

## Module 5 – Feedback Loops – Definitions

**Balancing Feedback:** "A balancing process is always operating to reduce a gap between what is desired and what exists."  
*The Fifth Discipline, The Art and Practice of the Learning Organization,*  
Senge, (Doubleday: 1990)

Balancing feedback can create an equalizing or oscillating effect.

**Causal Loop Diagram:** A causal loop diagram shows feedback within a system. Feedback refers to circular causal relationships inherent within a system.

Causal loop diagrams help one understand and communicate the interactions that determine the dynamics of a system.

**Exponential Change:** Any time the rate of change of some quantity is proportional to the quantity itself, the function for the quantity is an exponential function.

**Exponential Decay:** "Exponential decay is a process wherein the change of a quantity, from iteration to iteration, is proportional to the quantity itself. Thus the size of a population determines how quickly their numbers will diminish."  
*An Introduction to Systems Thinking,* (STELLA, isee systems, Inc.)

**Exponential Growth:** "...arises from positive (self-reinforcing) feedback. The larger the quantity, the greater its net increase, further augmenting the quantity and leading to the ever-faster growth."  
*Business Dynamics, Systems Thinking and Modeling for a Complex World,* John D. Sterman, (McGraw-Hill: 2000)

**Feedback:** "Feedback is said to occur when the effect of a cause re-effects the next iteration of the cause. The size of a population is the cause affecting, as feedback, the amount of the next change of population."  
*An Introduction to Systems Thinking,* (STELLA, isee systems, Inc.)

"... process whereby an initial cause ripples through a chain of causation ultimately to re-affect itself ..."

*Introduction to Computer Simulation, A System Dynamics Modeling Approach,* Roberts, Anderson, Deal, Garet, Shaffer, (1983)

**Reinforcing Feedback:** "In reinforcing processes, a small change builds on itself. Whatever movement occurs is amplified, producing more movement in the same direction."  
*The Fifth Discipline, The Art and Practice of the Learning Organization,*  
Senge, Doubleday: 1990