

SYSTEMS THINKING AND DYNAMICS

Foundations of Systems Thinking

Bertalanffy · Ackoff · Churchman · Checkland

PAPER 01 / 03

A Furtherance reference compendium on the intellectual traditions behind organisational design, leadership, execution, and culture.

IN THIS PAPER

This paper opens the Systems Thinking and Dynamics series in Furtherance's reference library. It covers the foundations – the insight that wholes behave differently from the sum of their parts, and the methods for reasoning about them. The question it answers: what does it mean to think in systems, and why does it change how we manage?

Bertalanffy founds a general science of systems; Ackoff brings it to management as the “mess” of interacting problems; Churchman insists on boundaries and ethics; Checkland builds methods for messy human situations shaped by competing worldviews.

Ludwig von Bertalanffy 1901–1972

General system theory · the science of wholes

CORE THESIS

General principles apply across all kinds of system – biological, social, mechanical. The **whole is more than the sum of its parts**, and living and social systems are **open**, exchanging matter, energy and information with their environment.

FRAMEWORK

Concept	Meaning
Open vs closed systems	Open systems exchange with their environment
Wholeness / emergence	System properties arise from interaction, not parts
Equifinality	Many different paths can reach the same end state
Homeostasis	Systems self-regulate to maintain stability

METHODOLOGY

A transdisciplinary theory seeking isomorphisms – shared patterns – across the sciences.

SIGNIFICANCE AND CRITIQUE

Founded systems theory as a field and gave later work its core vocabulary. The critique: at its most general it is abstract, offering orientation more than method.

Russell Ackoff 1919–2009

Systems thinking in management · messes and design

CORE THESIS

Managers face **messes** – systems of interacting problems – not isolated problems, and you cannot improve a system by improving its parts separately; optimising each part can degrade the whole. Better to **dissolve** problems by redesigning the system than to solve them within it.

FRAMEWORK

Idea	Meaning
Messes vs problems	Real situations are tangles of interacting problems
The system is its interactions	Performance depends on how parts fit, not each part
Dissolve, don't just solve	Redesign the system so the problem disappears
Idealised design	Design backward from the ideal, then approach it

METHODOLOGY

Operations research turned toward systems thinking, interactive planning and idealised design.

SIGNIFICANCE AND CRITIQUE

Brought systems thinking into management vividly and memorably. The critique: the style is aphoristic, and idealised design is demanding to run in practice.

C. West Churchman 1913–2004

The systems approach · boundaries and ethics

CORE THESIS

Systems thinking must include the **observer's values** and the **boundary** they draw. Every analysis of “the whole system” is a judgement about what to include and whose interests count – so ethics and multiple perspectives are inseparable from system design.

FRAMEWORK

Idea	Meaning
Boundary judgements	What counts as “the system” is a value-laden choice
The whole system	Begin by questioning the boundary, not accepting it
Inquiring systems	How we design ways of knowing shapes what we find
Ethics of the system	Whose good the system serves is part of the design

METHODOLOGY

Philosophy of the systems approach, bringing ethics and epistemology into systems design.

SIGNIFICANCE AND CRITIQUE

Introduced boundary-critique and ethics into systems thinking, and taught many who followed. The critique: the work is philosophical and less immediately operational.

Peter Checkland Soft Systems Methodology, 1981

Soft systems · worldviews and learning

CORE THESIS

For messy human situations there is no single “system” to engineer. **Soft Systems Methodology** builds several models of purposeful activity from different **worldviews** and uses them to structure debate, learning and accommodation – not to compute one right answer.

FRAMEWORK

Element	Meaning
Hard vs soft systems	Engineering a system vs learning about a situation
Worldview (Weltanschauung)	The perspective that makes a model meaningful
CATWOE	Customers, Actors, Transformation, worldview, Owner, Environment
Comparison to action	Compare models to reality to find feasible, desirable change

METHODOLOGY

Action research developing a learning methodology for ill-structured human problems.

SIGNIFICANCE AND CRITIQUE

Made systems thinking work for messy human problems, and the worldview insight is its lasting contribution. The critique: it is elaborate and depends heavily on skilled facilitation.

Synthesis

Theorist	Contribution	Key idea	Register
Bertalanffy	The general theory	Open systems; emergence	Transdisciplinary
Ackoff	Systems in management	Messes; dissolve problems	Managerial
Churchman	Boundaries and ethics	Boundary judgements	Philosophical
Checkland	Messy human problems	Soft systems; worldviews	Methodological

FOR THE OPERATOR

The foundations establish that wholes behave differently from parts – the general science of open systems (Bertalanffy), the manager's “mess” of interacting problems (Ackoff), the ethics and boundaries of the whole (Churchman), and methods for messy human situations built from multiple worldviews (Checkland). For the operator: optimise the system, not its parts; watch where you draw the boundary; and remember that in human systems, “the problem” depends on whose worldview you take. The next paper turns to the quantitative side – system dynamics.