



*The Cybernetics of Crisis  
and the Challenge of  
Sustainability*

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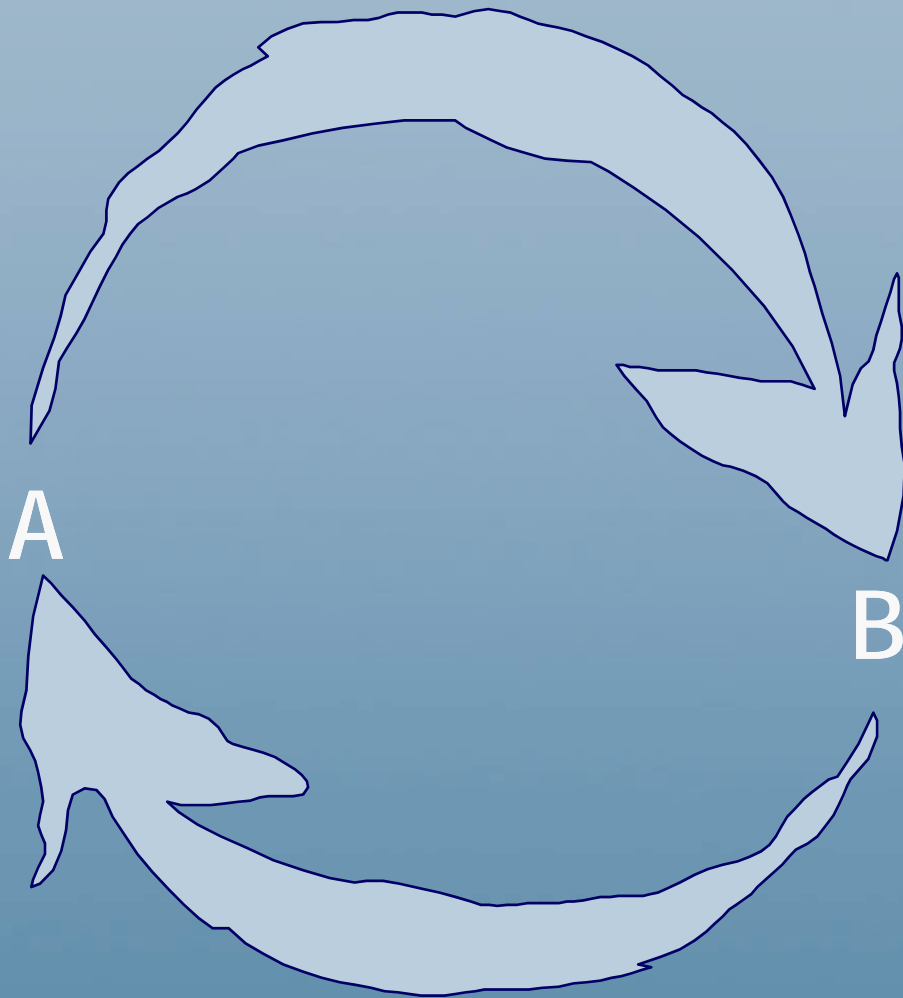
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## *Crisis:*

“A condition of **instability**, as in social, economic, political, or international affairs, leading to a decisive **change**.”

*Random House Dictionary of the English Language*

# *"Stability":*



- An underlying invariance (essential variables)
- A condition of dynamic equilibrium in processes of co-creation

# *Parts and Wholes*

- In complex dynamic systems the concept of stability pertains to particular identities (parts), as well as to the whole
- Wholes constitute “environments” consisting of interacting, mutually **adaptive** parts

# *Adaptation:*

- *Adaptation is the process of shaping identities under such interactions*



- *Ecosystems consist of patterns of such interactive, multi-loop, mutual adaptations.*

## *Adaptation Qua “Change”:*

- For each specific identity (system), the rest constitutes “the environment.”
- For each, adaptation involve **change** which produces better adjustment to its environment

# *The Anatomy of Adaptation:*

(Ashby & Sommerhoff)

Five key variables and the manner of their interaction:

- Regulator -- **R**
- Regulated system -- **S**
- Source of Disturbance -- **D**
- Set of All Possible Outcomes -- **Z**
- Set defining Desired Outcomes -- **G**

# *The Dynamics of Adaptation*

- Events in **D** produce conditions in **S** that cause outcomes to be driven out of **G**
- Effective regulation is achieved if for a given value of **D**, events in **R** and **S** relate such that outcomes are bounded by (a) **G**
- Requisite variety in **R** is key!

# *Strategies for Adaptation:*

- Fixed decision rule
- Ultrastability
- Evolution

*The later involves actual amplification of  
Regulation capability*

# *“Change”* (Ashby’s formulation):

- *Three basic elements in a change situation include an **operand** acted on by an **operator** to produce a **transform***
- *A transformation event is thus defined by a starting state, a decision rule, and an end result*

## *Consequences :*

- *Different transformations are produced by different types of relationships among these three basic elements.*
- *A distinction between two types of transformations: **changing states under a given decision rule and changing the decision rule itself.***

# *Types of Change (Watzlawick et al):*

- **First Order Change:**

Change which occurs within a system, where the system itself remains invariant

- **Second Order Change:**

Change which requires discontinuity and a shift in logical level, transformation occurs in the very nature of the system itself

# *Why is Change Difficult?*

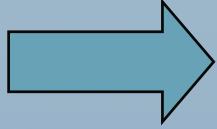
Four Essential Factors:

- The Complexity factor
- The Epistemology factor
- The Structural factor
- The Inertia, or Vested Interest factor

# *Second Order Change*

- In second order change situations all for factors interact to make transformation genuinely difficult
- The very need for second order change can be interpreted as a crisis condition
- A system freezes in a habitual mode while the context of its existence has changed

# Definition of "Crisis":

- Crisis  A failure in adaptation
- From the view point of Cybernetics:  
insufficient variety in the "Decision Rule"

Crisis is a failure to produce second order change

(failure to transform the decision rule itself)

# *Characteristics of Crisis Situations:*

## Three Essential Failures:

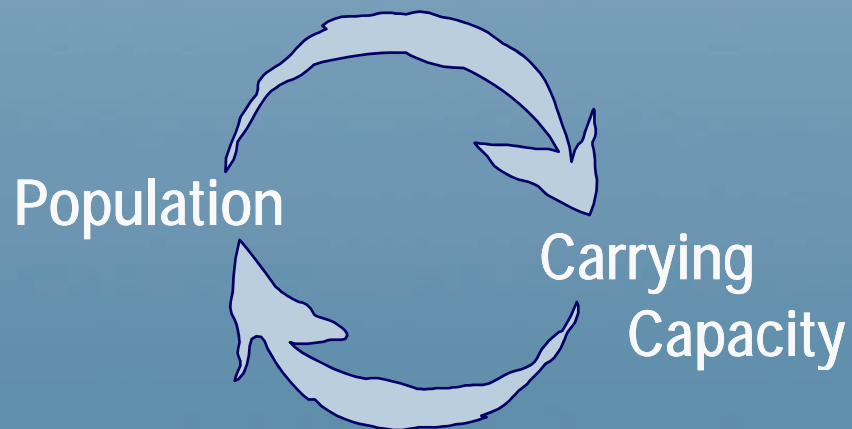
- Failure of identification
- Failure in response
- Failure in preventing run-away, exponential amplification

# The Management Question (big M)

Could we manage human affairs in a manner which would avoid these kind of crisis conditions?

# *Sustainability*

The concept of *sustainability* pertains to a balanced interaction between any **Population** and the **Carrying Capacity** of its environment



# *Definition*

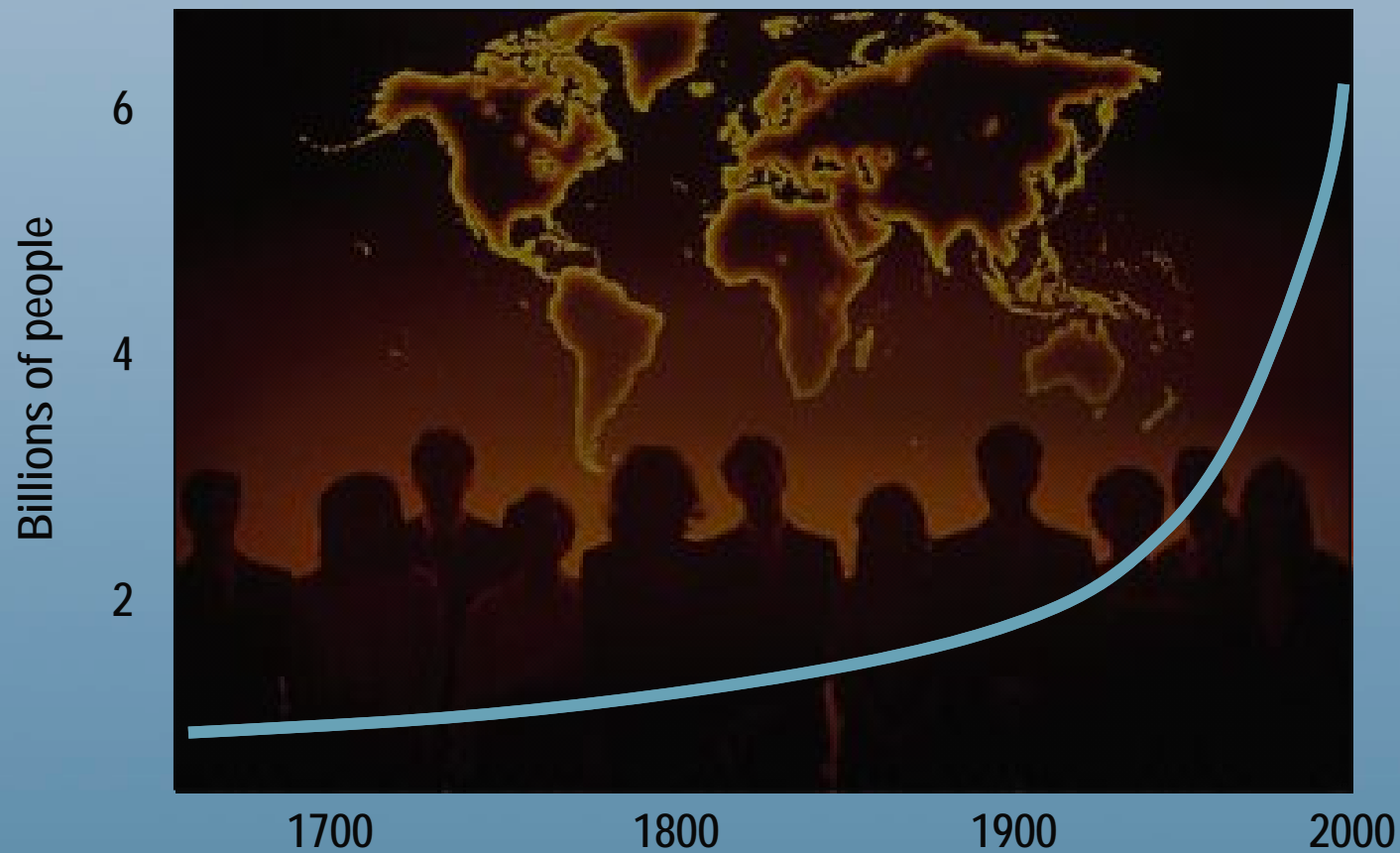
## **Sustainability:**

A dynamic equilibrium in the processes of interaction between a population and its environment such, that the population develops to express its full potential without adversely and irreversibly affecting the carrying capacity of the environment upon which it depends.

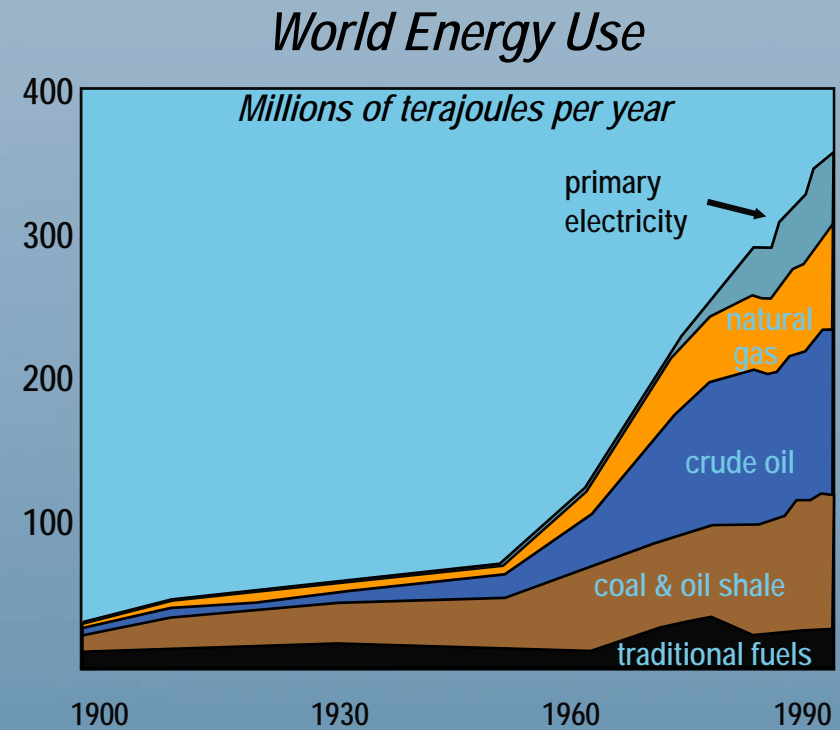
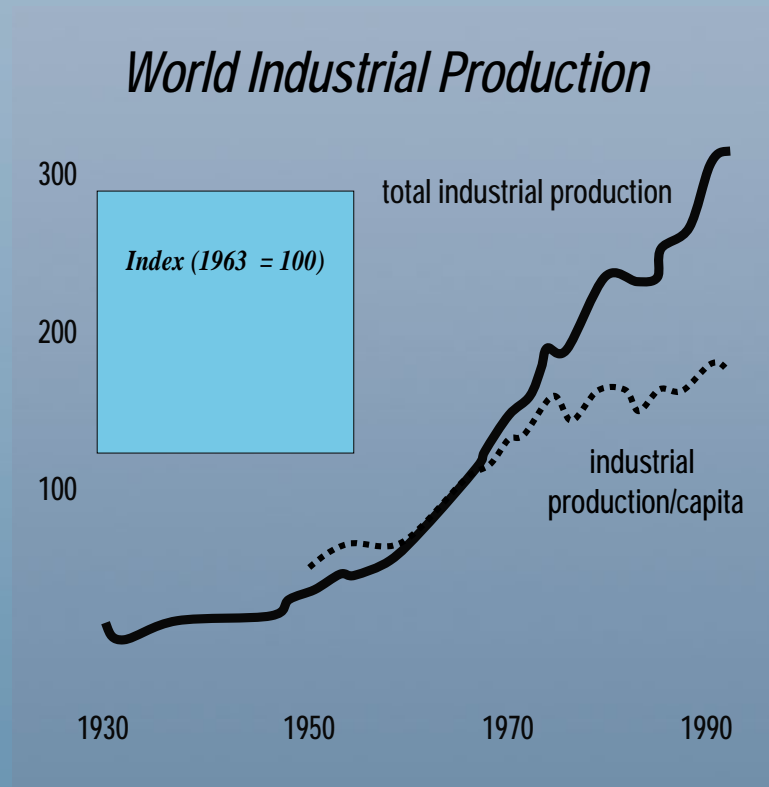


# Population

*The particular characteristics of underlying population dynamics produced, in our time, an exponential growth*



# Human Activity



*The result is an unprecedented human-induced, adverse impact on the planet's carrying capacity*

# *What is going on?*

- Reaching absolute limits — restrain growth or face a major cataclysm
- Annoying but secondary problems — fix as we go along — basically business as usual
- Symptoms of yet unrealized possibilities waiting to be born — need to unblock current constraints

# *"The Great Transformation"*

Transforming World society and its economy to a sustainable basis is the most significant challenge of our time

- The Challenge is unprecedented in scope
- It has all the characteristics of second order change
- Covers all key dimensions of the human experience: Values; world view; social organization & governance; economy; science & technology

# *The Objective*

To foster a well functioning alignment between individuals, society, the economy and the regenerative capacity of the planet's life-supporting ecosystems.



# *The Approach*

Our signature approach, at the Sustainability Laboratory, combines four essential dimensions that are required for affecting purposeful change:

- **First:** A **Vision** of a future, in which the concept of sustainability is established as the driving organizing principle on the planet.
- **Second:** A cutting-edge **Theory**, embodied in The Five Core Principles of Sustainability -- a new guiding, conceptual framework developed by the Labs.
- **Third:** A comprehensive design **Strategy**, inspired by the work of Buckminster Fuller and his Design Science discipline.
- **Fourth:** A proactive, **Action** orientation, making the vision, theory and strategy, cohere and actually manifest in the world.

# *The Challenge of Sustainability:*

*“To make the world work for 100% of humanity, in the shortest possible time, through spontaneous cooperation, and without ecological offence or the disadvantage of any one”*

*R. Buckminster Fuller*