Modelling Sustainable Systems and Semantic Web

Development of Systems and Their Components

Lecture in the Module 10-202-2309
for Master Computer Science

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Dissipative Systems and Steady States

The Theory of Dynamical Systems in the scope as discussed in this and the last lecture, describes *internal dynamics* of systems.

Our notion of a TS, however, assumes that components of a system in the execution dimension – via their input/output (parametrised in the description form) – are supplied with tasks and material by the system.

Since our concept is recursive, this must be applied to *all* systems, i.e. they are always driven by a *throughput of material and energy*.

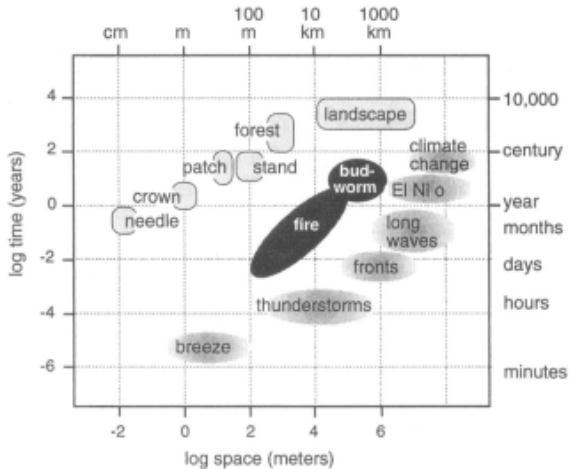This is also stated by the TRIZ law of *"energy conductivity"* through all parts of the system.

Examples and Notions

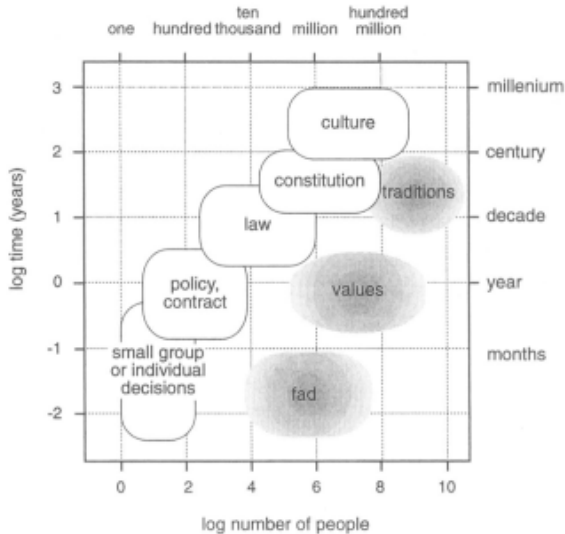Examples: Bénard cell, living beings, Earth's biosphere. See
`TDS.md`

Notions (in the description form!):

▶ eigentimes and eigenspaces

▶ limit cycles, attractors

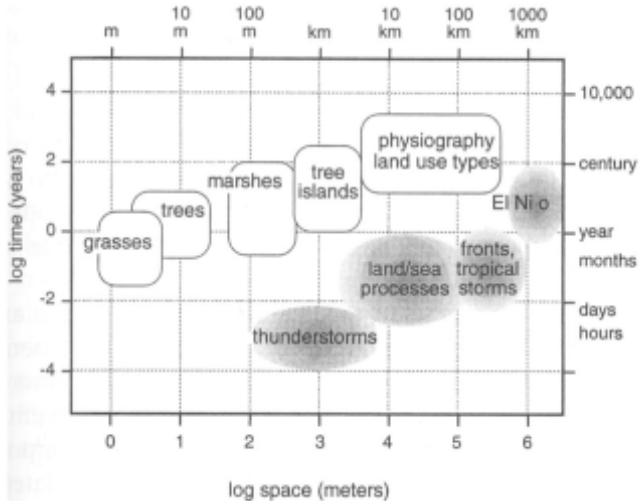▶ steady state and dissipative systems

Diagrams from (Holling 2001)
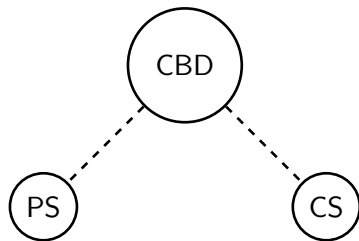
Diagrams from (Holling 2001)
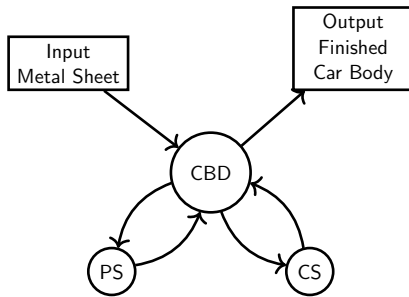
Diagrams from (Holling 2001)

Development of System and Components

Example: A TS with two components – the car body department of a car manufacturer with press subdepartment and coloring subdepartment.
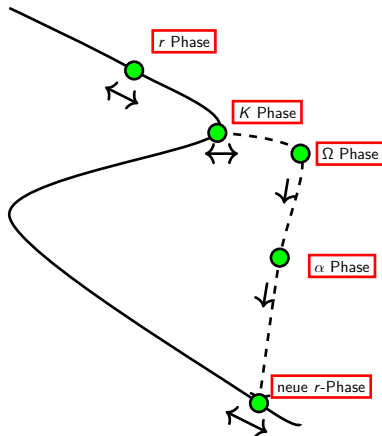

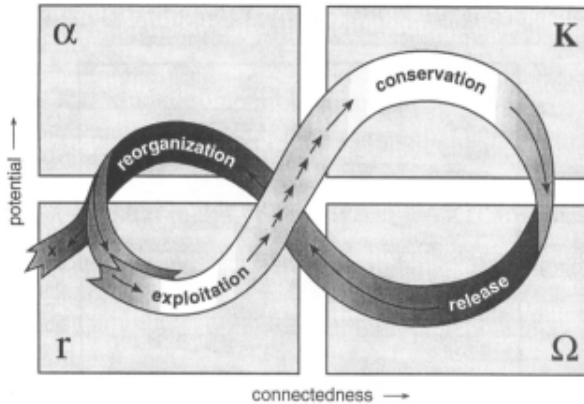Structural Organisation   Workflow Organisation

Development of System and Components

Continuation: The press department is modernised, industrial robots are being used. How does that affect the "neighbouring" systems? What scenarios are conceivable?

r Phase

K Phase

Ω Phase

α Phase

neue r-Phase

Diagrams from (Holling 2001)

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A — beginning of project

B — end of project

political

organizational

interorganizational

individual