

Lecture 2 - Techniques in Futurology

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What did you think of the reading?

According to this, the next century will be characterized, in part, by collapse. A world population of 7 billion people will be cut to half in 50 years, and it will be devastating.

Is this the fault of the developing world, with its huge population boom?

Perhaps not. A single American has as much impact on the world as 40 to 80 residents of developing countries.

Is this reading describing an extreme scenario?

Probably not: this model already accounts for optimistic changes in technology and policy.

What will this population disturbance do in the areas of science, art, government, culture, and subculture?

850 million people are currently in conditions of chronic malnutrition (13% of the population). What will the world be like when 4 billion (say 50%) are?

What policy changes can we expect over the next 100 years as a result of this?

More generally, how do we deal with no longer being able to live only needing to consider short-term consequences?

Here follows a brief introduction to system dynamics.

System dynamics is a tool for modeling the real world based on very simple principles. SD is well applied to economies, populations, companies, resources, and biological systems. It's also possible to pull out a number of general principles which apply to the real world from its models.

The basis of SD is stocks and flows. Stocks are real-world quantities, which can only change continuously. Flows are those changes, informed (through equations) by values throughout the model.

Basic Examples:

- Population Growth and Decay: this is a simple exponential model, or (potentially) an "S"-Curve.
- Feedback and Delay: If there are two stocks which feedback into each other, there will always be some delay. For example, suppose people have fewer children as a result of pollution. Pollution (like population) is a "stock" quantity, we will naturally overshoot our desired (steady-state) population. The result is oscillation.

The other examples from *The Fifth Discipline* all have direct analogs for studying the development of the present into the future.

- The Tragedy of the Commons is a problem with the world's resources, particularly air quality.
- Fixes that Fail could be applied to Jihadism.
- Shifting the Burden is at the crux of the dangers of the energy crisis.
- Shifting the Burden to the Intervenor may be occurring now in the Middle East.
- Escalation was the problem in the arms race between the US and Russia (and may now be a problem with terrorism responses).
- Success to the Successful is the fundamental model between the rich and poor under capitalism.

There are a number of general principles that one can pull out of the study of system dynamics. These include:

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- The Boiling Toad: Like the proverbial toad that gets boiled alive if you raise up heat slowly, we are much better at noticing fast changes than slow ones.
 - The Beer Game: Small and simple changes, far removed from your means of noticing them and appear to be complicated and unwieldy.
 - People often know exactly what are the most critical points in the system they're in– and push them in the **wrong** direction.
 - People are very good at self-organization. If a system seems to be broken, sometimes the best solution is to get rid of it.

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