Systems Thinking and the Internet from Independence to Interdependence

Kambiz E. Maani
The University of Queensland, Australia

INTRODUCTION

Despite our most impressive advances in sciences and technology, our prevailing worldview and the way we work and relate is deeply rooted in the thinking that emerged during the Renaissance of the 17th century! This thinking was influenced by the sciences of that era and in particular by Newtonian physics. Newton viewed the world as a *machine* that was created to serve its master–God, (Ackoff, 1993). The machine metaphor and the associated mechanistic (positivist) worldview, which was later extended to the economy, society, and the organization, has persisted until today and is evident in our thinking and vocabulary. The mechanistic view of the enterprise became less tenable in the 20th century partly due to the emergence of the corporation and the increasing prominence of human relation issues in the workplace. Today, this way of thinking has reached its useful life – The futurist, Alvin Toffler declared in 1991 "the Age of the Machine is screeching to a halt".

For well over a century, the western world has subscribed to a way of thinking known as analysis (Ackoff, 1995). In analysis, in order to understand things—a concept, a product, a law, an organization, human body—we break it into pieces and study the pieces *separately*. This approach tends to overlook the interdependencies and connections between the constituent parts, which are responsible for dynamic change in systems, say aging in human body.

On the one hand, this "divide and conquer" approach has served us well in the past. It has enabled efficient mass production of goods and services, which has brought a new social and economic order creating unprecedented wealth and standards of living in the industrialized world. On the other hand, this thinking has resulted in over-fragmentation and has created complexity and cross-purposes within organizations.

In the early part of the 20th century, a new breed of scientists, in particular quantum physicists such as Werner Heisenberg (Uncertainty Principle) and Norbert Weiner (Cybernetics) began to challenge the Newtonian precepts (Zohar & Marshal, 1994). In 1968, Austrian biologist Von Bertalanffy (1968) published "General Systems Theory"—a major departure from conventional fragmentation in science. Similarly, Jay Forrester of MIT introduced and demonstrated the applications of feedback theory in organizations (Forrester, 1958). Forrester's seminal work marks the birth of a new discipline known as System Dynamics. System Dynamics is concerned with applications of systems theory and computer modeling in complex problems in business, economics, and the environment. System Dynamics is the forerunner and the scientific foundation of Systems Thinking.

Today, biologist and physicists as well as social and cognitive scientists are working on new fields such as complexity and network theory, and Gaia theory. These emerging fields come under the broader umbrella of "systems theory" or "living systems" and "they are working in the systems sciences and are contributing to advancing the integrated, systemic understanding of life" (Capra, 2007).

BACKGROUND

The major intellectual and philosophical precepts that form the bedrock of our modern society, such as free-market economics, mass production, division of labor, and scientific management embed the following machine age characteristics (Zohar et al., 1994):

- The hierarchy
- Need for certainty, stability, and the absolute
- Treating organizations and the society as consisting of isolated, separate and interchangeable parts
- Relationships based on conflict and confrontation (rationality and self-interest)
- Desire for control and bureaucratic methods
- Persistence of "single points of view" leading to friction and polarisation
- Over-emphasis on specialist expertise, leading to fragmentation and loss of relevance

Machine-age thinking, still prevailing today, is based on the following notions, that:

- Complete understanding of the universe is possible
- All relationships can be described through simple (linear) cause-and-effect
- The world could be understood through analysis (breaking the wholes into pieces)

SYSTEMS THINKING

Systems Thinking (ST) is a discipline for understanding the dynamics of change and complexity underlying business, economic, scientific and social systems. Systems Thinking has three distinct but related dimensions: paradigm, language, and methodology. These dimensions are outlined next (Maani & Cavana, 2007):

- *Paradigm*: Systems Thinking is a way of thinking about the world and relationships. This paradigm relates to the dynamic relationships that influence the behaviour of complex systems. A number of expressions that we use in daily language reflect the Systems paradigm—vicious/virtuous cycle, ripple effect, snowballing, spiral effect, domino effect and chronic behaviour are among these.
- *Language*: As a language, Systems Thinking provides a tool for understanding complexity and group decision-making. The Systems Thinking language is known as Causal Loop Diagrams.
- *Methodology*: Systems Thinking provides a sophisticated computer modeling technology and associated learning environments for group interactions and learning.

Systems Thinking and the Internet

For centuries, knowledge was the preserve of the aristocrats and the clergy who controlled it to dominate and manipulate the masses. In the past century, the "knowledge" privilege extended to the teacher, the manager, and the boss who assumed this as part of their role and superiority. This knowledge divide, for its part, has strengthened the hierarchy and to some extent has widened the gap between the haves and have-nots.

In the past two decades, two movements have had a profound influence on the way we learn, think, communicate and do business—the Internet and Systems Thinking. Both are grounded in science and technology and complement each other in principle and practice. While one has become a daily necessity, the other is coming out of obscurity. The Internet was developed in military and academic quarters in the late 1960's. In the nineties, the Internet emerged in the public domain and rapidly became a mass movement. Today, the Internet is the engine driving the economy, globalization and convergence of various markets, services and industries (Query & Jin, 2003).

Systems Thinking also originated in scientific centers in the 1950's and is now growing rapidly in appeal and applications. It offers a way of thinking based on the primacy of the "whole" and relationships. Systems Thinking deals with hidden complexity, ambiguity, and mental models. It provides tools and techniques to leverage change and to create lasting interventions (Maani, 2001).

Although they may be regarded as purely technical advances, both Systems Thinking and the Internet challenge the age-old paradigms and the ways information and knowledge are disseminated. At a more fundamental level, they challenge the hierarchy and authority, power and leadership. In essence, the Internet has ushered in a new culture, social movements, and "new politics" around the globe (Webster, 2001). Through its unimpeded access and reach, the Internet has in effect brought down the boundaries that define business, trade, and even nationhood. For example, today, Facebook, an Internet portal, has over 100 million members—as a "nation" it would be the eighth largest "country" in the world (Bessant, 2007).

Likewise, Systems Thinking, through its unifying and compelling scientific principles, breaks down the superficial dichotomies of the whole vs the part, the individual vs. the collective, integration vs. autonomy, growth vs. sustainability, and nature vs. progress. Together, the Internet and Systems Thinking can provide powerful synergies blending new concepts, tools, and technologies.

Over the past 20 years, new management concepts and models have emerged that have dramatically challenged the prevailing assumptions and practices in business and organizations. Among these—the Just-in-Time philosophy and

Table 1. Why we need Systems Thinking (Maani & Cavana, 2007)

• Increasing complexity in our lives
• Growing interdependence of the world
• Revolutions in management theories and practice
• Increasing global consciousness and yet "local" decision-making
• Need for multistakeholder decision making and consensus building
• Increasing recognition of learning as a key organizational capability