

Open Systems Science

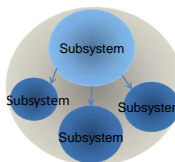
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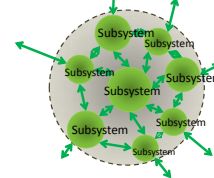
Closed Systems vs. Open Systems

Closed Systems



- No interaction with the outer world.
- Whole problems are solvable by dividing into elements and collecting answers from the elements.
- It consists of subsystems with simple structure.
- The structures, relations, boundary conditions, and functions of subsystems are statically defined.

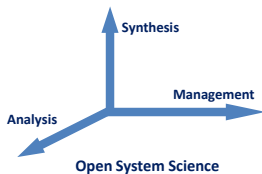
Open Systems



- Interaction with the outer world.
- A system cannot simply be decomposed into subsystems. Entire behavior emerges from all interactions among subsystems.
- Time development and irreversible systems
- The structures, interactions, boundary conditions, and functions of each subsystems change dynamically.

Proposal of Open Systems Science

- An approach toward Open Systems Problems.
- Scientific methodology that solves problems while keeping the systems alive or running.
- Division into subsystems can be allowed provided that mutual-dependency among them are fully preserved. This means "abstraction without elimination."
- Since "internal observer's view" is inevitable, we need to try our best to maintain the model of a system so as to be consistent with new findings in the real-world.
- A new methodology of science which adds a new perspective of "Management" to the conventional perspectives of "Analysis" and "Synthesis."



Summary

- Remaining issues of great urgency are mostly Open Systems Problems, such as the earth sustainability, life and health, huge networked infrastructures, etc.
- We need to solve a problem, while preserving all the properties of the systems
- We need to solve a problem while keeping the systems alive or running.
- We need a new methodology for solving open systems problems beyond reductionism.
- As such methodology, we proposed Open Systems Science, in which a new perspective of "management" is added to the conventional perspectives of "analysis" and "synthesis."