

Class 5, 5/05/04

Attendance		10
Forrester's paper on "Counterintuitive Behavior"	Discussion	10
Look for the loops	LCD projection & discussion	30
Break		10
5D Chapters 6 & Appendix 2 on the Systems Archetypes	LCD projection & discussion	45
Stocks and flows - assignment	LCD projection & discussion	10
Break		10
Questions about completing 5D diagrams	discussion	10
Reflection papers	discussion	10
Review for Exam	discussion	25
		170

Presentations

Students will present on the dynamic structure underlying behaviors observed from news articles, personal experience, or another source. There will be one presentation from each team of two or three.

After the team prepares a preliminary model, I will act as a consultant to the team to improve your model. In effect I will be an additional team member.

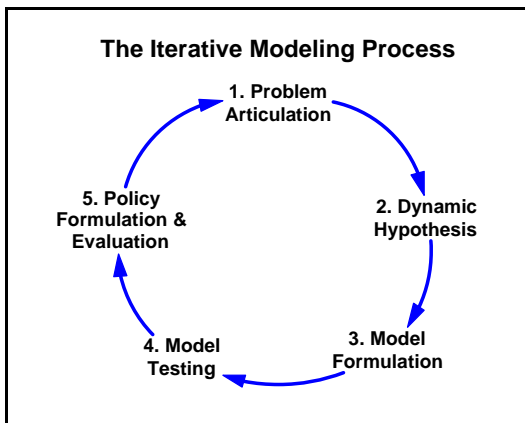
Specifics to be presented and submitted in the team report are in **bold** with an * below.

*Complete the Task Assignment Checklist

After the Presentation, complete the confidential ***Presentation Team Evaluations** and turn them in. This will count toward your grade.

The Modeling Process

For an overview, see the diagram on "The Iterative Modeling Process"¹ We're doing step 1, step 2, part of step 3 (which could include developing a simulation model), and a simplified step 5.



Problem Articulation (defines the boundary of the model)

- Select a story from news articles, personal experience, or another source. The story should

describe some problem for which the outcome is counterintuitive and which is dynamically complex.

- ***Provide a written summary of the story.**
- Describe the problem and why it's a problem.
 - ***Write a concise "problem statement."**
- Define key variables.
 - ***Identify and list the key variables.**
- Describe the behavior of the key variables over time.
 - ***Draw graphs of key variable behavior over time.**

Dynamic Hypothesis

- Describe your theory of the problematic behavior.
 - ***Write a description of the team's dynamic hypothesis that explains the dynamics as an internal (endogenous) consequence of the stock & flow or feedback structure of the system.**
- Map the causal structure using a causal loop diagram (CLD) or stock & flow (S&F) diagram and create transparencies for presentation to the class.
 - **Follow these guidelines:**
 - Use valid variable names: (1) don't include "less" or "more" (or equivalent indicator) as part of the name of the variables (2) valid variables can increase & decrease (e.g., "type of employee" isn't a variable, "number of engineers" is a variable).
 - Label links with link polarities.
 - Label loops with loop polarities.
 - Make the goals of balancing feedback loops explicit.
 - If appropriate, distinguish between "perceived conditions" and "actual conditions," because often there's a delay between a change in conditions and our perception of the change. An example is "perceived quality of life" vs. "actual quality of life." "Undesirable outcomes can result from taking action based on "perceived conditions," instead of basing action on "actual conditions".
 - Indicate important delays in causal links.

¹ From *Business Dynamics, Systems Thinking and Modeling for a Complex World* by John Sterman (2000)

- Name each loop to describe what's happening.
- Make important loops follow circular or oval paths.
- Minimize crossed lines.
- Don't try to get it right the first time, redraw and reorganize several times.
- If the diagram is complicated, create multiple layers that can be overlaid to build and build the structure.

Dynamic Behavior and Policy Recommendations

- **Tell the stories** using your CLD or S&F diagram model in the presentation to the class.
- **Identify systems thinking archetypes.**
- **Describe why you see the actual outcome as counterintuitive**, if what is happening differs from what one would think would happen, or **point to a conclusion or recommendation in the article, or generally accepted solution, that will not work or does not work for reasons you explain with your model** (e.g., the article may recommend a fix that will fail).

“Tragedy of the Commons” archetype & farming

From: <http://www.agpolicy.org/weekcol/169.html>

Current commodity programs: Are they for the producers or the users?

As we know, under current farm policy, up to half of the total US net farm income has come from government payments in recent years. In some grain-dominated farm-states government payments have equaled or exceeded net farm incomes on occasion.

It's no mystery why this has occurred. The 10 to 15 million acres that were periodically “set-aside” became permanently available for production with the 1996 farm bill. During the discussion of the bill, some were claiming that farmers would idle land on their own since “farmers would receive the decoupled payments whether or not they produced on the land.” That, of course, was an incredulous expectation. Farmers and others who understand how agriculture operates knew what to expect: in the main, farmers would farm every square foot available to them irrespective of whether the land had previously been part of a set-aside, 0/92 or any other land diversion program. That is just the way it is.

As a result, prices plummeted and government payments were provided to help fill the gap. In presentations, I often point out that this policy of all-out-production, with no regard for market needs, is a boon for users of grain and other crop. Crop agriculture is providing integrated livestock producers, millers and other processors, and importers with one of their most important raw-material inputs at a 40 to 50 percent discount with Uncle Sam picking up the difference. Furthermore, agribusinesses sell the seed, fertilizer, herbicides, transportation, handling

and other goods and services required to keep crop agriculture producing at full tilt.

The obvious conclusion is that it's the grain users and agribusinesses who are the real beneficiaries of today's government check-writing version of commodity programs, not crop farmers. Crop farmers could receive the same net income as now by producing less and receiving their revenue totally from the market.

Then grain users and agribusinesses would have to pay closer to the full-cost of production for grains, and the sales of inputs and other goods and services by agribusiness would settle down from their inflated levels.

This is a result that most economists would usually applaud but, in this case, are dead set against because actions would have to be taken to cut crop-production. They give a thumbs-up however when Sony announces plans to reduce production of TV sets by “setting aside” workers and production facilities as means to increase Sony profits and ultimately the value of 401Ks.

Of course, it would be preferable if crop farmers themselves could individually throttle production to better meet market needs. Since the absurdity of that is evident to all by now, second best solutions require collective action that could be farmer-run but have usually been administered as part of farm legislation.

If the intended major beneficiaries of the recent farm policies were the large integrated livestock producers, grain importers and multinational agribusinesses, kudos to the designers. If not, it may be time to rethink agricultural policy.

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