPT

SHOW & TELL SEMINAR & PROJECT IDEAS TUES 16TH SEPT

CHECK THE COURSE PORTAL FOR THE LATEST INFORMATION

MAP ON THE COURSE PORTAL

CLASS EVENT

Cemus SDPMC H14

SYSTEMS THINKING SKILLS

CREATIVE THINKING
- Overcome obvious solutions with unwanted side effects
- Use various supporting tools and methods
  - Mind and concept mapping
  - Lateral thinking
  - Synectics
  - Brainstorming
  - TRIZ and ASIT
- Surprise others and have fun

SYSTEM AS A CAUSE
- Don't accuse others
- To find a problem cause, uncover the systems' structure first
  - Hard structure
  - Soft structure
    - Mental models
    - Policies
- Seek for opportunities to learn and change

SCIENTIFIC THINKING
- Quantify and measure
- Formulate and test hypotheses

10 KM VIEW
- Overcome an influence of situation
- Expand your perception
  - Problem boundaries
  - Time
- Try to see both trees and forest

NONLINEAR THINKING
- Action and reaction need not to be necesarilly closely linked
  - In time
  - In space
  - In strength
- Use policies as a leverage
- Small change - big effect

CLOSED-LOOP THINKING
- Find loops of causal relationships
  - Reinforcing
  - Balancing
- Search for feedbacks in both policies and mental models

OPERATIONAL THINKING
- Think in the same way as things are already happening
- Be consistent in units of measurement

DYNAMIC THINKING
- Search for recurrent patterns of behaviour over time
- Don't overestimate events
- Think in continuous terms
- Try to perceive impacts of small changes

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Based on thoughts of Barry Richmond and George Richardson

Habits of a System Thinker

Look at the "Big Picture"

Talk about ideas and listen to the ideas of others

Look at things from different sides

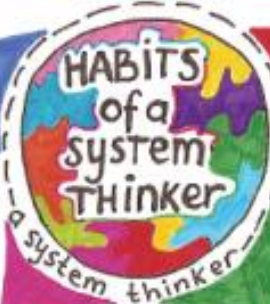Think about change over time

Identify how connections cause change over time
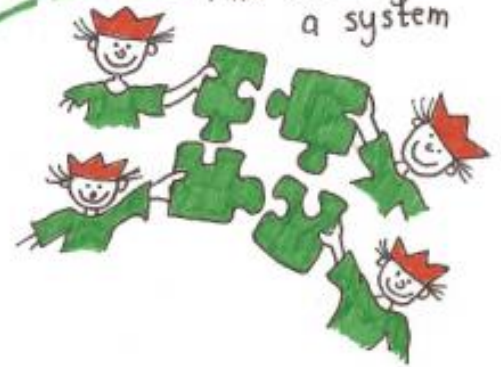
What do you think?

Be patient when things get confusing or complicated

Look for ways to help the system work better, doesn't blame

Find the "keys" to a system

Check results and changes actions if needed. "Getting better and better"

Consider how our thinking affects what happens

Figure out the effect of actions

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