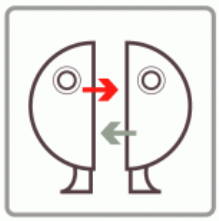
cybernetics



characteristics

author:	Wiener, Norbert
country:	United States
period:	1948
type:	theory
role:	consultant and change agent
activity:	analyse and design
topic:	org. design & development, technology & operations and change management
abstr. level:	environment
perspective:	transformational
status:	final
module:	classics I
comments:	0

related models

- chunking limit
- system dynamics

description:

During the Second World War, the mathematician, Norbert Wiener, and several colleagues developed a new branch of applied science and named this science of information feedback systems "cybernetics". Cybernetics can be used to analyse properties of a particular, dynamic system using control and communication principles. The theory focuses on the system's components as well as the relations between them.

From the beginning, cybernetics had great success in helping factories control their machines. Pre-cyberbetics, when numerous factors influenced a machine's output controlling production was difficult. Engineers tried to determine operating rules by varying one factor at the time, only to realise that changing one disrupted the others. Cybernetics overcame this problem by adding a simple automatic feedback loop to the machine that regulated the last variable in a line that automatically controlled the other variables. Corrections by the machine's control system would be calculated immediately, from the bottom up and without human intervention. Engineers no longer had to calculate settings before a machine could begin production.

Cybernetics offered management theory a better understanding of an organisation's or group's purpose by providing insight into how a system interacts with its environment. Negative feedback loops minimize differences between the current situation and the desired situation by feeding the outcome of an action back into the system. Any discrepancy between the outcome and the desired situation leads to a corrective action whose intent is to reduce the gap. A positive feedback loop tries to widen a gap. The transfer of information across corrective feedback loops results in emergent, unplanned behaviour such as self-organisation.

Cybernetics can be used both as a justification to develop a one dimensional, mechanical, hierarchical planning and control cycle, as well as an organisational design framework where organisations are perceived as living organisms interacting in a wider environment. It provides a language to describe and understand complex and dynamic behaviour.

Cybernetics gave birth to System Theory that was later transformed for business use by management theory scholars such as Stafford Beer.

assets:

- cybernetics
  ProvenModels • editor PM • version 0.1 • 46 KB
- influence maps
  ProvenModels • editor PM • version 0.1 • 54 KB
- multiple cause diagrams
  ProvenModels • editor PM • version 0.1 • 47 KB
- sign graph
  ProvenModels • editor PM • version 0.1 • 60 KB
- system maps
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pros:

- Cybernetics provided insight into the fundamentals of organisational change. The self-correcting trait of feedback loops allows any complex system to begin functioning with imperfect inputs and imprecise processes, and improve over time.
- Using such Cybernetic Principles as feedback, homeostasis and the law of requisite variety, W.R. Ashby helped discover the earliest examples of chaos: complex systems that unexpectedly reset themselves from one state of equilibrium into a new state.
- Cybernetics stressed the necessity of recognising that the observer and the interviewee influence one another. Observers are never independent from the systems they study.

cons:

- Cybernetics claimed to be universal. However, in the 1960's, the validity of universality steadily lost credibility. The principles should be applied to describe systems rather than to prescribe.

references:

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