

An introduction to systems thinking

“There is no denying the rapid growth of the complex systems that continuously spring to life in the world around us....With this comes a growing need for systems thinkers to tackle these complex problems. This need stretches far beyond the science and engineering disciplines, encompassing, in truth, every aspect of life. Now, more than ever, systems thinkers are needed to prepare for an increasingly complex, globalized, system of systems future...all people in decision-making roles should have a solid grasp on systems thinking”

Arnold and Wade, 2015

This quote demonstrates the clear need for systems thinking skills in the future; a complex and interconnected world consisting of multiple systems and positive feedback mechanisms. Many reports about the future of work have highlighted the need for systems thinking skills (e.g. Bakhshi *et al.*, 2017; McKinsey, 2017) but despite the clear need for such skills there is a lack of clarity about what the term “systems thinking” means and what “systems thinking skills” are.

A set of tools and a mindset

Systems thinking is both a collection of tools and methods (for example [causal loop diagrams](#) and [decision matrices](#)) and it is also a mindset, a way of seeing the world and issues as systematic wholes. Many issues and problems facing the world today, such as the global climate crisis, are caused by a web of interconnected circular relationships and in order to understand and solve these problems we need systems thinking. This is in contrast to seeing the world as a series of linear, causal relationships (x causes y).

Characteristics of systems thinking

Anderson and Johnson (1997) identify a set of principles that characterise systems thinking:

- Thinking of the big picture
- Balancing short-term and long-term perspectives
- Recognising the dynamic, complex and interdependent nature of systems
- Taking into account measurable and non-measurable factors
- Recognising that we are all part of the systems in which we function and that we each influence those systems and are in turn influenced by them

According to *The Systems Thinker* (<https://thesystemsthinker.com/systems-thinking-what-why-when-where-and-how/>), problems that are ideal for a systems thinking intervention have the following characteristics:

- The issue is important
- The problem is chronic, not a one-time event
- The problem is familiar and has a known history
- People have unsuccessfully tried to solve the problem before

A lack of attention in education?

Despite the importance of systems thinking and systems thinking skills, Arnold and Wade (2015) argue that it has sometimes been neglected in academic contexts and in order for it to receive mainstream educational attention a complete definition is needed that can be applied across a wide range of academic disciplines.

Questions to consider:

- How would you define systems thinking?
- What other skills are required for systems thinking?
- Why is systems thinking important?
- Do you agree with Arnold and Wade's assertion that systems thinking has been neglected in the academic context? Why or why not?
- How are you developing your systems thinking skills, both inside and outside university?
- How can you further develop your systems thinking skills?
- What do you think universities need to do to support students to develop systems thinking skills?

Key references and sources of information on systems thinking

Anderson, V. and Johnson, L., 1997. *Systems thinking basics* (pp. 1-14). Cambridge, MA: Pegasus Communications

Arnold, R.D. and Wade, J.P. (2015): A definition of systems thinking: A systems approach. *Procedia Computer Science*, **44(2015)**, pp.669-678.

Bakhshi, H., Downing, J., Osborne, M. and Schneider, P. (2017): *The Future of Skills: Employment in 2030*. London: Pearson and Nesta

Dominici, G. (2012): Why Does Systems Thinking Matter? *Business Systems Review*, **1(1)**, 1–2.

McKinsey Global Institute. (2017) *Technology, Jobs and The Future of Work*. Available from:

<https://www.mckinsey.com/global-themes/employment-and-growth/technology-jobs-and-the-future-of-work>

Mastering Systems thinking in practice (free online postgraduate level course from Open Learn):

<https://www.open.edu/openlearn/science-maths-technology/mastering-systems-thinking-practice/content-section-overview?active-tab=description-tab>

Richmond, B. (1994): *Systems Dynamics/Systems Thinking: Let's Just Get On With It*. In International Systems Dynamics Conference. Stirling, Scotland

Systems thinking: What, why, when, where and how? Available from:

<https://thesystemsthinker.com/systems-thinking-what-why-when-where-and-how/>

Tools for Systems Thinkers: The 6 Fundamental Concepts of Systems Thinking Available from:

<https://medium.com/disruptive-design/tools-for-systems-thinkers-the-6-fundamental-concepts-of-systems-thinking-379cdac3dc6a>