Engineering Systems Thinking

Systems thinking is a way of looking at complex systems as a whole.

It helps us to see how different parts of a system connect and work together.

The Sustainable Development Goals

The 17 Sustainable Development Goals (SDGs) were adopted by the United Nations in 2015 as a call to “end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity”. Find out more here: https://www.undp.org/sustainable-development-goals.

Systems thinking in engineering and the SDGs

Systems thinking helps us understand how achieving one goal can help achieve others in engineering and science.

For example, creating clean energy solutions (**SDG 7**) can lead to better health (**SDG 3**) and combat climate change (**SDG 13**).

By seeing the connections, we can create technological solutions that address multiple goals at once.

Find out more about some of the ways engineers and engineering can help shape a better, more sustainable future in This is Engineering’s short video: https://www.youtube.com/watch?v=tmGsOSGGURY

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How does Systems Thinking help in engineering?

Systems thinking in engineering helps:

- solve complex problems by understanding how things are related and how changes affect the whole system
- engineers and scientists make better decisions by looking at the big picture
- teamwork and creative problem-solving in projects like designing robots or building eco-friendly houses
- create solutions that have long-lasting positive effects on technology and the environment.

Skills for Systems Thinking in Engineering

- Seeing whole systems and their parts.
- Understanding how the parts connect together.

Female civil engineer discusses weir plans with colleague. © This is Engineering. Used under CC BY-NC-ND 2.0 via Flickr.

- Understanding how changes in one part of the system can affect the whole system.
- Recognising patterns.
- Bringing all the parts together to make a whole system.

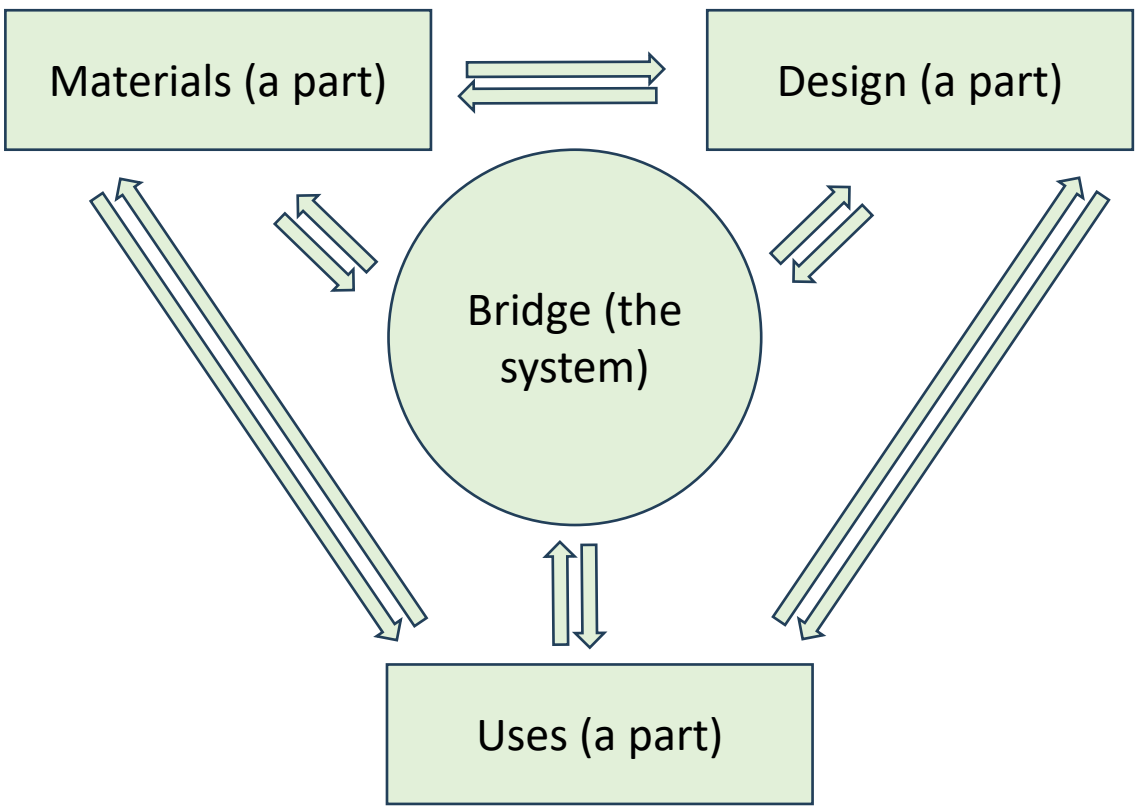
Imagine a bridge.

Engineers think about:

- the materials
- the design
- how it will be used

Image: Keith Proven from Pexels

to make it strong and safe. Each of these separate parts affect each other, and the whole bridge.



What other parts could there be in this system?

Minecraft Challenge

Use systems thinking to design a plan of a sustainable town.

You don't need to build it yet! Use Minecraft to map out where the parts of your town might go, to make a whole town system.

You could use blocks or signs to mark out areas, or any other ideas you come up with – it's your plan. Here are some tips:

- **Think like an engineer**. How do different parts of your city like schools, parks and hospitals connect and work together?

- How can you make your city **environmentally friendly, healthy, and happy for everyone**? For example, you might want to include:
  - Renewable energy sources like wind turbines and solar panels
  - Public transport systems to reduce pollution
  - Community gardens to grow food and bring people together.

If you do not have access to Minecraft you could:
- draw your design
- build your own using simple materials.

For ideas and information about building the parts of your town, please see our other sessions!

Not an official Minecraft resource. This project was supported by the Royal Academy of Engineering under the *Ingenious Awards* scheme. Developed with Adriana D'Souza, Airbus. For educational use only. Contact: sciencehunters@uwe.ac.uk.

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