



GST 66 – Components

Formal Description

A component is an entity or process considered as part of a larger system. A component is defined by the role it plays within that system rather than by its own level of organisation. A component may itself be an assembly, a pre-systemic assembly or a complete system. Components contribute to the organisation, behaviour and function of the larger system through their causal interactions with other components. Whether something is regarded as a component depends upon the system of interest and the purpose of the investigation.

Plain English Explanation

When studying a system, we often divide it into smaller parts so that we can understand how it works. These parts are called components.

A component is not defined by what it is in isolation, but by the role it plays within a larger system. The same entity may be regarded as a complete system in one investigation and as a component of a larger system in another.

For example, the engine of a car is itself a complete system. It contains many interacting components and exhibits its own emergent behaviours. However, when we study the car as a whole, the engine is treated simply as one component of the vehicle system.

The same idea applies throughout nature and society. A single cell is a biological system, but it is also a component of an organ. The organ is itself a system and a component of an organism. Likewise, a business may be regarded as a system, while also forming a component of a national economy. This illustrates an important principle of systems theory. Components are identified relative to the chosen system of interest. The system boundary defines what is regarded as the system and, consequently, what is regarded as its components. Changing the boundary changes what is regarded as the system and what is regarded as its components, even though the underlying physical reality remains unchanged.

Components contribute to systems through their causal interactions with one another. Some components are themselves complete systems possessing their own emergent properties, behaviours or outputs, while others are assemblies that contribute to the larger system without themselves exhibiting system-level emergence.

Some components play central roles, while others provide supporting functions. Understanding a system therefore requires not only identifying its components but also understanding how they interact to produce the system's emergent properties, behaviours and outputs.

Components that are themselves complete systems are known as subsystems because they are systems that simultaneously function as components of a larger system. We shall examine subsystems in the next module.

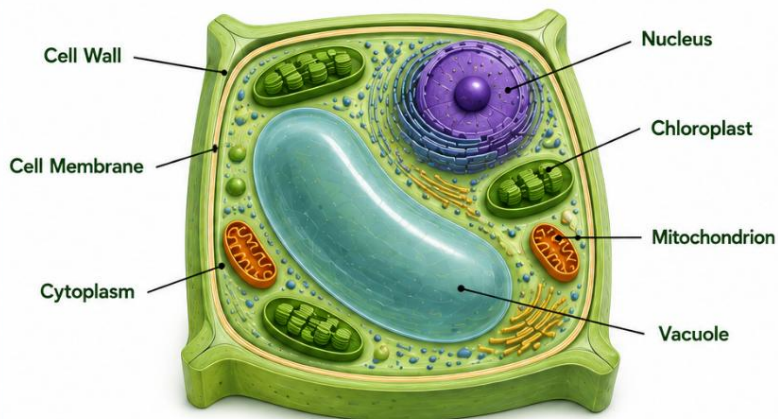
This illustrates an important distinction. Whether something is a component does not depend upon what it is, but upon how it is being considered. The same entity may simultaneously be a system in relation to its own parts and a component in relation to a larger system. Component therefore describes a role within a larger system rather than a separate kind of entity.



COMPONENTS

A component is a constituent part of a system that contributes to the system's functioning.

EXAMPLE: A PLANT CELL



Constituent Part
of a Whole



Has Properties
and Capabilities



Interacts with
Other Components



Contributes to
System Functioning



May Be a System
at a Lower Level

COMPONENTS – KEY FEATURES

- A system is made up of components.
- Each component is a constituent part of the system.
- Components have properties and capabilities.
- Components interact with other components.
- Each component contributes to the functioning and behaviour of the system.
- Components may themselves be systems at a lower level.



KEY POINT: A component is a constituent part of a system that interacts with other components and contributes to the system's emergence, behaviour and outputs.

Examples

A computer processor is a system containing billions of interacting electronic components. When studying the computer as a whole, however, the processor is treated as a single component within the larger computer system.

A local council is a social system comprising departments, staff and procedures. When analysing national governance, the same council may be regarded simply as one component of the wider system of public administration.

Provenance and Links

The concept of components is fundamental to engineering, biology and General Systems Theory. Hierarchical descriptions of systems have long recognised that systems are frequently composed of smaller systems while simultaneously forming parts of larger systems. This recursive organisation has been emphasised by many systems theorists and provides an important foundation for analysing complex systems across multiple levels.



Practical Exercise

Choose a familiar system, such as a bicycle, a computer, a school or a business.

Identify its principal components and describe the role each plays within the larger system.

Next, choose one of those components and decide whether the chosen component is an assembly, a pre-systemic assembly or a complete system. Explain your reasoning. If it is a complete system, identify some of its own components and explain how they interact.

Finally, identify a larger system of which your original system is itself a component. Explain how changing the system boundary changes your description without changing the underlying physical reality.