

Class 2, 4/14/04

Attendance		10
ST review	LCD projection & discussion	40
Break		10
5D Chapters 1 & 2	Discussion of reading	30
"Learning in & about" & Sterman slides	Discussion of reading	30
Break		10
"Learning in & about" (cont'd)	Discussion of reading	20
Exercise	"circles in the air"	5
Q&A	General discussion	15
		170

5D - Chapter 1. Give me a lever ...

The only sustainable competitive advantage ...

Disability 4: The fixation on events

Discipline Definition: A body of theory and technique that must be studied and mastered to be put into practice for acquiring certain skills or competencies.

Disability 5: The parable of the boiled frog

Senge's Five Disciplines

Disability 6: The delusion of learning from experience

What's wrong with "best practices?"

- Core learning dilemma:

"metanoia"

- The problem with learning in cyclic situations

The problem with "team building"

- What this means for training

5D - Chapter 2. Learning Disability?

Avg. life of industrial enterprises:

Disability 7: The myth of the management team

Disability 1: "I am my position"

- "appearance" of a team
- defensiveness
- blame
- rewards advocacy, not inquiry

Disability 2: "The enemy is out there"

- "always know the answer"
- skilled incompetence

Disability 3: The illusion of taking charge

Scott Peck's Disciplines

“Learning in and about complex systems” by John Sterman

All learning depends on feedback.

Single-loop & double-loop learning

System dynamics makes mental models explicit

- beliefs about the network of causes & effects
- boundary of the model
- relevant time horizon

Reality is _____ constructed.

Barriers to learning

- *Dynamic complexity*
 - ♦ improvement half life & ADI
 - ♦ overshoot & oscillation
- *Limited information, flawed & delayed measures*

An important quote: “Sometimes the positive feedback assists learning by sharpening our ability to perceive features of the environment Often, however, the mutual feedback of expectations and perceptions limits learning by blinding us to the anomalies that might challenge our mental models.”

 - ♦ filters
 - ♦ example: GDP ... externalities
 - ♦ unemployment
 - ♦ ozone hole - Nimbus 7
- *Confounding variables and ambiguity*

- *Misperceptions of feedback*
 - ♦ policy resistance
 - ♦ Machiavelli quote
 - ♦ Human performance in complex environments is poor relative to normative standards, even compared to simple decision rules ...
 - ♦ Beer game
 - ♦ “... the mental models people use to guide their decisions are dynamically deficient.”
 - ♦ Management flight simulator experiments:
 - “naive strategy outperforms nearly 90% of the subjects.”
 - “subjects did not learn how to improve their performance in the dynamically complex conditions.
 - “misperceptions of feedback are robust to experience, incentives, opportunities for learning, and the presence of market institutions.”
 - “Subjects actually spent less time making their decisions in the complex markets than in the simple ones.
 - ♦ Two basic and related deficiencies in our mental models of complexity
 - “First, our cognitive maps of the causal structure of systems are vastly simplified compared to the complexity of the systems themselves.”
 - “Second, we are unable to infer correctly the dynamics of all but the simplest causal maps.
 - “Both are direct consequences of bounded rationality: the many limitations of attention, memory, recall, information processing, and time that constrain human decision making.”
- *Flawed cognitive maps of causal relations*
 - ♦ “... virtually no feedback processes in studies of the cognitive maps of political elites ...”
 - ♦ “fundamental attribution error”
 - ♦ HR implication
- *Erroneous inferences about dynamics*
 - ♦ “People cannot simulate mentally even the simplest possible feedback system
 - “... people significantly underestimate exponential growth ...
 - what’s the thickness after folding a sheet of paper
 - 42 folds ...
 - 100 folds ...

- *Unscientific reasoning; judgmental errors & biases*
 - ♦ overconfidence
 - ♦ wishful thinking
 - ♦ illusion of control
 - ♦ violate basic rules of probability
 - ♦ Don't understand the "law of small numbers":
Definition: "There aren't enough small numbers to meet the many demands made of them." *That is:* "We often see things happen with small numbers that are not normative, that is, often small numbers do not well represent the behavior of large numbers."
 - You can't tell by looking [at a few examples].
 - Superficial similarities spawn spurious statements.
 - Capricious coincidences cause careless conjectures.
 - Early exceptions eclipse eventual essentials.
 - Initial irregularities inhibit incisive intuition.
 - ♦ Don't understand basic statistical concepts
 - ♦ Do not update beliefs according to Bayes' rule
 - ♦ Memory distorted by hindsight & desirability of outcomes
 - ♦ "... the tendency to seek confirmation is robust in the face of training in logic, mathematics, and statistics. Search strategies that focus only on confirmation of current beliefs slow the generation and recognition of anomalies that might lead to learning, particularly double-loop learning."
 - ♦ Belief in "miracle, mystery, and authority" ... astrology, ESP, UFO's, creationism, conspiracy theories of history, channeling of past lives, cult leaders promising Armageddon, and Elvis sightings.
 - ♦ Wade Boggs
 - ♦ "For many people scientific thought leads not to enlightenment but to existential angst and the absurdity of human insignificance in an incomprehensibly vast universe. Others believe science and technology were the shock troops for the triumph of materialism ... over the sacred and spiritual."
 - ♦ **"A central principle of the systems view of the world is to examine issues from multiple perspectives; to expand the boundaries of our mental models to consider the long-term consequences and side effects of our actions, including their environmental, cultural, and moral implications."**
- *Defensive routines and interpersonal impediments to learning*
- *Implementation failure*

Requirements for successful learning in complex systems

- "... how do we get through the day without grave injury?"
- evolution by generating new candidate decision rules
- But evolution requires
 - ♦ generating new candidate rules with sufficient variety
 - ♦ better-performing rules are rewarded
 - ♦ evolution proceeds rapidly compared to changes in the system itself
- "Dynamic complexity and the misperceptions of feedback, however, reduce the effectiveness of all three."
 - ♦ riding a bicycle
 - ♦ real estate industry
- Virtual worlds
- Use of virtual worlds requires "reflective thought"
- "In practice, effective learning from models occurs bests, and perhaps only, when the decision makers participate actively in the development of the model.
- Need soft variables.
- When galaxies collide ...