Kim, D. (1999). *Introduction to systems thinking*. Massachusetts: Pegasus Communications. Retrieved from: https://systemability.gr/wp-content/uploads/2019/01/Introduction-to-Systems-Thinking-IMS013Epk.pdf

Summary

This article explores the types of systems in our world, their characteristics and how our behaviour can initiate and respond to changes in their performance. The author differentiates between systems thinking and a system and elaborates on those factors that contribute to systemic behaviour.

Analysis

This author contends that systems thinking is an important complement to analytical thinking because it helps anticipate systemic behaviour rather than being controlled by systems. It allows both a reductionist (analytical) view of how the world works and a proactive view, associated with systems thinking.

The author defines systems thinking as ‘a way of seeing and talking about reality that helps us better understand and work with systems to influence the quality of our lives’. He views it as a perspective as well as a set of tools.

Kim differentiates a system from a collection on the basis that if you remove a component from a system, then its specific purpose cannot be achieved, whereas removing an item from a collection does not matter because they are not interrelated.

Kim posits that a system possesses the following four characteristics:

- It has a *purpose* that pertains to the whole system and its purpose is a property of the system and not of any of the parts.
- *All* parts must be present for the system to achieve its intended purposes.
- The *order* of the parts matters as they affect the performance of a system. This contrasts with a collection, where order does not matter.
- *Feedback* is needed for a system to maintain stability.

Kim argues that understanding the purpose of a system is important. Some systems, such as mechanical systems, usually have an explicit purpose, whereas natural systems can have purposes that are evolving, temporary or permanent. Social systems are also complex in their purpose, and this can lead to making decisions based on a lack of understanding of the consequences. Kim contends that human systems are challenging to manage, and they

often behave in counterintuitive ways, hence understanding the following levels of perspectives will achieve what we want.

Kim offers multiple levels of perspective to help understand how systems fit into a broader context:

- ‘Events’ are the tip of the iceberg and are usually visible and familiar.
- ‘Patterns’ are accumulated memories that explain an event.
- ‘Systemic structure’ are the ways in which the parts of a system are organised.

The author suggests that because events are visible, they become strong drivers in our decision-making, camouflaging what is really happening at the patterning and systemic structure levels.

The article discusses the role of feedback, described as the transmission and return of information, as being essential to maintaining system stability. ‘Return’ implies loops hence systems represent the world as an interconnected set of circular relationships. This should lead to a question such as: ‘How do the consequences of my actions feedback to affect the system?’ Thinking in these loops helps see the interrelationships among all the variables in a system.

The article then discusses the reinforcing and balancing processes that are the building blocks of systemic behaviour and how they can be used to maintain stability, trying to take corrective actions to achieve desired levels.

Reflection

This article highlights the importance of the relationships between information systems and the natural and built environments. It illustrates why systems, computational and design thinking are integral to the Digital Technologies curriculum. It also explains why computational solutions need to not only be elegant and efficient but also considerate of the implications of their widespread use. This links to the key concepts of interactions and impact. The characteristics of a system are very useful for teaching and learning purposes.