What is happening?

Phenomenon

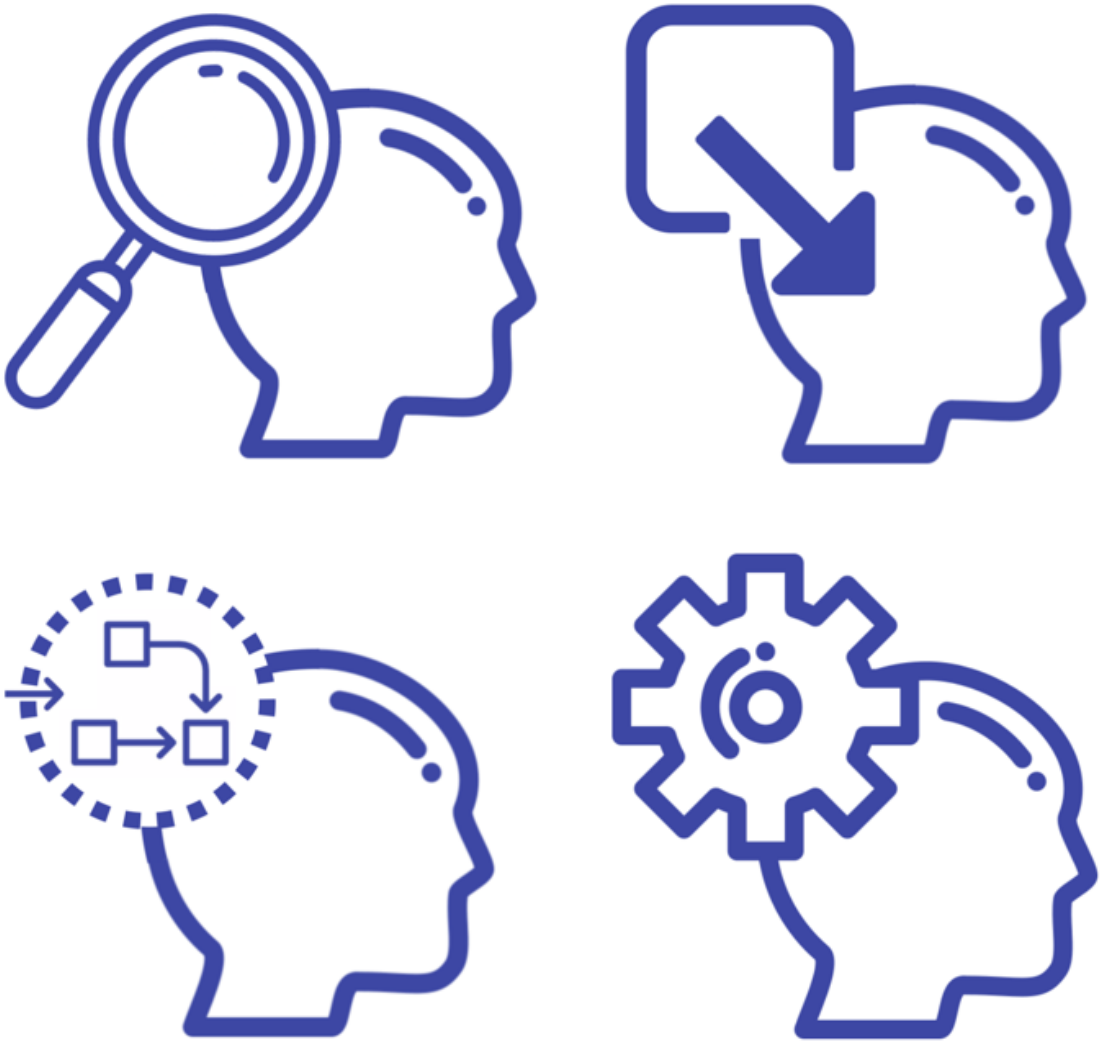
Observable events in the real world

What is the problem?

Problem

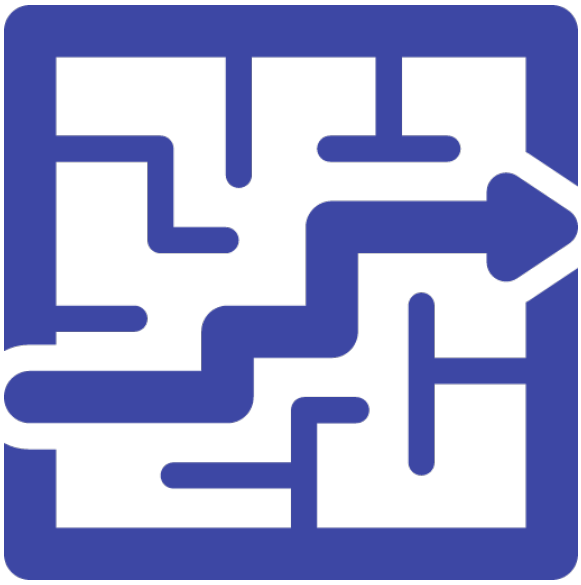
Human needs and wants

What do you wonder?



Asking Questions

What do you think?



Constructing Explanations

Developing and Using Models

Mathematics

Computational Thinking

How do you investigate?

Planning and Carrying Out Investigations

How do you know?

Engaging in Argument from Evidence

Analyzing and Interpreting Data

Obtaining, Evaluating and Communicating Information

What do you notice?

Patterns

How does it work?

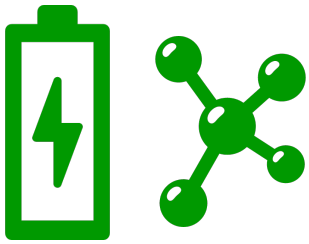
Cause & Effect

Structure
Function

What happens in the system?

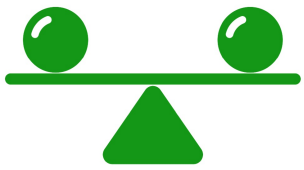
Systems

System Models



Energy
Matter

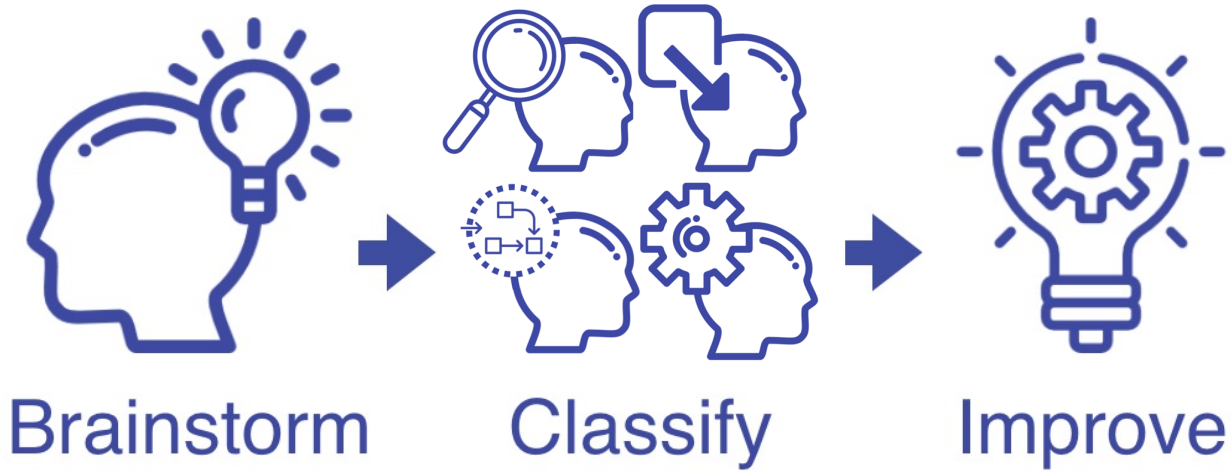
Scale
Proportion
Quantity



Stability
Change

What do you wonder?

Asking Questions

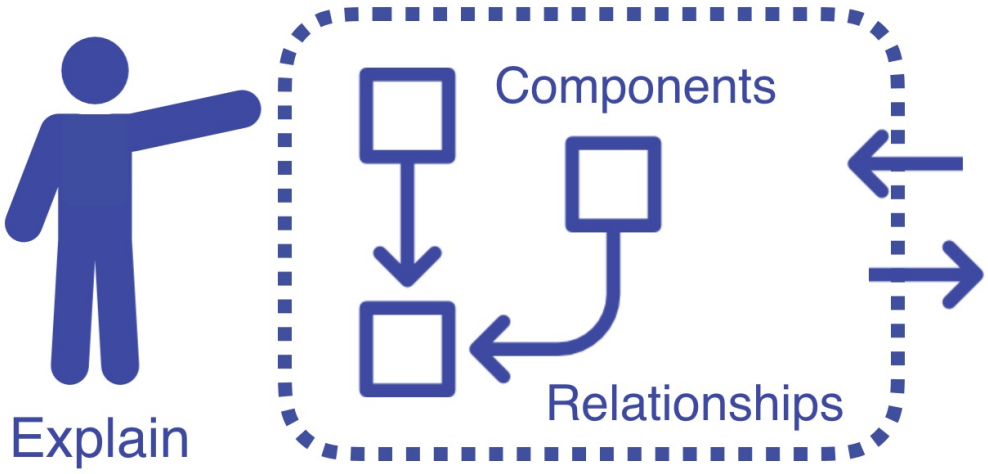


Good Questions:

- ☐ Address the **phenomenon** or **problem**
- ☐ Identify the **nature** of the question
  - ☐ Observational - What do I notice?
  - ☐ Explanatory - How does it work?
  - ☐ Systems - What happens in the system?
  - ☐ Engineering - What is the problem?
- ☐ Can be empirically **tested**

What do you think?

Constructing Explanations



Good Explanations:

- ☐ Identify a scientific **cause**
- ☐ Identify the **components** of the system
- ☐ Use connections between the components to **explain**, describe and predict
- ☐ Represent the **components** of the system mathematically
- ☐ Use **computational thinking**

How do you investigate?

Planning and Carrying Out Investigations

Good Investigations:

- ☐ Investigate a **phenomenon** or **design**.
- ☐ Identify the **evidence** that will be collected
- ☐ Have a **plan**
- ☐ Collect **evidence**
- ☐ **Improve** the design of the investigation

How do you know?

Engaging in Argument From Evidence

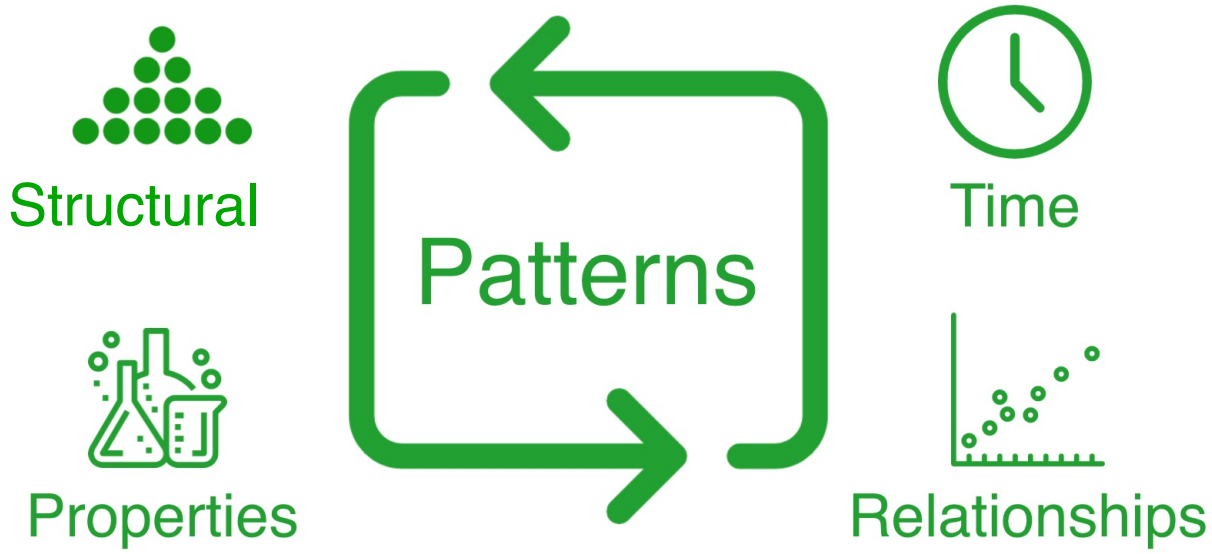
Good Arguments:

- ☐ **Obtain, evaluate** and **organize** the evidence
- ☐ Identify **patterns** within and between datasets
- ☐ Identify a **claim**
- ☐ Link the evidence and claim with a chain of **reasoning**.
- ☐ **Communicate** information using the appropriate style and format

What do you notice?

Patterns

See - Hear - Touch - Smell - Taste



What are the parts?

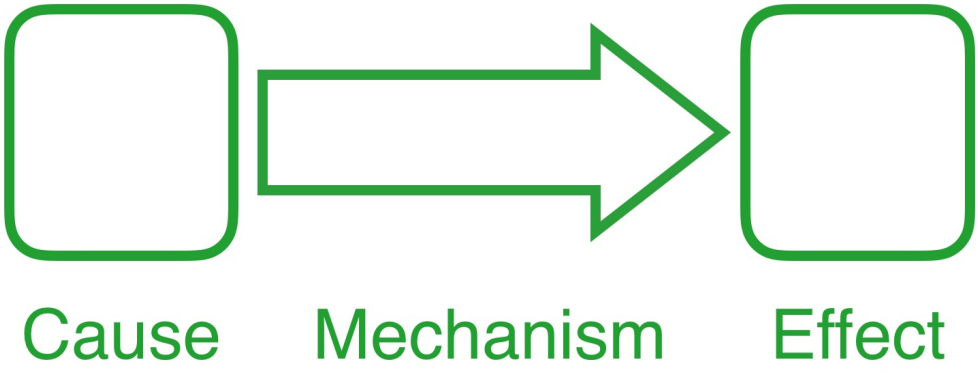
How does it change?

What stays the same?

What is related?

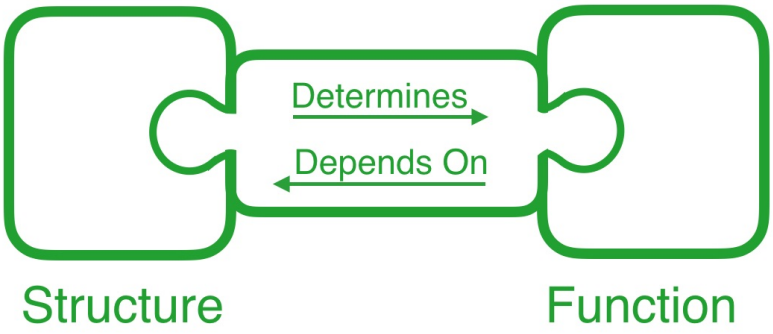
How does it work?

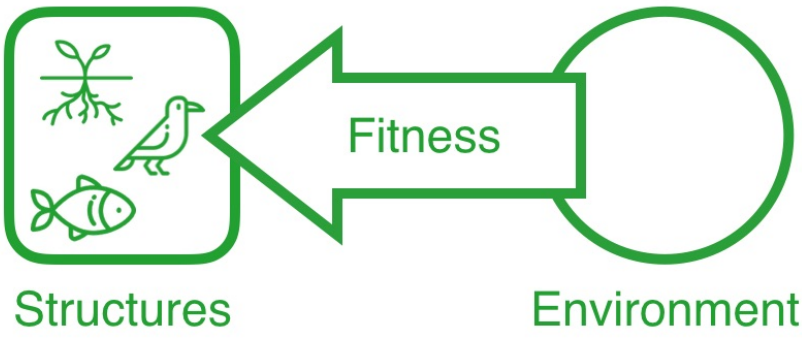
Cause & Effect



What's the structure?

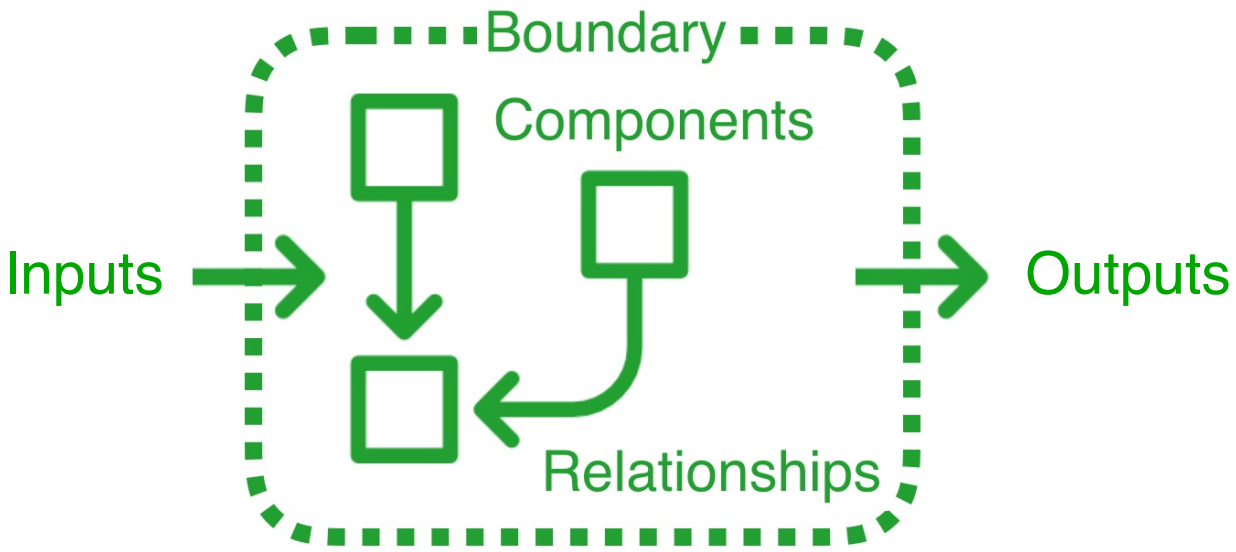
What's the function?





What happens in the system?

Systems and System Models



What is the boundary?

What flows? What cycles?

What makes it change?

What keeps it stable?

What is important?