Systems Thinking

A Complete Set of Systems Thinking Skills

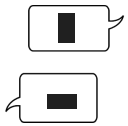
Mindset

Content

Structure

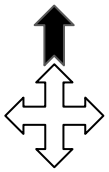
Behavior

1 Explore Multiple Perspectives

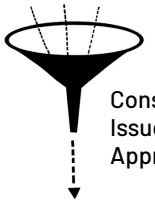


2 Consider the Wholes & Parts

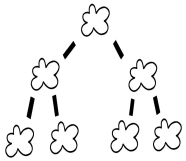
3 Respond to Uncertainty & Ambiguity



4 Consider Issues Appropriately



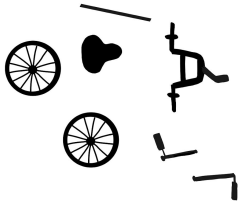
5 Use Mental Modeling & Abstraction



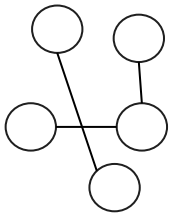
6 Recognize Systems

7 Maintain Boundaries

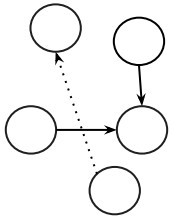
8 Differentiate & Quantify Elements



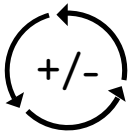
9 Identify Relationships



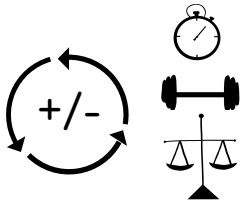
10 Characterize Relationships



11 Identify Feedback Loops



12 Characterize Feedback Loops



13 Describe Past System Behavior

14 Predict Future System Behavior

15 Respond to Changes Over Time

16 Use Leverage Points to Produce Effects

For an editable version of this document, please contact becky.howsmon@isbscience.org.
Content provided by Ross Arnold and Jon Wade's paper "A Complete Set of Systems Thinking Skills" published in INCOSE International Symposium, 2017

ISB Systems Education Experiences

As a Systems Thinker, You Can...

Mindset

1) Explore Multiple Perspectives
Look at problems in many different ways, even if it conflicts with your own view.

2) Consider the Wholes & Parts
Always keep in mind both the whole of a system and its parts (like thinking about a whole forest as well as all the trees within it at the same time).

3) Effectively Respond to Uncertainty and Ambiguity
Make good choices that are sustainable even in confusing situations.

5) Consider Issues Appropriately
Allow time for the complexity of problems to sink in, consider all parts, and don't jump to conclusions.

5) Use Mental Modeling & Abstraction
Use the simplest mental model that describes a system for your purpose, and recognize that all models are imperfect in some way.

Content

6) Recognize Systems
Identify a problem as systemic and have an idea of its contents.

7) Maintain Boundaries
Decide which elements are included in a system and which are not. Continually update the boundaries of a system so they remain accurate over time**.**

8) Differentiate & Quantify Elements
Distinguish and assess each part of a system, including its stocks and flows. In the system of a bathtub, the amount of water in it would be the stock, and the water pouring into into it or draining out of it would be the flows.

Structure

9) Identify Relationships
Recognize which system elements are connected, even in complex or non-physical ways.

10) Characterize Relationships
Understand the strength and manner in which system elements are related

11) Identify Feedback Loops
Recognize relationships where the output affects the input. For example, a banana that ripens itself faster the more ripe it already is would be a feedback loop because the output amplifies the input.

12) Characterize Feedback Loops
Describe the properties of feedback loops, such as their strength, balance, time delays, and whether it is a positive or negative loop. The output will either amplify the system (positive), or inhibit it (negative).

Behavior

13) Describe Past System Behavior
Understand how a system's whole and its parts have worked in the past.

14) Predict Future System Behavior
Use the knowledge of how a system has changed over time to predict how that system will behave in the future.

15) Respond to Changes Over Time
Avoid falling into a comfort zone with the way you approach a system, because it may change over time. Instead, continually evaluate and improve the strategies you use with it.

16) Use Leverage Points to Produce Effects
Apply all of these skills to modify a system to complete your goals.

For an editable version of this document, please contact becky.howsmon@isbscience.org.
Content provided by Ross Arnold and Jon Wade's paper "A Complete Set of Systems Thinking Skills" published in INCOSE International Symposium, 2017

ISB Systems Education Experiences