HSD at Work:
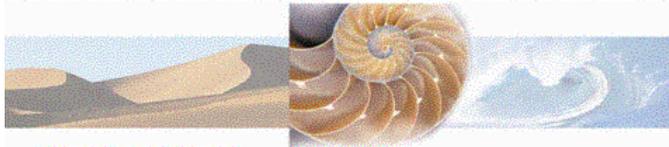
Frequently Asked Questions About Human Systems Dynamics

by
Royce Holladay
The Human Systems Dynamics Institute

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What is human systems dynamics (HSD), and why is it important?

Human systems dynamics (HSD) is a collection of concepts and tools that help make sense of the patterns that emerge from the chaos when people work and play together in groups, families, and communities. We study HSD because it offers insights and opportunities for action to increase the efficiency and effectiveness of individuals and organizations in times of radical change.

HSD is based on the study of complexity science and chaos theory—relatively new fields that focus on the surprising behavior of Complex Adaptive Systems (CAS). In HSD, the CAS we study are individuals, groups, families, and communities. The concepts are grounded in science, but they continue to emerge as we explore the complex behaviors of human systems. In this new and emerging field, we are all learning together.

HSD uses metaphors from the physical, mathematical, and computer sciences to help practitioners understand what is happening in the everyday dynamical interactions in organizations and groups.

Who uses HSD? Any leader, group, organization or agency can draw from HSD to understand what is happening and to work more effectively toward their goals. Professional consultants and coaches use HSD to enrich the services they provide their clients. HSD principles can be applied in businesses, schools, non-profits, government agencies, communities, families, relationships—anywhere people come together to live, work or play.

Regardless of our age, gender, role, or profession, we all deal with and participate in human systems. HSD can help us understand the patterns of behavior that emerge in our relationships with each other, so we are better able to plan, solve problems, work, and play in productive and healthy ways.

The use of HSD to understand self-organization provides consultants and leaders with more options for action in the context of a changing and volatile organizational environment.

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What is Self-Organization?

Self-organization is how a complex system adapts in its environment. As a system experiences changes or differences, its agents—the individuals who make up the organization—begin to organize themselves to assure that they will survive. Self-organization is the process by which systems in nature bring order out of chaos.

We can observe self-organization in many ways. For instance, as new team mates spend the first days of a project together, they learn about how to work together, they form relationships, and leaders begin to stand out—they self-organize into a team. Throughout the project they continue to self-organize as they adjust to new ideas, new learnings, and new experiences.

Organizational life is surprising; new challenges arise daily. In the workplace, individuals make choices and respond to challenges in their systems. This is the essence of self-organization. People continue the "dance" of life: interacting, adjusting, responding, progressing, retreating, exploring, and resting. One individual or group reacts to another, which elicits the next action...it is never ending and it is instantaneous. It is these actions/responses/reactions that create the patterns in our lives.

Those patterns are the themes or constants that create our lives. In organizations, it is often easy to sense the culture or climate—it may be trusting and open or territorial and competitive. These manifestations of the culture of the organization come from patterns that emerge as the entire system engages in the ongoing dance of self-organization.

What is a Complex Adaptive System?

Complex Adaptive Systems (CAS) are dynamical, self-organizing and continually changing. They are made up of "semi-autonomous agents that interact in unpredictable ways such that they create system-wide patterns." (*The diagram on the next page represents the definition.*) Let's break this definition down:

- **Semi-autonomous agents** refers to the parts (for example, individuals, teams, groups) that make up the system. They operate within some constraints, but they are free to make their own choices about how they interact with each other and in the environment.

- Because these agents are free to choose, their behaviors are **unpredictable**. While you can anticipate patterns of action over time, you cannot predict what any one agent will be doing at any particular moment.

- The people in the organization interact in ways that create **system-wide patterns**. We may see these patterns as the culture or climate of an organization. When people interact in ways that respect diversity, for instance, you will probably see patterns of trust and openness and exploration of new ideas. The patterns may or may not be obvious across the system as a whole.

- As a system-wide pattern emerges, it **influences (reinforces) the behavior** of the agents in the system. So, over time, the pattern becomes stronger and stronger.

For instance, when the prevailing patterns in an organization are about respect and diversity, then the climate is one of acceptance and trust. These patterns then amplify (recognize and reward) individual behaviors that contribute to the patterns of respect. At the same time, those behaviors that are not contributing to the patterns of respect are damped (negatively reinforced), and the behavior disappears.
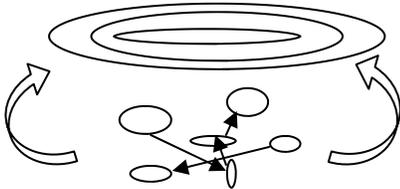
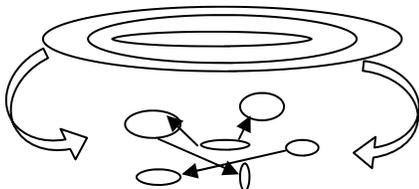## Self-Organization in a Complex Adaptive System
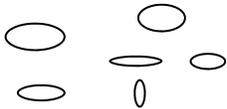
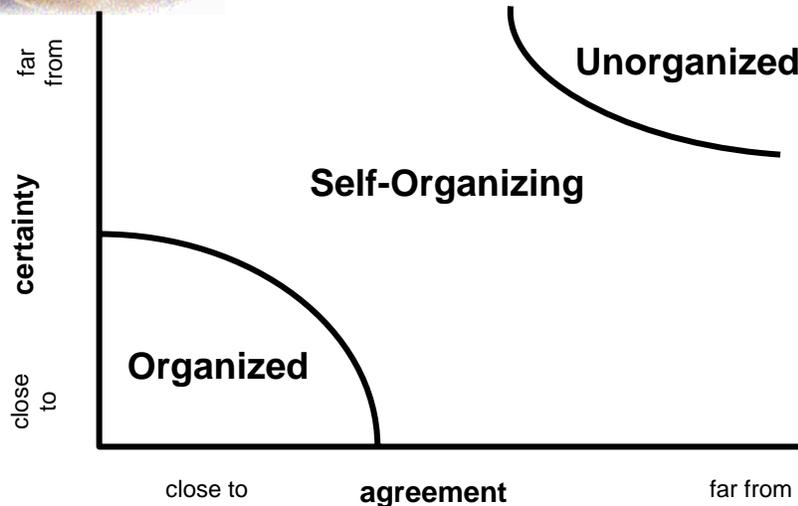Semi-autonomous agents... (people)
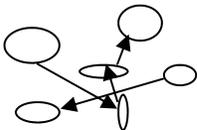
interact in unpredictable ways...

that lead to system-wide patterns...

and those patterns then
reinforce the actions of the agents.

WHAT IS THE LANDSCAPE DIAGRAM?

Unorganized

Self-Organizing

Organized

far from / certainty / close to

close to — **agreement** — far from

The Landscape Diagram is one way to describe what is going on in an organization as it operates in its day-to-day work. The two factors the Diagram considers are:

- **Certainty**—how sure an individual is that he or she knows what is to happen. For example, three people might all have different ideas about what is to happen, but each is certain that his or her ideas are correct.
- **Agreement**—the degree to which they agree about what is to happen. In the example above, even as *certain* as the three were that they knew what was to happen, they were far from *agreement* about what was actually going to happen.

When people in the organization are close to certainty and close to agreement, things are **organized**. Think about a payroll department. People know the payroll cycle; they know the procedures; they know when they are going to turn in forms and get their checks. There is high **certainty** that they are all on the same page. They also agree on what to do...procedures are clearly established...there is high **agreement**. In every business it is critical that those operations that "run" the business be maintained in this organized landscape.

At the same time, random and unpredictable events happen—storms prevent deliveries or new groups of customers show up or an outbreak of flu depletes the workforce for a week. Even in the day-to-day life of the organization, individuals interact in unpredictable ways. One person's mood, another person's illness, someone else's excitement—these small differences can cause unpredictable consequences. At these times, people are far from certainty and far from agreement. Because there are no patterns; everything appears as a single event, and this landscape is **unorganized**. For example, on any given day it is difficult to predict when and who might call in sick for work.

Other times people interact with each other and respond to the patterns of challenges and opportunities that come along. There is some degree of certainty in their work, and some agreement, but it is not specifically predictable or controlled. A leader can say, generally, how employees will behave, based on past patterns. That same leader, however, cannot say specifically from moment to moment what any individual will do. This landscape is **self-organizing,** and this is where creative things happen. It is also where relationships, risk, and growth take place.

The Landscape Diagram describes all degrees of agreement and certainty as valid in organizations. In any organization all of these landscapes will be present, with the focus of the action shifting from one landscape to another; departments operating more specifically in one than the other, and people moving between the landscapes continuously. It is important to remember that each dimension requires specific leadership styles and actions.

Organized work requires a leadership style that is controlled and precise, with clear, unambiguous rules, regulations, policies and procedures.

Self-Organizing work requires leadership that looks for patterns and is able to influence and establish productive relationships.

Unorganized work requires leadership that watches for patterns, while maintaining flexibility in dealing with challenges that arise.

What are "patterns," and why are they important?

"Patterns" refers to behaviors or events that repeat themselves over time and space. Patterns in time may be seen in cycles of economic growth, changes in customer requirements, and shifting sources of competition. Patterns in space may appear when teams in different places work together on a shared project or when information is accessible to part, but not all, of an organization. Different types of patterns influence organizations in different ways.

Fractal patterns are repetitive patterns that emerge at different levels of the organization. Triggered by repeated application of a single idea or set of ideas at one level, they play themselves out to generate similar patterns across the remaining levels of operation. Culture is an example of a fractal pattern. Behaviors of the leader will often be reflected in the actions of mid-management and among line workers.

Attractor patterns are established by key events or points within the organization or for the organization as a whole.

- Some attractor patterns are **periodic**, as in the retail boom of pre-Christmas sales in US markets.
- **Point attractors**, form around a central point that seems to draw people together, as a charismatic leader does.
- **Strange attractors** occur when something seems bounded in a finite way, but there is infinite variation within the boundary. (Strange attractor patterns are fractal.) A loosely stated rule, such as, "Be good," is one example of a strange attractor pattern. The rule may set boundaries on behavior, but there are infinite variations of what one can do inside that rule.
- Some attractor patterns are **random**, and the interplay of forces is so complex they cannot be seen, even when the observer steps back and looks at the whole picture .

Multiple patterns play themselves out across the organization, through structures that are established for functions like operations, communication, decision making, and accountability. Leaders and consultants who identify, observe, and learn from patterns are better equipped to establish conditions for successful adaptation within the organization.

What are simple rules?

Simple rules are spoken or unspoken guides for behaviors across a complex adaptive system. The metaphor comes from computer simulations of events in nature. One such simulation describes three rules that seem to govern the flocking of birds as they fly together. When computer models are given these three rules, figures on the computer screen light up in patterns that resemble the behavior of flocking birds. Those rules are simple and concrete.

- Fly toward the center of the flock.
- Match the speed of the others.
- Avoid running into other birds.

When humans are together, we can imagine that they obey simple rules when their group behavior is coherent. For example, queuing up at a counter and moving to the right edge of the sidewalk are unspoken, un-posted rules that most of us obey without thinking.

Simple rules establish fractal patterns in a system (see "Patterns", page 10). When one "core" set of expectations guide the behavior at all levels of the organization, the patterns of interactions established by those expectations are just one example of a fractal pattern.

In an organization, simple rules can function as guides that inform behaviors, helping individuals know how to function when there are no formal, specific rules. Policies and procedures guide behavior in organized work. Simple rules guide behaviors in self-organized work and may be at play in unorganized work. Mostly unspoken and unrecognized, they can be identified from the patterns of behavior that make up the culture. For example, if the simple rules in an organization are about protecting turf and self, they give rise to observable patterns of distrust and competition.

Leaders often espouse a set of core values, then bemoan the fact that they are not evident in the day-to-day actions of individuals. Simple rules make those core values actionable. They make it clear what behaviors are expected and what will be rewarded. A leader who develops and implements a short set of simple rules based on core values is making those values accessible to each individual in the organization.

What does all of this say about the leader's role?

First it says that there is more than one leader in an organization. When people work toward self-organization, leaders emerge, depending on the needs at any given moment. This doesn't do away with the need for CEO's and other organizational leaders; however, supporting people in moving the organization forward is no longer just the role of the person in the "boss's" chair.

In today's changing, challenging environment, organizations have to be flexible, dynamic systems that use available resources to grow and change. Ultimately, it is the role of the formal leader to recognize this and to provide resources and support to allow it to happen. Using HSD to observe and understand the system-wide dynamics within the organization can help leaders in a number of ways.

First consultants and leaders can see organizations **retrospectively** to understand the causes and impacts of past decisions and actions, both internal and external to the organization.

- Patterns of organizational culture reveal unspoken simple rules from the past.
- Types of patterns observed can help identify possible causes.
- Old, long-time patterns of behavior and their impact reveal how organizations have adapted in the past.

HSD can also be used **prospectively** to establish conditions so an organization can adapt as it encounters the challenges of continued change in the environment.

- A set of simple rules supports consistency in the organization in the face of unpredictable change.
- Patterns of behavior allow leaders to make decisions when prediction in a changing world is limited at best and impossible most of the time.
- Trends in behavior inform leaders' decision making, even when exact outcomes cannot be predicted.

The use of HSD to understand self-organization provides leaders and consultants with more options for action in the context of a changing and volatile organizational environment.

As a Consultant, how can I influence what happens in a CAS?

Self-organization is neither magic nor unmanageable. A consultant or leader cannot predict or control self-organization, but can influence it. As a Complex Adaptive System (CAS) self-organizes, three conditions in the system influence its speed, path, and direction. By understanding those conditions and how they can be shifted, consultants gain options for actions they can take when they feel at the mercy of the unpredictable.

The **container** bounds the system and "holds" it together. Containers can be physical (a building or area); organizational (a department or family): or they can draw people together by a common linkage (a charismatic leader who draws people to a shared idea or belief).

Another condition that influences self-organization is the presence of **differences**. If everything in the system is alike, there is no pattern - no opportunity for exploring and learning. Consultants who pay attention to differences are able to use them to bring about change when necessary.

Exchanges, the third condition affecting self-organization, occur when resources—time, money, information, etc.—change hands in a system. Communications, rules, and feedback are all examples of exchanges in a system.

These three conditions are present in every CAS at all times. It is their interactions with each other that influence self-organization. Consultants influence self-organization in their client's systems by shifting one or more of these conditions. This influences how quickly the organization self-organizes, what direction that self-organization will take, or even the path by which the organization will move.

The conditions are massively entangled, meaning that, even though they can be separately seen and described, their influences on each other cannot be separated. A shift in one condition can significantly influence either one or both of the other conditions.

Consultants who understand and pay attention to these conditions are better able to use what they know to influence outcomes within the system.

What is the concept of "coupling" in a CAS?

"Coupling" refers to the connections that exist between parts of an organization—departments, people, and policies and procedures, for example.

- **Tight couples** exist when two areas are closely aligned. A change in one causes a similar and scaled change in the other. The work of one depends on the needs of the other and vice versa.
- **Loose couples** exist when parts are connected, but their responses are not directly triggered by the other. Like the movements of a slinky, large motions in one part cause only small motions in another.
- **Uncoupled** refers to two parts of the organization being unlinked. They have no influence over each other; they are not connected.

One kind of coupling is no better or worse than another. Tight coupling is needed in some functions. If the people in payroll were loosely coupled, no two people would get paid the same way. Supervisors who micro-manage are relying on tight coupling, which might be a good thing if the leader needs to know what is happening in a particular area. Sometimes employees who are struggling benefit from being tightly coupled to a supervisor until they gain new skills or learn what they need to learn.

On the other hand, some areas need to be loosely coupled. You can't expect all members of a creative development team to think and act in the same way. They need to be loosely coupled so that they have freedom to explore options and come back together to share ideas.

Consultants can work with strong leaders to build appropriate couplings throughout the organization with enough flexibility that people and processes have the connections they need, and as those needs change, so, too, can the connections that hold them together.

What are loops and bands in communications?

Communication "loops" refer to the distance a message travels before it is received. You speak; I hear; I respond; you hear. This describes the "loop" of communication that is taught in Communication 101. There is, however, much more to consider in thinking about those loops.

Short loops happen in face-to-face meetings and telephone conversations. Long loops occur in newsletters and announcements. In short loops, you can explain your message and answer questions. In long loops, you don't have that luxury.

Informational "bands" refer to the width of the message. Wide bands carry a great deal of information, such as the rationale for pursuing a new product line or the elimination of jobs. Narrow bands carry straightforward, indisputable information, like meeting announcements or current market prices.

It is critical to match band width with length of the loop. Broad bands require discussion to be understood, so they are shared through short loops. Narrow bands (meeting announcements) can go through long loops (newsletters) because their unambiguous nature requires little or no explanation.

Anyone who has been at the receiving end of a complex message shared through a long band knows how frustrating it can be when questions are unanswered. People tend to make up their own answers. When broad bands are delivered through long loops, people feel distanced from the organization and they don't have the information they need. Communication is slow, cumbersome, and confusing.

On the other hand, it is boring to be in a meeting receiving only narrow band information—meeting announcements, deadlines for submission of documents, etc. Messages that require no discussion should be shared through longer loops, which saves time and energy for more meaningful dialogue that broader band messages require.

By paying attention to the applications of loops and bands in messages, consultants become even more skilled in helping leaders share their messages and shape adaptive patterns in organizations.

What is the Butterfly Effect?

Simulations of weather systems demonstrate that if a butterfly flaps its wings in Argentina, the tiny disturbance in the atmosphere could be magnified by other forces until it results in a hurricane off the coast of Florida. By the same physics, the potential hurricane might be damped to the strength of a butterfly wing. This is referred to as "sensitivity to initial conditions".

In an organization, a casual comment can cause a huge response among colleagues. In meetings one small thing can happen, and suddenly everything goes off track and seems crazy. An event that is supposed to trigger a storm of interest and excitement may go badly and crash before it gets started. These are examples of the butterfly effect.

In an organization there are behaviors that one wants to increase and amplify. Good news, innovation, and creativity can all respond like the butterfly effect, given the appropriate conditions. Rewards, recognition, celebration, and replication are all ways of amplifying what you value. It is the job of the leaders in the organization and the consultants that guide them to set those conditions to nurture positive, healthy patterns across the system.

At the same time it is their job to find ways to damp non-productive patterns to assure that hurricanes do not gain the strength to destroy everything in their paths.

Leaders and consultants who pay attention to how their systems are sensitive to initial conditions are better able to see the dynamics at work in the organization and use those dynamics to move toward their desired outcomes.

How can human systems dynamics improve my communications?

Applying HSD can improve your communications by helping you identify what is important to communicate and how messages should be delivered. Almost every page in this booklet includes information that you can use.

- If there is a message that you want spread throughout an organization, include it in every communication (fractals, page 10).
- The transformational nature of each communication is important. The system needs to have as much information as possible concerning the environment (exchanges, page 13).
- Information that requires your response is often emergent and can be read in the patterns of behavior of the people in the system (patterns, page 10).
- Communications can be used to focus on the patterns you value, such as those that follow the simple rules (simple rules, page 11).
- It is important to pay attention to the depth of information sent in any message and how it is delivered (communication loops and bands, page 15).
- Communications can be used to increase the degree of connection between two segments of an organization (coupling, page 14).
- Frequent face-to-face meetings are necessary in situations where control and immediacy are required (coupling, page14).
- Messages in and about the "organized" work of the system need to be clear and unambiguous. Messages in the "self-organizing" landscape should be clear, but provide more options and opportunities for choice and individual response (landscape diagram, page 8).

What is the Human Systems Dynamics Institute?

The Human Systems Dynamics Institute was established in 2003 to facilitate the development of theory and practice in the field of human systems dynamics (HSD). This non-profit organization provides services to the field in a number of ways.

1. It is a network of individuals who have been certified as Human Systems Dynamics Professionals. Coming from a variety of backgrounds and professions, these individuals have all completed the HSD Institute certification program, and they use the principles of HSD in their work .
2. HSD Institute is a referral network for consultants who have completed the certification program. By participating in this network, consultants can benefit from the depth of skill and talent among the members. When a consultant needs input on a project, when a client needs support that is beyond an individual's scope of knowledge or skill, or when someone contacts the HSD Institute for help, the members of this network share these opportunities with each other.
3. The HSD Institute has published two books in its Press, and provides on-line access to a number of papers and resources in the field.
4. The HSD Institute continues to explore opportunities to support research and practice through its Foundation. One example of this work is the development of a research protocol that supports practitioners in using their work to further their exploration and learning.

How can you find out more about the HSD Institute and about joining its network of talented Associates? Visit us online at www.hsdinstitute.org or contact us at info@hsdinstitute.org. We look forward to hearing from you.

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About the Author

Royce Holladay is a certified Associate of the HSD Institute, and serves on its Board of Directors as Director of The Network. A lifelong educator, Royce spent almost 25 years working in public schools. She now works as a consultant and coach, working with the HSD Institute in Minneapolis, MN.

Her passion about HSD lies in making concrete, common sense applications of the metaphors and principles that come from the science. She is currently working with government agencies and public schools in the Minneapolis area, supporting them in learning about HSD and applying its principles in their work.

A prolific writer, Royce is able to take complex ideas and concepts and communicate them in easily understandable ways through text and graphics.

Royce can be contacted at rholladay@hsdinstitute.org.

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