SYSTEMS

**EXTRACTS and LEARNINGS FROM DONELLA MEADOWS´BOOK**

**Thinking in Systems: A Primer by Donella Meadows**

**Biography**

Donella H. Meadows was a pioneering environmental scientist, author, teacher, and farmer widely considered ahead of her time. She was one of the world's foremost systems analysts and lead author of the influential Limits to Growth. She was Adjunct Professor of Environmental Studies at Dartmouth College, the founder of the Sustainability Institute and co-founder of the International Network of Resource Information Centers.

**INTRODUCTION**

Introduction: The System Lens

“Systems can’t be controlled, but they can be designed and redesigned”

**More Than the Sum of Its Parts**

A system isn’t just any old collection of things. A **system\*** is an intercon- nected set of elements that is coherently organized in a way that achieves something. If you look at that definition closely for a minute, you can see that a system must consist of three kinds of things: *elements, interconnections,* and a *function* or *purpose.*

Once we see the relationship between structure and behavior, we can begin to understand how systems work, what makes them produce poor results, and how to shift them into better behavior patterns. As our world continues to change rapidly and become more complex, systems think- ing will help us manage, adapt, and see the wide range of choices we have before us. It is a way of thinking that gives us the freedom to identify root causes of problems and see new opportunities.

So, what is a system? A system is a set of things—people, cells, molecules, or whatever—interconnected in such a way that they produce their own pattern of behavior over time. The system may be buffeted, constricted, triggered, or driven by outside forces. But the system’s response to these forces is characteristic of itself, and that response is seldom simple in the real world.”

Is there anything that is not a system? Yes—a conglomeration without any particular interconnections or function. Sand scattered on a road by happenstance is not, itself, a system. You can add sand or take away sand and you still have just sand on the road. Arbitrarily add or take away foot- ball players, or pieces of your digestive system, and you quickly no longer have the same system.

**CREATING CHANGE—IN SYSTEMS AND IN OUR PHILOSOPHY**

**Get the Beat of the System**

Before you disturb the system in any way, watch how it behaves. If it’s a piece of music or a whitewater rapid or a fluctuation in a commodity price, study its beat. If it’s a social system, watch it work. Learn its history. Ask people who’ve been around a long time to tell you what has happened. If possible, find or make a time graph of actual data from the system— peoples’ memories are not always reliable when it comes to timing.

**Pay Attention to What Is Important, Not Just What Is Quantifiable**

“Our culture, obsessed with numbers, has given us the idea that what we can measure is more important than what we can’t measure. Think about that for a minute. It means that we make quantity more important than quality. If quantity forms the goals of our feedback loops, if quantity is the center of our attention and language and institutions, if we motivate ourselves, rate ourselves, and reward ourselves on our ability to produce quantity, then quantity will be the result. You can look around and make up your own mind about whether quantity or quality is the outstanding character- istic of the world in which you live”.

**Listen to the Wisdom of the System**

“Aid and encourage the forces and structures that help the system run itself. Notice how many of those forces and structures are at the bottom of the hierarchy. Don’t be an unthinking intervenor and destroy the system’s own self-maintenance capacities. Before you charge in to make things better, pay attention to the value of what’s already there.”

**Celebrate Complexity**

“Let’s face it, the universe is messy. It is nonlinear, turbulent, and dynamic. It spends its time in transient behavior on its way to somewhere else, not in mathematically neat equilibria. It self-organizes and evolves. It creates diversity *and* uniformity. That’s what makes the world interesting, that’s what makes it beautiful, and that’s what makes it work”.

**Stay Humble—Stay a Learner**

“Systems thinking has taught me to trust my intuition more and my figur- ing-out rationality less, to lean on both as much as I can, but still to be prepared for surprises. Working with systems, on the computer, in nature, among people, in organizations, constantly reminds me of how incomplete my mental models are, how complex the world is, and how much I don’t know.”

 **Honor, Respect, and Distribute Information**

“Information is power. Anyone interested in power grasps that idea very quickly. The media, the public relations people, the politicians, and adver- tisers who regulate much of the public flow of information have far more power than most people realize. They filter and channel information. Often they do so for short-term, self-interested purposes. It’s no wonder our that social systems so often run amok.”

“You’ve seen how information holds systems together and how delayed, biased, scattered, or missing information can make feedback loops malfunction. Decision makers can’t respond to information they don’t have, can’t respond accurately to information that is inaccurate, and can’t respond in a timely way to information that is late.”

“Systems modelers say that we change paradigms by building a model of the system, which takes us outside the system and forces us to see it whole. I say that because my own paradigms have been changed that way.”

Source: http://ir.nmu.org.ua/bitstream/handle/123456789/129200/2ee4a14a158e824b867e07ad95005643.pdf?sequence=1

Introduction: The Biomimicry Lens

**What is Biomimicry?**

Biomimicry is an innovation method that seeks sustainable solutions by emulating nature’s time-tested patterns and strategies, e.g., a solar cell inspired by a leaf. The goal is to create products, processes, and policies—new ways of living—that are well-adapted to life on earth over the long haul.

**Biomimicry Life´s Principles**

Having reached the limits of nature’s tolerance, we are finally shopping for answers to the question: “How can we live on this home planet without destroying it?”

Biomimicry follows Life’s Principles. Life’s Principles instruct us to build from the bottom up, self-assemble, optimize rather than maximize, use free energy, cross-pollinate, embrace diversity, adapt and evolve, and use life-friendly materials and processes, engage in symbiotic relationships, and enhance the bio-sphere. By following the principles life uses, you can create products and processes that are well adapted to life on earth.

**Biomimicry DesignLens**

Biomimicry Thinking provides context to where, how, what, and why biomimicry fits into the process of any discipline or any scale of design. While akin to a methodology, Biomimicry Thinking is a framework that is intended to help people practice biomimicry while designing anything. There are four areas in which a biomimicry lens provides the greatest value to the design process (independent of the discipline in which it is integrated): scoping, discovering, creating, and evaluating. Following the specific steps within each phase helps ensure the successful integration of life’s strategies into human designs.

**Bprofessional (Bpro)**

The BPro Program prepares graduates to address solutions to some of the most pressing and varied global challenges, such as climate change, resistance to antibiotics, toxic chemical proliferation, and fair and healthy housing. Each BPro cohort is a balanced mix of designers, biologists, engineers, business people and those with strong sustainability training and backgrounds. By selecting individuals from these and their related sub-disciplines, we foster a truly interdisciplinary learning experience.

**What Is the Biomimicry Taxonomy?**

The Biomimicry Taxonomy provides a novel way to approach your next innovation challenge sustainably. Information organized on AskNature uses a classification system—the Biomimicry Taxonomy—to categorize the different ways in which organisms and natural systems address challenges. How these organisms and systems do so represents potential solutions to similar challenges that we face as humans.