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| INTRODUCTION TO SOCIOCULTURAL SYSTEMS THINKING |

There are many definitions of “Systems Thinking”, but for our purposes we rely on the explanations developed by Peter Senge (1990) and Jamshid Gharajedahgi (2013). The glossary contains their full definitions of systems thinking, but in essence, they focus on the importance of thinking about issues as a complex system or system of systems that are larger than just the sum of its parts. In particular they identify specific characteristics and processes of systems that should be considered when understanding a complex system.

Systems are:

* **Adaptive** and Fluid
* **Complex**
* **Multidimensional**
* **Open**, not closed
* **Purposeful**
* **Counterintuitive**
* **Self-organizing**
* Impacted by **Goal Conflict** and Competition for Resources
* Influenced by **Feedback Loops**
* Affected by Historical Factors
* Differentially Changed by **Leverage** Points
* Depicted by **Patterns of Change**

 **(Bolded terms can be found in the glossary)**

By considering these characteristics and processes, decision makers can formulate more effective courses of action based on a more holistic picture of the operational environment and dynamic situation. For instance, Senge (1990) presents an intriguing example: the U.S. – U.S.S.R. nuclear arms race (p. 69). He describes the beginning of the arms race as the result of both countries’ shared suspicion regarding each other and the potential threat of attack. Each saw the other as the aggressor and in response began building their nuclear capability in a defensive reaction to the perceived threat.

“The systems view of the arms race shows a perpetual cycle of aggression” (p.71). Each country responds to achieve a short-term goal of establishing a sense of security, but through both country’s actions, the long-term result is the exact opposite, more insecurity and more fear. This positive feedback loop feeds the fear and strengthens the defensive response to a potential dangerous end state for both countries. Senge states that this situation is an example of dynamic complexity where you have to appreciate and understand the interrelatedness and patterns of change inherent to the system.

Another important characteristic of a system is whether it is “Open” versus “Closed”. Gharajedahgi (2013) explains that in closed systems there is no influence from the environment. No energy, information, or influence is shared outside of the system. For example, a balloon that is filled with air is a closed system because it doesn’t exchange matter from inside to outside of the elastic barriers. In business, a closed system may be the production line where the factory workers do their job, the same job every day, without any awareness or inclusion of what goes on in the rest of the business. Completely closed systems are rare, but as boundaries become more arbitrary or impacted by the surrounding environment, the more the system becomes “Open”. This is important to understand because with more openness the less ability you have to control the system. You must rely instead on influencing the system. This is where leverage points play a significant role in understanding and manipulating systems.

Senge (1990) states that “The bottom line of systems thinking is leverage – seeing where actions and changes in structures can lead to significant, enduring improvements” (p.114). The problem though is that the leverage point is not usually obvious. In fact, often the “obvious” answer leads to the opposite outcome that you expected, as in the arms race example. An in-depth study of Senge’s research identifies several processes to consider when identifying leverage points in a system. Things to consider are cause and effect relationships within the system, the pattern of change inherent to the system, identifying facts versus assumptions about the system, stakeholder motivations and connections inside and outside of the system, and points of tension, competition, and error that might occur in the future as the system develops. These are the aspects of a system that we will focus on in this practical exercise.

For this activity, we don’t expect you to be a systems thinking expert, our goal is to introduce the topic of systems thinking and give you the opportunity to practice applying the concepts to complex problems. In fact, you may already be familiar with some of the concepts, even though you may not recognize the specific names. A glossary of terms has been included to give you clarity on the characteristics and processes integral to most systems. A list of related resources has also been included as you choose to expand your knowledge about systems thinking for future course of action development with your staff members.

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|  Glossary |

**Adaptive –** is a characteristic of most systems in that they will change and modify based on influence from inside and outside of the system. For instance, a system can evolve with pressures that impact and thus change the system.

**Complex –** is a characteristic of many systems that highlights that systems are not just “complicated” by the number of nodes or links within the system, but that complete understanding of the systems, its parts, connections, and interconnectedness with other systems is near impossible to fully achieve, especially in a short period of assessment or simply by intuition.

**Counterintuitive –** is a characteristic of many complex systems where the expected result of one’s action is the opposite of what was expected. This represents the fact that cause and effect is not always and only one directional. It highlights that many actions have second and third effects that are often unintentional.

**Feedback Loop –** is a characteristic of a system where a factor influence a node that in turn impacts the factor creating a continual connection resulting in either a positive or negative affect on the system. A positive feedback loop enhances or increases the change where a negative affect suppresses the change related to the system’s equilibrium.

**Fluid –** is a characteristic of all open systems in that they are not static. They are easily changed by influences inside and outside of the system. This change can be frequent and unexpected.

**Goal Conflict –** is a characteristic of a system that recognizes that individuals within and outside of a system have different goals and interests, and that some of these goals likely conflict with one another. Oftentimes, it is not obvious how goals are in competition or at odds with each other. It is important to consider stakeholder agendas and goals.

**Leverage –** influence on the system that creates a specific outcome often from an indirect manipulation of the system. If done carefully, a small manipulation can result in large gains.

**Multidimensional –** is a characteristic of many systems indicating that direction of influence can flow through many different dimensions of the system, especially when considering passing time and changing environments. Additionally, the direction of influence results in multiple outcomes that further impact the system. This creates unknown implications on the system as cause and effect continues to alter the system. It is demonstrated through interdependency of factors resulting in paradoxes like “the more you learn, the more you realize you don’t know”.

**Open –** is a characteristic of most systems in that they are influenced by the environment around them.

**Patterns of change –** in systems this refers to the fact that change is not usually isolated to one factor, but incorporates multiple factors in the system that creates a pattern of movement throughout the system. This pattern may be recognizable and used as a clue to decipher points of influence and leverage.

**Purposeful –** is a characteristic of all systems in that things don’t happen without a reason. For complex systems, the “reason” may be deeply imbedded in hidden influence from culture, emotion, intention, or a combination of these and more factors.

**Self-organizing –** is a process within all systems reflected in the fact that the universe doesn’t move and change in a chaotic state, but is driven to increasing order and complexity. Some argue that the order is predetermined, so changing a system requires one to challenge the underlying assumptions and create new sets of alternatives to direct the change. For example, birds flocking demonstrates the continual movement and reorganization of individual parts within a larger group creating a fluid and sometimes difficult to understand system.

**Systems thinking –** is the ability to identify components of a system and understand how those variables interact and influence each other and the system as a whole (Gharajedahgi, 2013, p.5). Another definition from Senge (1990) is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static “snapshots (p. 68).