

## 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:

- 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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