

Systems Thinking

Systems Thinking

The printable version is no longer supported and may have rendering errors. Please update your browser bookmarks and please use the default browser print function instead.

Lead Author: *Rick Adcock*

This knowledge area (KA) provides a guide to knowledge about systems thinking which is the integrating paradigm for systems science and systems approaches to practice.

This is part of the wider systems knowledge which can help to provide a common language and intellectual foundation, and make practical systems concepts, principles, patterns and tools accessible to systems engineering (SE), as discussed in the Introduction to Part 2.



Contents

Topics

Introduction

References

 Works Cited

 Primary References

 Additional References

Topics

Each part of the Guide to the SE Body of Knowledge (SEBoK) is divided into KAs, which are groupings of information with a related theme. The KAs, in turn, are divided into topics. This KA contains the following topics:

- What is Systems Thinking?
- Concepts of Systems Thinking

- Principles of Systems Thinking
- Patterns of Systems Thinking

Introduction

Systems thinking is concerned with understanding or intervening in problem situations, based on the principles and concepts of the systems paradigm. This KA offers some basic definitions of systems thinking. The following diagram summarizes how the knowledge is presented.

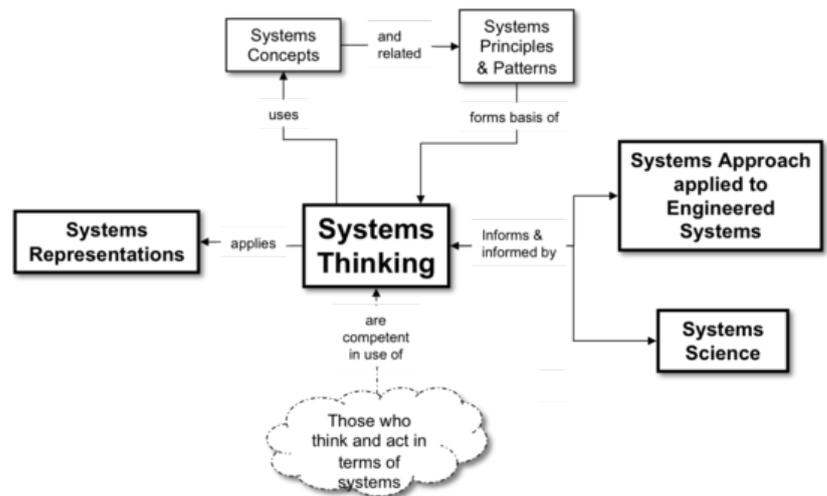


Figure 1. Systems Thinking in the SEBoK. (SEBoK Original)

Systems thinking considers the similarities between systems from different domains in terms of a set of common systems concepts, principles and patterns:

- A principle is a rule of conduct or behavior. To take this further, a principle is a “basic generalization that is accepted as true and that can be used as a basis for reasoning or conduct” (WordWeb.com).
- A concept is an abstraction, or a general idea inferred or derived from specific instances.

Principles depend on concepts in order to state a “truth.” Hence, principles and concepts go hand in hand; principles cannot exist without concepts and concepts are not very useful without principles to help guide the proper way to act (Lawson and Martin 2008).

Many sources combine both concepts and the principles based on them. The Concepts of Systems Thinking article presents concepts extracted from a variety of theory and practice sources. The Principles of Systems Thinking article, in turn, presents a summary of important principles referring back to the concepts upon

which they are based.

A pattern is an expression of observable similarities found in systems from different domains. Patterns exist in both natural and man-made systems and are used in systems science and systems engineering. A summary of the different classes of patterns and the use of patterns to support a systems approach is discussed in the final Patterns of Systems Thinking article.

The practical application of systems thinking often employs the use of abstract system representations or models. Some mention of models is made in this KA; additionally, a more complete guide is provided in Representing Systems with Models.

References

Works Cited

Lawson, H., and J.N. Martin. 2008. "On the Use of Concepts and Principles for Improving Systems Engineering Practice," in Proceedings of the 18th Annual International Council on Systems Engineering (INCOSE) International Symposium, Utrecht, The Netherlands, 5-19 June 2008.

WordWeb Online. n.d. "Definition: Principle." Accessed Dec 3, 2014. Available at: WordWeb Online <http://www.wordwebonline.com/en/PRINCIPLE>.

Primary References

Bertalanffy, L. von. 1968. *General System Theory: Foundations, Development, Applications*. Revised ed. New York, NY, USA: Braziller.

Checkland, P. 1999. *Systems Thinking, Systems Practice*. New York, NY, USA: John Wiley & Sons.

Churchman, C. W. 1968. *The Systems Approach and its Enemies*. New York, NY, USA: Dell Publishing.

Flood, R. L. 1999. *Rethinking the Fifth Discipline: Learning Within the Unknowable*. London UK: Routledge.

INCOSE. 2012. *INCOSE Systems Engineering Handbook: A Guide for System Life Cycle Processes and Activities*, version 3.2.2. San Diego, CA, USA: International Council on Systems Engineering (INCOSE),

Additional References

Ackoff, R.L. 1971. "Towards a system of systems concepts," *Management Science*, vol. 17, no. 11.

Hitchins, D. 2009. "What are the general principles applicable to systems?" *INCOSE Insight*, vol. 12, no. 4.

Lawson, H. 2010. *A Journey Through the Systems Landscape*. London, UK: College Publications, Kings College.

Ramage, M. and K. Shipp. 2009. *Systems Thinkers*. Dordrecht, The Netherlands: Springer.

Weinberg, G. M. 1975. *An Introduction to General Systems Thinking*. New York, NY, USA: Wiley.

< [Previous Article](#) | [Parent Article](#) | [Next Article](#) >

SEBoK v. 2.10, released 06 May 2024

Retrieved from

"https://sandbox.sebokwiki.org/index.php?title=Systems_Thinking&oldid=71854"

This page was last edited on 2 May 2024, at 23:16.