

## 1.6 The 10 habits of a systems thinker

Thinking in systems helps us structure and organize knowledge about a complex situation. “Systems thinking” is a set of ten skills to decide what to include in our mental models, how to draw the elements and their relationships and how to mentally simulate the outcomes of these interactions. These skills were first identified by the preeminent American systems scientist, Barry Richmond.

The first filtering skill is called **forest thinking**. We need to see the big picture of the forest rather than the individual detail of each tree. When we build models of complex situations we need to apply Occam’s razor and cut away unnecessary details. William of Occam was a 13<sup>th</sup> century Franciscan philosopher and theologian who wrote that “it is pointless to do with more what can be done with fewer”. This simply means that the simplest explanation for a phenomenon is most often the best explanation.

The second filtering skill involves taking a horizontal, trans-disciplinary approach to choosing variables rather than a vertical, domain specific one. Many complex situations involve variables from several areas. **Horizontal thinking** requires us to look beyond our own domains of expertise and include variables and relationships from other disciplines.

**Dynamic thinking** is the third filtering skill. It involves taking a step back from individual events and looking for the patterns over time of which they are a part. We should never forget that causal relationships between variables are sometimes spread across time. There are many examples all around us. The French Revolution for example is celebrated on July 14 which commemorates the storming of the Bastille prison in 1789, and yet this event was the result of growing tensions over the previous two year period. Dynamic thinking helps us widen our temporal view of a situation.

Once we have decided what to include in a mental model, we then need a common language to represent the elements and their connections.

The first representing or drawing skill is **operational thinking**. Operational thinking involves getting at causality and explaining how behavior is actually generated. We often need in-depth knowledge to be able to identify the variables that lie at the heart of any issue: we must understand economics to model a fall in unemployment, and health care and nutrition to model a rise in obesity.

The second representing skill is **generic thinking**. A problem situation is rarely unique. Several common structures underlie a large number of situations. Generic thinking involves looking for and identifying these structures in the world around us.

The third representing skill is **feedback thinking**. Feedback thinking involves viewing reality as made up of a web of closed feedback loops and being able to structure our mental models to reflect this.

The fourth representing skill is **system-as-cause thinking**. Our mental models should contain only those elements whose interaction generates the complex behavior. Do you remember the iceberg? The structure of the system is the true cause of its behavior, and it’s not due to some external influence.

Once we have built a mental model we then need to mentally simulate it and perhaps find places to intervene and influence behavior.

The first simulation skill is **quantitative thinking**. Quantitative thinking involves quantifying both the hard and soft variables that are operating in a system. You need to be able to mentally quantify and imagine variables rising and falling over time.

The second simulation skill is **bathtub thinking**. We have trouble understanding how variables accumulate and dissipate over time. Levels are important as they influence the way systems and complex situation evolve.

The third and final simulation skill is **leverage thinking**. When faced with complexity, we shouldn't look for easy solutions – there aren't any! Instead we should look for leverage points where we can best influence the systemic structure and behavior.

These are the ten skills of the systems thinker. We will be learning them as we move through the course. When we use systems thinking, we are better equipped to think complexity.