



## GST 69 – Systems of Interest

### Formal Description

A system of interest is the particular system selected for investigation, description or analysis. It is identified by choosing an appropriate system boundary that reflects the purpose of the investigation. The choice of system of interest determines the scope of the study but does not alter the underlying physical reality.

### Plain English Explanation

The world contains countless interacting systems. It is neither possible nor necessary to study all of them at the same time. Instead, we choose the particular system that is most relevant to the question we wish to answer. This chosen system is called the system of interest.

The system of interest depends entirely upon the purpose of the investigation. An engineer investigating an engine may treat the engine as the system of interest. A vehicle designer may instead regard the whole car as the system of interest, with the engine becoming one of its subsystems. A transport planner may extend the boundary still further and study an entire road network.

Each of these investigations examines the same physical reality but from a different perspective. The choice of system of interest determines which components, processes, interactions and transfers are examined in detail, and which are regarded as part of the wider environment.

There is therefore no universally correct system of interest. The most useful choice is the one that best supports the objectives of the investigation. A boundary that is too narrow may overlook important influences from the environment, while one that is too broad may include unnecessary detail and make the investigation unnecessarily complicated.

Choosing an appropriate system of interest is one of the first and most important steps in systems investigation. It provides a clear focus for the analysis while recognising that the chosen system continues to interact with many other systems beyond its boundary.

In the following modules we shall examine how systems interact with their environments and how these interactions influence their behaviour and development.



## SYSTEMS OF INTEREST

*The Same Physical Situation Represented at Three Different Levels*

The system of interest is chosen to suit the purpose of the investigation.  
The underlying physical reality remains unchanged in all three representations.

### 1. POND ECOSYSTEM as the System of Interest

*Purpose: How does the pond ecosystem function?*



What is shown inside the boundary:  
The pond ecosystem and its components  
(water, aquatic plants, algae, animals, microorganisms, sediment, etc.)

#### KEY POINT

The physical components and transfers are identical in all three diagrams.

Only the system boundary – and therefore the level of detail – has changed.

#### PURPOSE OF INVESTIGATION

The arrow shows that the boundary (and thus the system of interest) is selected by the investigator depending on the question being asked.

Different questions lead to different boundaries.

#### NOTE

The system of interest is not an intrinsic property of the real world.

It is a **representational choice** made to achieve the purpose of the investigation.

### 2. FOREST HABITAT as the System of Interest

*Purpose: How does the forest habitat support life?*



What is shown inside the boundary:  
The forest habitat including the pond, vegetation, animals, soil, fungi, and their interactions.

### 3. WATERSHED ECOSYSTEM as the System of Interest

*Purpose: How does the watershed ecosystem function?*



What is shown inside the boundary:  
The entire watershed ecosystem including landscape, streams, groundwater, vegetation, animals, soil, climate influences, etc.

#### EDUCATIONAL EMPHASIS

A system boundary helps us focus on what matters for our investigation.

The same reality can be viewed at different levels of analysis.

Choosing the right level avoids over-simplification and over-complexity.

Good investigation is about asking the right question at the right level.

Reality is one. Our representations are many. The system of interest is our choice.



### **Examples**

A doctor investigating chest pain may regard the cardiovascular system as the system of interest. A public health researcher studying heart disease may instead regard an entire population as the system of interest because lifestyle, healthcare and environmental factors become important. A business manager may investigate the production department as the system of interest when improving manufacturing efficiency. The company's directors may instead regard the whole business as the system of interest when developing long-term strategy.

### **Provenance and Links**

The concept of a system of interest is widely used within systems engineering, systems science and systems practice. It recognises that investigations require an explicit choice of scope and boundary appropriate to the purpose of the study. Within General Systems Theory, the system of interest is understood as the particular causal organisation selected for investigation, with the chosen boundary determining the representation rather than the underlying reality.

### **Practical Exercise**

Choose a familiar situation such as a school, a hospital, a transport system or a business. Identify three possible systems of interest that could be investigated within the same situation.

For each system of interest:

- Explain the purpose of the investigation.
- Draw an appropriate system boundary.
- Identify the principal components or subsystems.
- Describe which surrounding systems would be regarded as part of the environment.

Finally, explain why each choice of system of interest is appropriate for its particular investigative purpose.