

The 12 Natural Laws of Living Systems*

Life's Laws Rediscovered: A Universal Thinking Framework and Guide

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A UNIVERSAL THINKING GUIDE

Ludwig von Bertalanffy was an intellectual titan of the 20th century and the founder of General Systems Theory. In 1954, von Bertalanffy formed the Society of General Systems Research (now ISSS) to explore and advance the method of critical thinking that can be applied to every area of life. His goal was to “find the unity of science for all living systems.”

In December 1972, six months after the death of Bertalanffy, the Academy of American Management Journal published the Twelve Characteristics of Living and Open Systems, which stems from his research of his Society of General Systems Research. This journal article listed the 12 Codes or meta-laws of Living Systems of all types that allow us to utilize them for all eight levels of living systems on earth: cells, organs, individuals, families, organizations, communities, societies and earth (see James Grier Miller's book Living Systems).

These foundational laws are really the touchstone for the worldwide applications of the entire field of systems thinking. However, most people are unaware of this foundational source document, which has been lost over time. This article revisits and interprets these Twelve Natural Laws so we can understand and use them as a “Universal Thinking Framework and Guide” for applying Systems Thinking.

In our organizations as living systems, we don't deal with “problems”—we deal with “messes of interrelated problems with huge unintended consequences.”

Artificial either/or thinking is the ruin of our societies.

— Stephen Haines, with thanks to Russell Ackoff

Steve Haines said that thinking across boundaries, or integrative thinking, was the ultimate entrepreneurial act. Call it business creativity. It is the systems thinking approach™

The 12 Natural Laws Revisited

PART I: THE SIX WHOLE SYSTEM LAWS

Based on the characteristics of General Systems Theory, there are six laws and meta-characteristics on earth that make up every living system at all eight levels that make it a Universal Thinking Guide. It is just like the laws of chemistry or physics. In every living system, “the whole is greater than the sum of the parts.” This is due to the integrated nature of these six characteristics from the research of the Society for General Systems Research:

#1. Holism (Purpose and Synergy)

Systems Thinking is finding patterns and relationships, and learning to reinforce or change these patterns to fulfill your vision and mission. In this approach, the whole is primary and the parts are secondary, so a focus on maximizing the parts leads to suboptimizing the whole. The whole is not just the sum of the parts; the system itself has properties that parts do not have. Holism is the opposite of elementariness, which views the total as the sum of its individual parts.

Think: Analytical either/or, win-lose dialogue vs. “Yes, and...” Systems views.

Traditional Human Dynamics:

- Parts-focused
- Suboptimal results
- Narrower views
- Means focus first/ ignore ends

Holism Best Practices:

- Overall broader perspectives
- Ends/ purpose-focused foremost
- Synergy can be the integrated result

#2. Open Systems View

Systems can be characterized in two ways: (1) closed or (2) open (with degrees in between). Open systems exchange information, energy or material with

12 NATURAL LAWS OF LIVING SYSTEMS*

BEST PRACTICES

vs.

TRADITIONAL HUMAN DYNAMICS

I. THE WHOLE SYSTEM: “The whole is greater than the sum of its parts.”

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|--|---|
| 1. Holism —Overall broader perspectives; ends/ purpose-focused; synergy | 1. Parts Focused —Suboptimal results; narrower views; means |
| 2. Open Systems —To the environment, regular scanning; outside-in; implications clear | 2. Closed Systems —Low environmental scanning or concern; parts-focused |
| 3. Boundaries —Clarity of system; integrated; fit; collaborative; complementary | 3. Fragmented/ Inflexible —Turf battles; voids; overlaps; duplication |
| 4. Input/ Output —How Natural Systems operate; “Backwards Thinking” | 4. Sequential —Linear; mechanistic; piecemeal/ analytic; forecasts |
| 5. Feedback —On effectiveness; results; “feedback is a gift”; encourage it | 5. Low Feedback —Financial only fear; defensiveness; lack of measures |
| 6. Multiple Outcomes —Goal-seeking at all levels; “What's In It For Me?” (WIIFM) | 6. Conflict —Artificial “either/or” thinking; “Yes, but...”; one result only |
- #### II. THE INNER WORKINGS: Synergy, Relationships and Interdependence.
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| 7. Equifinality —Flexible and adaptive; more than one way to do it; empower the means | 7. Direct Cause-Effect —One best way; quick fix fails; activity-focused |
| 8. Entropy —Follow-up/ inputs of energy; renewal; “Booster Shots” needed | 8. Natural Decline —Obsolescence; rigidity and death |
| 9. Hierarchy —Flatter organization; self-organizing; productive order emerges | 9. Bureaucracy —Command and control; policy paramount, centralize decisions |
| 10. Interrelated Parts —Patterns; webs; fit; interdependence and leverage | 10. Separate Parts —Components; silos, individualism; parts are primary |
| 11. Dynamic Equilibrium —Maintain stability and balance/ culture; self-regulating | 11. Resistance to Change —Myopic view ruts; habits; root causes delayed in time and space |
| 12. Internal Elaboration —Details and sophistication; clarity and simplicity | 12. Complexity —Confusion; chaos |

*Source: Society for General Systems Research, *American Management Journal*, December 1972

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their environment. Biological and social systems are inherently open systems, while mechanical systems may be open or closed. The concepts of open and closed systems are difficult to defend in the absolute. We prefer to think of open-closed as a continuum—that is, systems are relatively open or relatively closed.

Think: Chinese economy in 1998 vs. 2018—which is more open?

Traditional Human Dynamics:

- Closed systems with rigid boundaries
- Limited environmental scanning or external concerns
- Parts-focused

Open Systems Best Practices:

- Systems are open to the environment and key stakeholders
- Regular environmental scanning is crucial
- “Outside-in” perspective—in that order (helicopter view)
- Implications of external change are clear

#3. System Boundaries

It follows that systems have boundaries (real or imagined) that define the limits of a particular system and separate it from its environments. The concept of boundaries helps clarify the distinction between open and closed systems. The relatively closed system has rigid, impenetrable boundaries, whereas the open system has permeable boundaries between itself and broader supra-systems and the external environment.

Boundaries are easily defined in physical and biological systems, but are difficult to clearly delineate in social systems such as countries, organizations, communities and societies. Even the earth's boundaries are open to the universe!

Think: What is the 9th Level of Living Systems (James Grier Miller)? Is there one more in our universe?

Traditional Human Dynamics:

- Fragmented/ inflexible
- Turf battles
- Voids, overlaps and duplication

System Boundaries Best Practices:

- Establishing clarity of system levels is the first step
- Integrated fit—alignment and attunement are both key
- Collaboration between systems is key—seek win-win
- Complementary or competing—which is it for you?

#4. Inputs – Transformation – Outputs

An open system is best understood and viewed as a transformational process. In a dynamic relationship with its environment, a system receives various inputs, transforms them as throughputs in various processes and ways, then provides outputs into its environment. This law encompasses the fundamentals of the natural operating systems of all living systems and life on earth—we call it our ABCs to keep it simple.

Think: Breathing in and out.

Traditional Human Dynamics:

- Sequential and linear
- Mechanistic and assembly line mentality
- Piecemeal, analytic and parts-focused
- Feed forward only

Transformational Best Practices:

- How natural systems operate
- “Backwards Thinking”

#5. Feedback

The concept of feedback is important in understanding how a system maintains a steady state/ culture and also adapts to its environment. Information concerning the outputs and the processes of the system is fed back as new inputs into the system, perhaps leading to changes to improve the transformation process or future outputs. In fact, feedback is the framework for transformation. The more feedback open systems receive from the environment through all channels through their boundaries, the more likely they are to sustain their existence longer by serving their purpose more effectively.

Feedback can be both positive and negative. Positive feedback is information that promotes more of the same outputs. Negative feedback as an input indicates that the system is deviating from a desired state and needs to change how it works to get what it desires.

Think: About how professional athletes are managed (e.g. skin folds, GPS tracking, etc) versus your supervisor's feedback. Which is better?

Traditional Human Dynamics:

- Low feedback—lack of honesty and openness
- Financial only
- Defensiveness and fear
- Lack of measures and goals

Feedback Best Practices:

- Realtime feedback on effectiveness is key
- Results will be improved with broader stakeholder feedback
- “Feedback is a gift”—learn to ask for it and accept it
- Encourage it—“Skeptics are my best friends”

#6. Multiple Outcomes (Goal-Seeking)

Biological and social systems appear to have multiple goals or purposes, which lead to multiple outcomes. Social organizations have multiple goals, if for no other reason than that they are composed of individuals and subunits with different values and goals. Since all social systems have multiple goals, building consensus on them all first is the key to successful teamwork and achieving these goals.

Clarity of goals is the #1 key to success in all the literature—see Stephen Covey's best seller, *The Seven Habits of Highly Successful People*, in which he writes, “Begin with the end in mind.”

Think: Conflicts between individuals and among teams and departments, and the multiple cultures within one organization, not to mention conflicting goals in the climate change debate.

Traditional Human Dynamics:

- Conflict—narrow “silo” thinking
- Artificial either/or thinking
- “Yes, but...”
- Only one result—loss of perspective

Multiple Outcomes Best Practices:

- Goal-seeking at all levels is the first job - win-win
- “What's In It For Me?” (WIIFM?) is a sign on all of our chests—and a legitimate question

PART 2: THE INNER WORKINGS OF LIVING SYSTEMS

All living systems also have a set of standard internal relationships and dynamics, which are marked by six more of the meta-laws identified in the same research by the Society for General Systems Research:

#7. Equifinality (of open systems)

In mechanistic systems, there is a direct cause-and-effect relationship between the initial conditions and the final state. Biological and social systems operate differently. Equifinality suggests that certain results may be achieved with many different initial conditions and in different ways. This view suggests that social organizations are flexible and adaptive, and can accomplish their objectives with diverse inputs and varying internal activities and conversation processes.

Think: The entire field of Empowerment, with a focus on the loose-tight concept of agreed upon/tight goals and loose/flexible, empowered ways of reaching those goals.

Traditional Human Dynamics:

- Direct Cause-Effect
- One best way
- Quick fix fails every time
- Activity-focused

Equifinality Best Practices:

- Agree on the goals first as “tight”
- Be flexible and adaptive
- Empower the means “as loose”
- More than one way to do it

#8. Entropy (of natural systems)

Closed, physical systems are subject to the force of entropy that increases until the entire system eventually fails. The tendency toward maximum entropy is a movement to disorder, complete lack of resource transformation and termination. All systems have a tendency towards maximum entropy. But since importing resources from the environment is key to long-term viability, closed systems move toward this disorganization faster than open systems.

In a closed system, a change in entropy always results in death; however, in open biological or social systems, entropy can be arrested and even reversed—a process of more complete organization and ability to transform resources—because the system imports resources from its environment. The key is renewal and continual reinforcement. Levels of Living Systems above individual humans do not have to be subject to this ultimate demise from entropy.

Think: The great civilizations in the history of the world have all had a natural rise and decline of 300 - 500 years—Why?

Traditional Human Dynamics:

- Natural decline
- Obsolescence
- Rigidity and death

Entropy Best Practices:

- Follow-up is crucial to any change effort
- Inputs of energy are key to long-term success
- Renewal is a requirement for longevity
- Regular “Booster Shots” of new energy are needed

#9. Hierarchy (of nested systems)

A basic concept in systems thinking is there are hierarchical relationships in and between systems. Despite recent trends towards flatter hierarchies, rather than command and control, and accountability, all systems have a natural hierarchy. A system is composed of subsystems and is also part of the supra-systems above it (see Miller's Living Systems). Since systems can only be understood holistically, try to understand the system and its environment first. As open systems, organizations are only viable in mutual interaction with and adaptation to the changing environment.

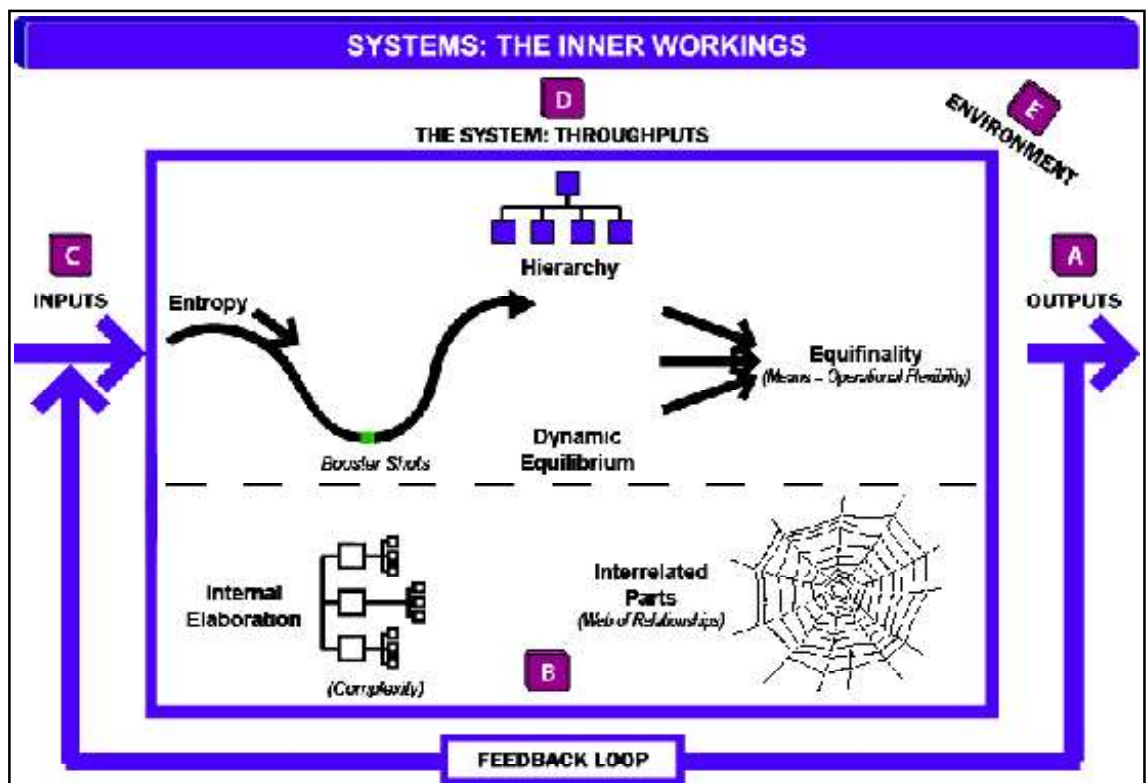
Think: Russian “nesting dolls” as nested systems within systems in an organization—individuals, teams, departments, project teams, divisions, etc.

Traditional Human Dynamics:

- Bureaucracy and policy are paramount
- Command and control, with centralized decisions

Hierarchy Best Practices:

- Flatter organizations are usually better
- Self-organizing teams work to a point, but a leader must emerge
- Productive order emerges ultimately, but only if it serves the purpose of the higher order system.



#10. Interrelated Components and Subsystems

A system by definition is composed of interrelated parts or elements, or subsystems. This is true for mechanical, biological and social systems. Every system has at least two elements and these elements are interconnected and must be integrated seamlessly for best results.

While each system functions uniquely, its parts, elements and subsystems are interdependent, weaving a web of relationships. Change in any element of a system affects the whole as well as the other parts. As a result, yesterday's great solutions may lead to today's issues and unintended consequences. An exclusive focus on one element or subsystem without simultaneous attention to others leads to suboptimal results and new disturbances for the system as a whole.

Every system cannot be subdivided into independent parts; conversely, a system as a whole cannot function effectively when it loses a part (Think: Department "silos"). Begin with the whole (Think: An organization's purpose = vision, mission & values) and the purpose it serves within its environment, and then the parts (departments) and their relationships evolve from this. Since parts play their role in light of the purposes for which the whole exists, focus on the desired outcomes first, not just the problems of the parts.

Think: Any dysfunctional organization or the complexity of the European Union and all its unintended consequences. For example, The BREXIT may make things worse for some parts of Britain (e.g. Scotland). No one is happy with these decisions because of the artificial, either/or thinking of the extreme left and right.

Traditional Human Dynamics:

- Think that they are separate parts and components
- Silos and defensiveness
- Individualism/nationalism paramount ("I" not "we")
- Parts are primary—lack of relationships

Interrelated Components Best Practices:

- Patterns and webs are crucial to identify ('butterfly effect')
- Interdependence and leverage are key to successful change
- Fit is the "dirty" three-letter word—make it happen
- Play out the 40 Laws of Unintended Consequences

#11. Steady-State Dynamic Equilibrium

The concept of "steady state" is closely related to that of the thermodynamic concept of negative entropy. A closed system eventually will attain an equilibrium state with maximum entropy—death or disorganization. However, an open system may attain and maintain a state where the system remains in dynamic equilibrium with its changing environment through the continuous inflow of materials, energy, people and information (e.g. agile and adaptive).

Systems have a natural pace to them (their pulse), so sometimes trying to go faster is ultimately slower. Delayed reactions—along with cause and effect being unrelated in time and space—lead to inaccurate diagnoses and poor solutions.

Think: How extremely difficult cultural change is to achieve due to this dynamic equilibrium.

Traditional Human Dynamics:

- Resistance to change
- Myopic view, ruts and habits

- Root causes delayed in time and space—hard to find

Dynamic Equilibrium Best Practices:

- Maintain stability, direction and balance is hard work today
- Culture change is hard and takes years
- Focus on the edges of the system where transformation occurs more easily through structural changes

#12. Internal Elaboration (Complexity)

Closed systems move toward entropy and disorganization. In contrast, open systems move in the direction of greater differentiation, elaboration and a higher level of organization. It yields details, growth and sophistication. However, the result is usually the growth of complexity and bureaucracy.

Think: Complexity is everywhere, simplicity is rare. Why is the health care system becoming increasingly difficult to navigate?

Traditional Human Dynamics:

- Complexity—lack of understanding relationships
- Specialisations leading to confusion and chaos
- Lots of unintended consequences

Internal Elaboration Best Practices:

- Details and sophistication occur as you grow
- Simplicity does not happen automatically—you need "Simplicity Police"
- Clarity does not happen automatically—you must pursue it first and foremost

SUMMARY

A system cannot be understood through analysis, but through synthesis—looking at it as a whole within its environment. Thus, in our organizations as living systems, we don't deal with "problems"—we deal with "messes of interrelated problems with huge unintended consequences." And as Russell L. Ackoff, the former chairman of Interact, wisely said, "Effective managers do not solve problems. They dissolve messes."

These 12 Natural Laws of Living Systems are Ludwig von Bertalanffy and his Society for General Systems Research's answers to their search for the unity of science for living systems. See reference: Ludwig von Bertalanffy, "An Outline of General System Theory," The British Journal for the Philosophy of Science, Vol. 1, No. 2 (Aug., 1950), pp. 134-165.

There have been other great writers in more recent times; Meadows, Ackoff & Senge; each with their own take. But the 12 Natural Laws and Miller's Eight Levels of Living Systems can serve you as your Universal Thinking Framework and Guide.

Another in the
Strategic and Systems Thinking Series.

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