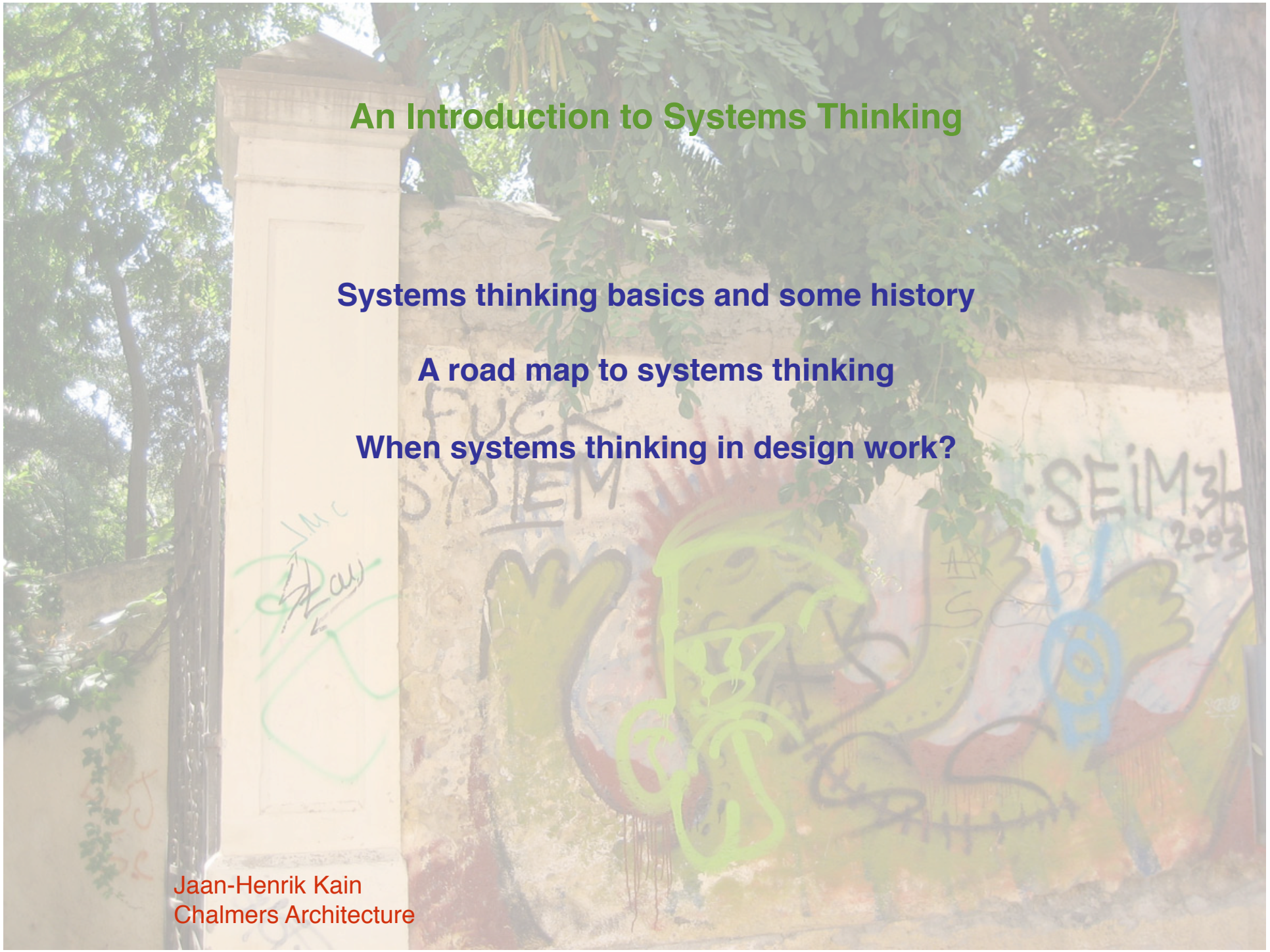

An Introduction to Systems Thinking

Systems thinking basics and some history

A road map to systems thinking

When systems thinking in design work?

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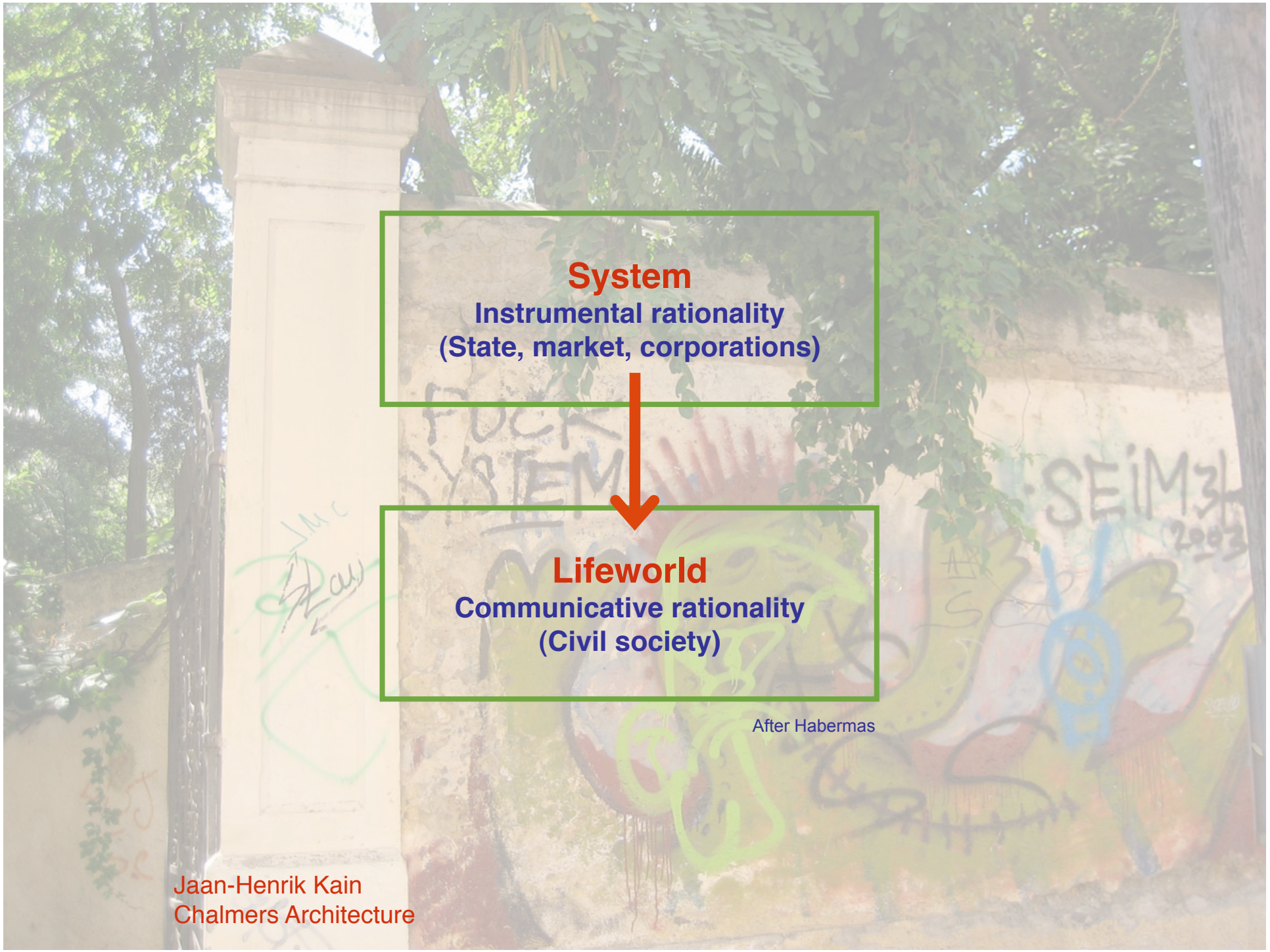

After Habermas

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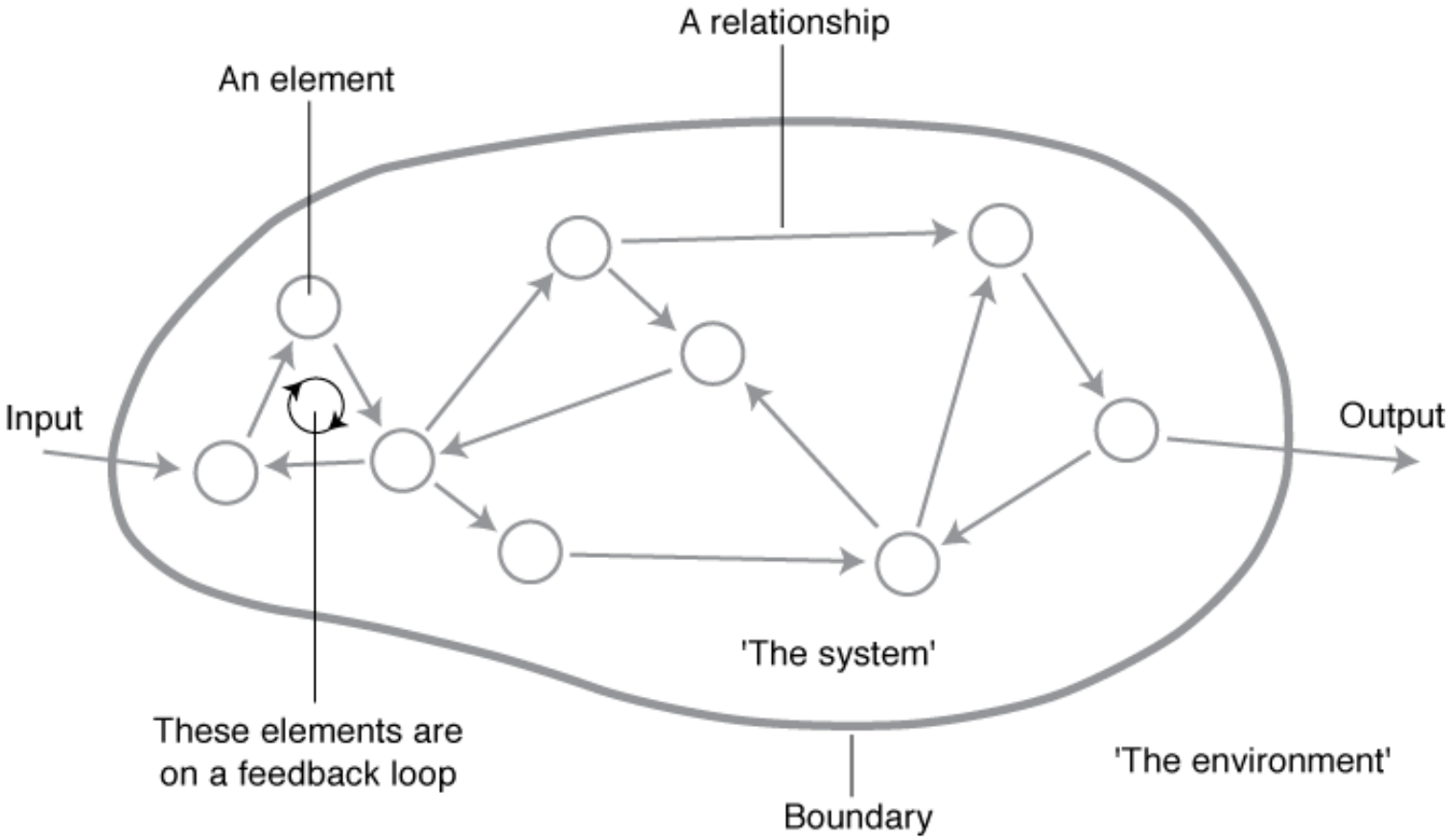
Systems Thinking Basics



A system…

After Flood and Jackson (1991)

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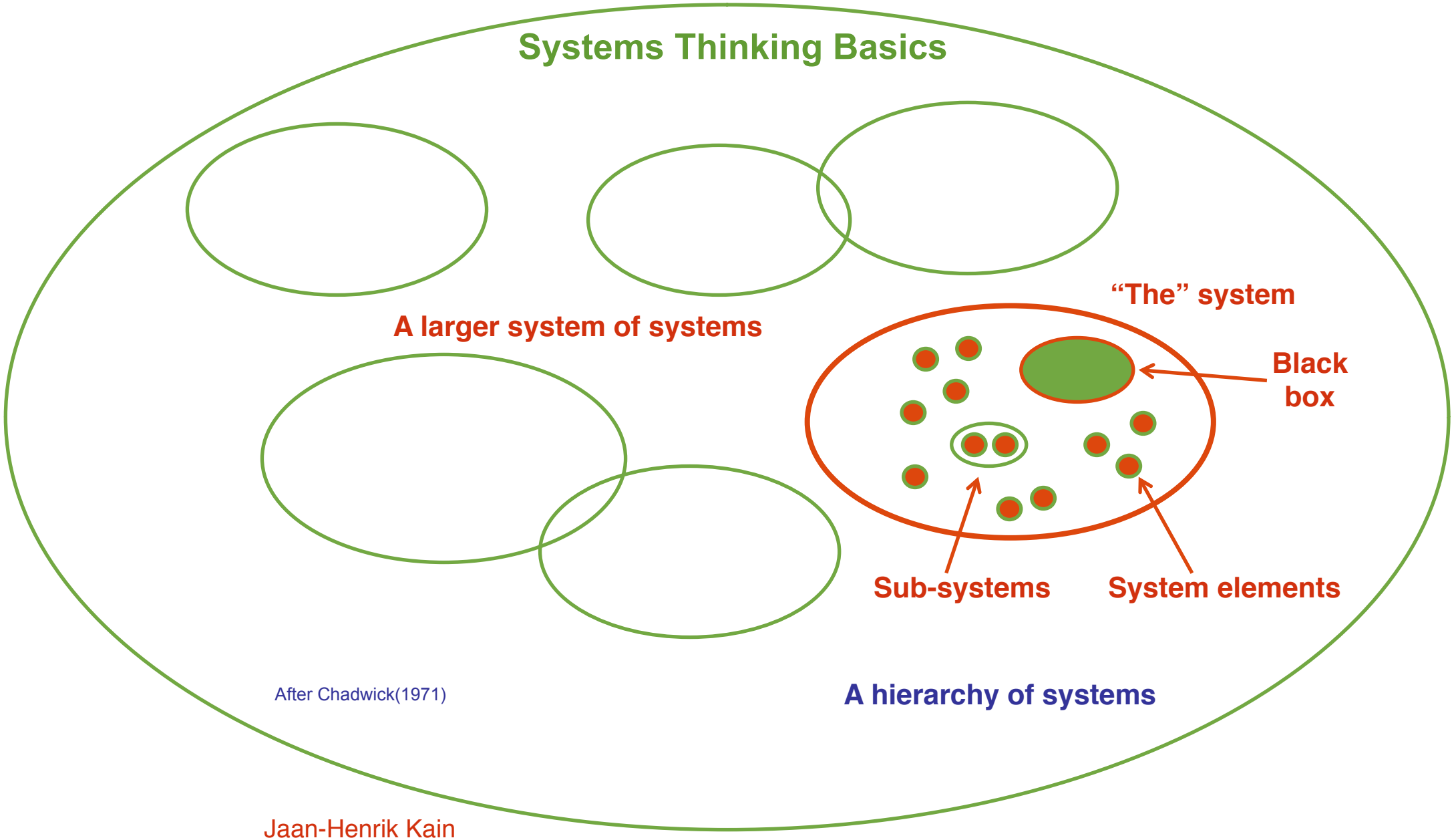
Systems Thinking Basics



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An introduction to Systems Thinking

Systems Thinking Basics

Abstract systems theory
Adaptive systems theory
Applied general systems theory
Applied multidimensional systems theory
Archaeological Systems Theory
Associated systems theory
Behavioral systems theory
Biochemical systems theory
Chaos theory
Complex adaptive systems theory
Complex systems theory
Computer-aided systems theory
Conceptual Systems Theory
Control systems theory
Critical systems theory
Critical systems thinking
Critical theory
Cybernetics
Developmental systems theory
Distributed parameter systems theory
Dynamical systems theory
Ecological systems theory
Ecosystem
Ecosystem ecology
Economic systems theory
Electric energy systems theory
Family systems theory
Fuzzy systems theory
Fuzzy logic
General systems theory
Human Systems Theory
Infinite dimensional systems theory
Large scale systems theory
Large technological systems
Liberating systems theory
Linear systems theory
Living systems theory
LTI system theory
Macrosystems theory
Mathematical systems theory
Medical ethics systems theory
Modeling systems theory
Modern control systems theory
Modern systems theory
Multidimensional systems theory
Nonlinear stochastic systems theory
Operating systems theory
Operational research
Open systems theory
Physical systems theory
Retrieval system theory
Social dynamics
Social systems theory
Sociocybernetics
Sociotechnical systems theory
Social rule system theory
Soft operational research
Soft systems methodology
System analysis
Systemic therapy
Systemics
Systems biology
Systems dynamics
Systems engineering
Systems intelligence
Systems philosophy
Systems theory in archaeology
Systems theory in political science
Systems thinking
Systems science
Tectology
Transit systems theory
World-systems theory

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Some history

Mechanical problems

1940s
- General Systems Theory: from biology to a general theory
- Operational Research: complex man-machine problems (WW2)
- Cybernetics: machine-biology interface (artificial intelligence, robotics)

Social problems

1960s
- Systems Analysis: solving management problems
- The systems approach to planning: solving urban/regional problems

Learning systems, emancipation

1970s
- Soft Systems Methodology: problem-solving in organizations

1980s
- Strategic Choice Approach: problem-solving in planning

Understanding complexity, more emancipation

1990s
- Complex Systems Theory: collective and adaptive behaviour
- Critical Systems Thinking: systems thinking as critique

Managing complexity and synthesizing -> shaping societies

2000s
- Design systems: focus on relations/interfaces and their consequences

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An introduction to Systems Thinking

A road map to systems thinking

	Simple Systems	Complex Systems
Unitary Context		
Pluralist Context		
Coersive Context		

After Flood and Jackson (1991) and Kain (2003)

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A road map to systems thinking

	Simple Systems	
Unitary Context	Easily established objectives (unitary) residing within a defined system. This system can be represented in quite simple, quantitative or highly structured models. - Operational Research - Systems Analysis - Systems Engineering - Systems Dynamics (Hard Systems Approaches)	

After Flood and Jackson (1991) and Kain (2003)

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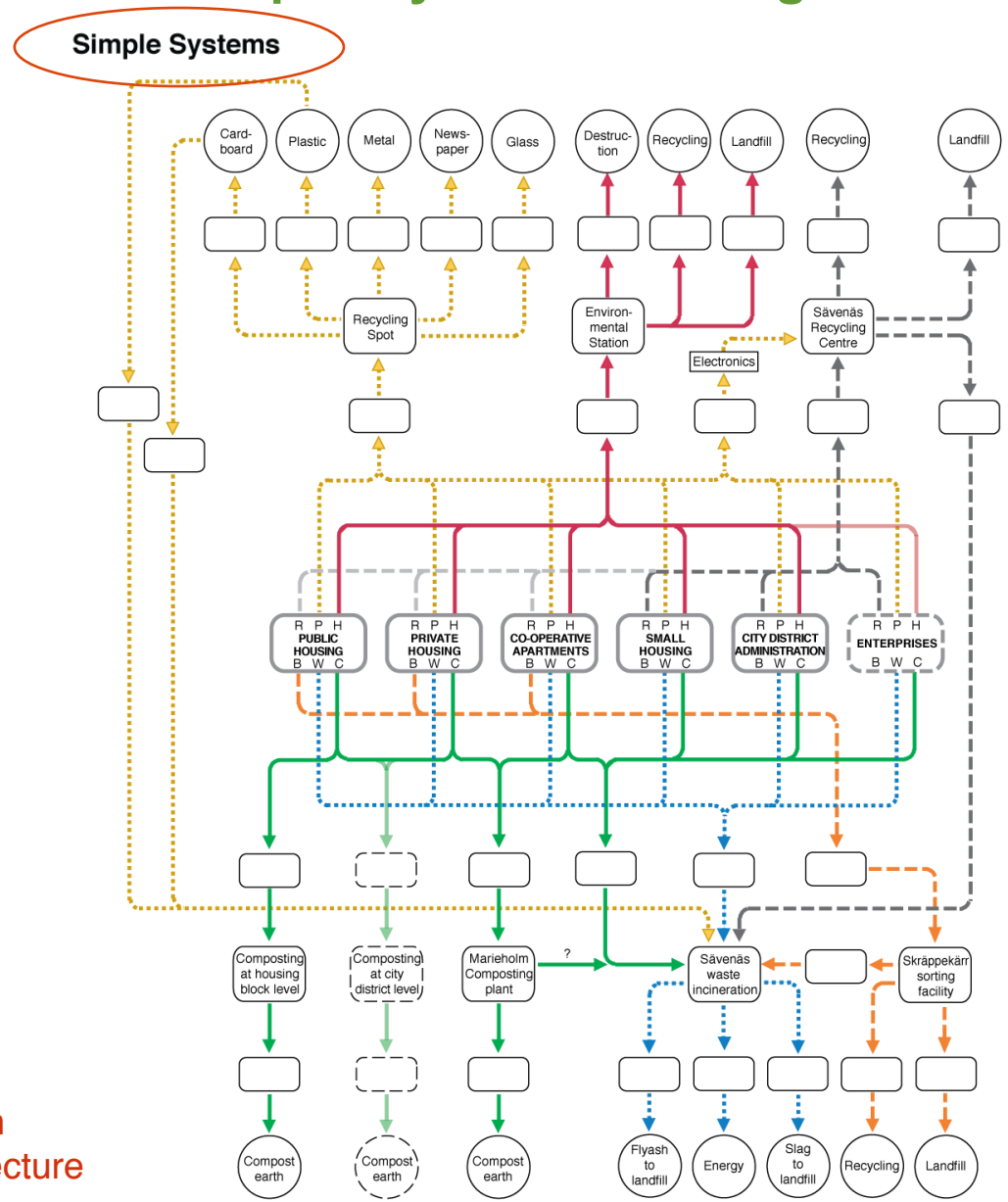
A road map to systems thinking

Unitary Context



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Kain (2003)

An introduction to Systems Thinking

A road map to systems thinking

	Complex Systems
Unitary Context	Complex systems containing many closely interrelated elements, with behaviour difficult to predict. The systems are open to the environment and include purposeful parts. There is agreement concerning the objectives (unitary). - Viable Systems Diagnosis - General System Theory - Sociotechnical Systems Thinking - Large Technological Systems

After Flood and Jackson (1991) and Kain (2003)

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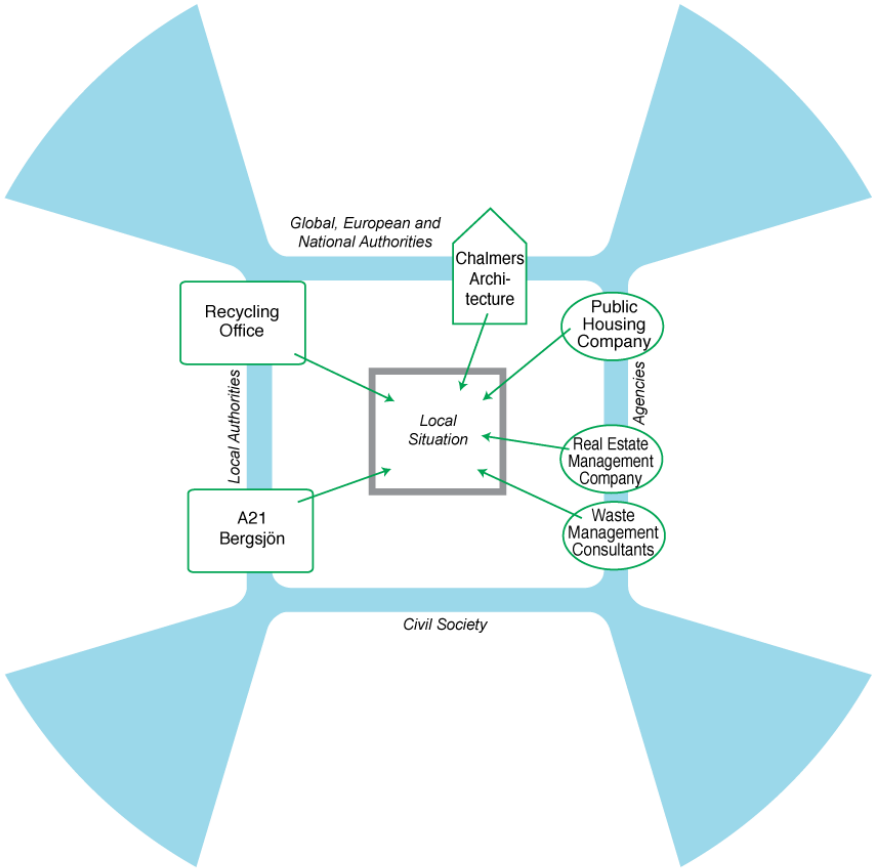
A road map to systems thinking

Complex Systems

Unitary Context



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Kain (2003)

A road map to systems thinking

	Simple Systems	
Pluralist Context	The participants disagree about the objectives (pluralist) but organisations can be understood as machines (simple) once the pluralism is resolved. - Social Systems Design - Strategic Assumption Surfacing and Testing	

After Flood and Jackson (1991) and Kain (2003)

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A road map to systems thinking

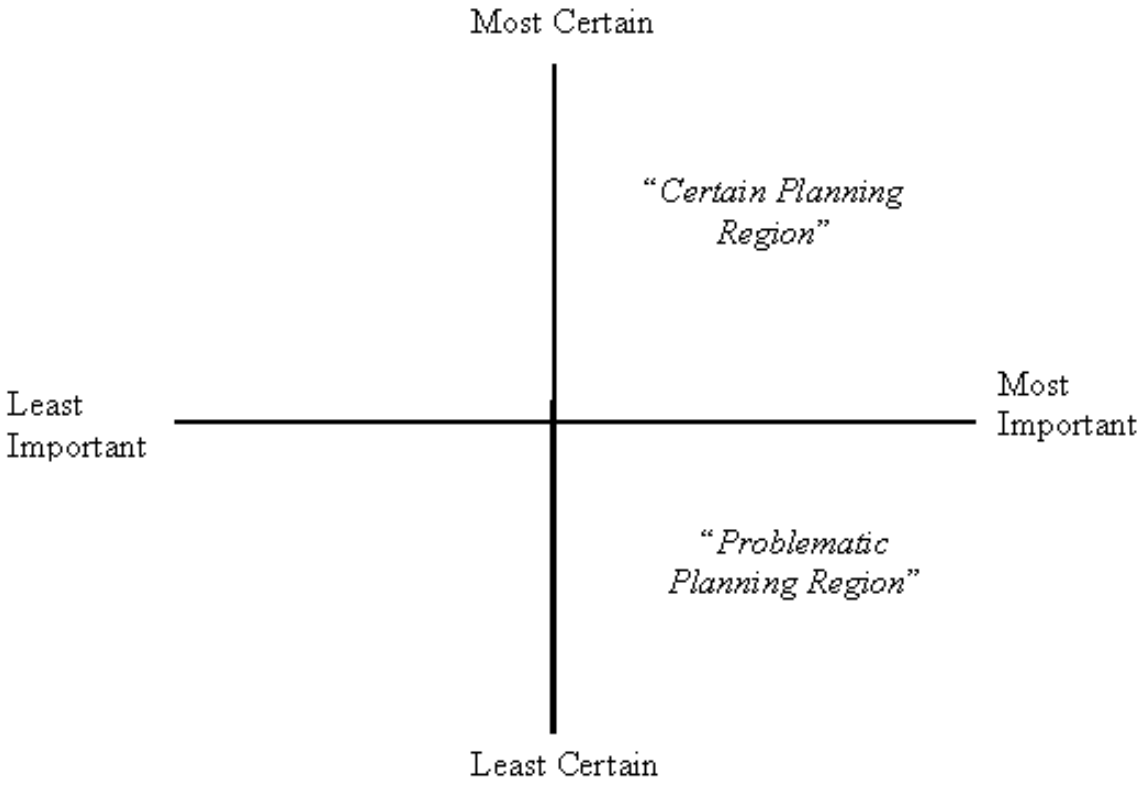
Simple Systems

- Who is affected by the strategy?
- Who has can interest in it?
- Who can affect its adoption, execution or implementation?
- Who cares about it?

After Flood and Jackson (1991)

Pluralist Context

Figure 1: Assumption rating chart



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A road map to systems thinking

		Complex Systems
Pluralist Context	No consensus exists on goals and objectives (pluralist) but compromise is possible. It is also necessary to deal with difficulties originating from the complexity of the context. - Interactive Planning - Soft Systems Methodology - Strategic Choice Approach	

After Flood and Jackson (1991) and Kain (2003)

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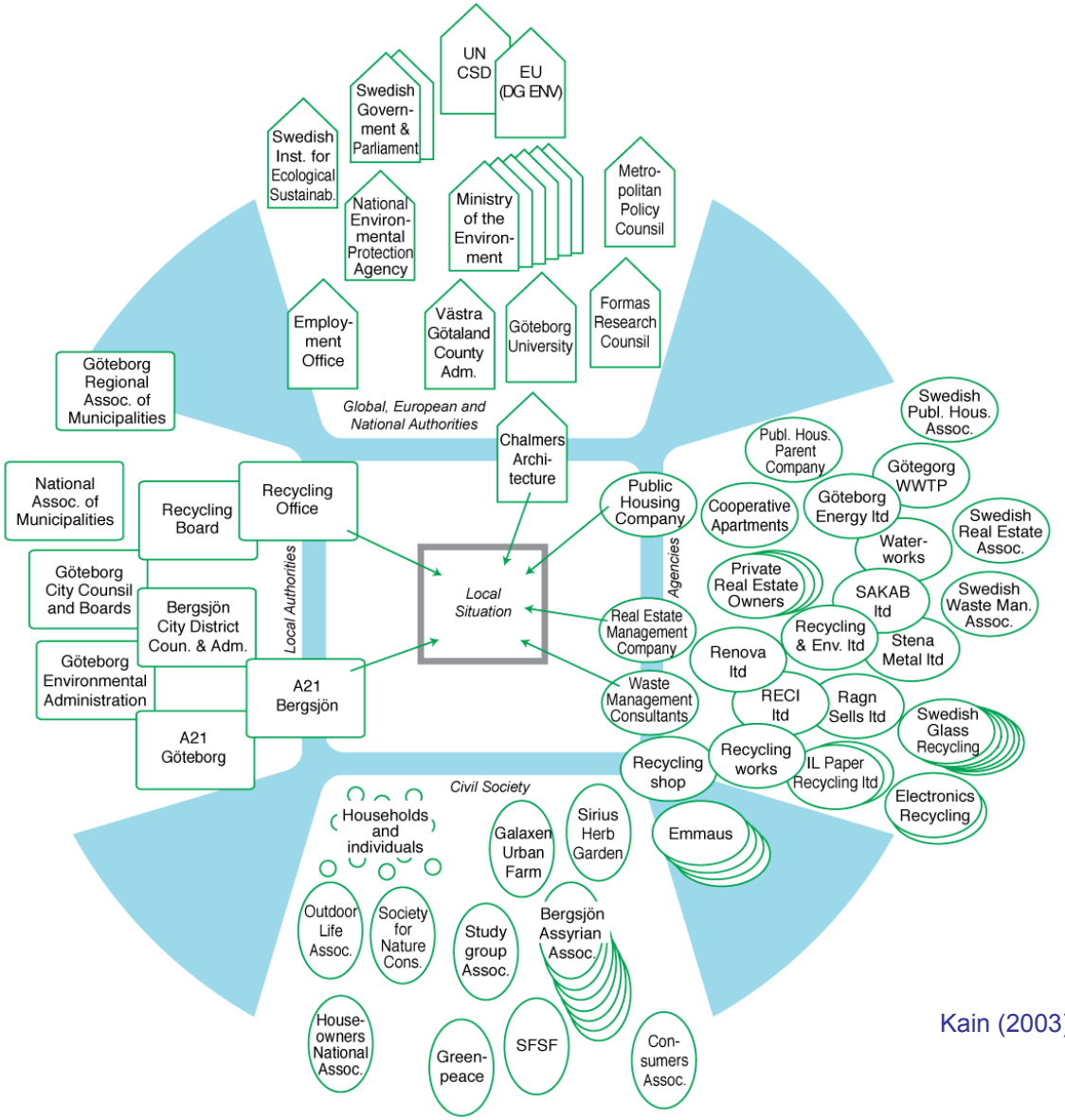
A road map to systems thinking

Complex Systems

Pluralist Context



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Kain (2003)

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A road map to systems thinking

Simple Systems

Coersive Context

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Simple Systems

Coersive Context

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A road map to systems thinking

Simple Systems

Critical Systems Thinking

- Critical reflection:
To reflect on the relationship between different organizational and societal interests and the dominance of different theories and methodologies.

- Emancipation:
To develop systems thinking and practice beyond its present conservative limitations and, in particular, to formulate new methodologies to tackle problem situations where the operation of power prevents proper use of systems approaches.

- Complementarism:
To reveal and critique the theoretical (ontological and epistemological) and methodological bases of systems approaches, and to reflect on the problem situations in which approaches can be properly employed and to critique their actual use.

Coersive Context

Quote from Flood and Jackson (1991)

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An introduction to Systems Thinking

A road map to systems thinking

Complex Systems

	High levels of disagreement and system complexity. This complexity hides the true sources of power. - ? ? ?

Coersive Context

After Flood and Jackson (1991) and Kain (2003)

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A road map to systems thinking

Complex Systems

Coersive Context

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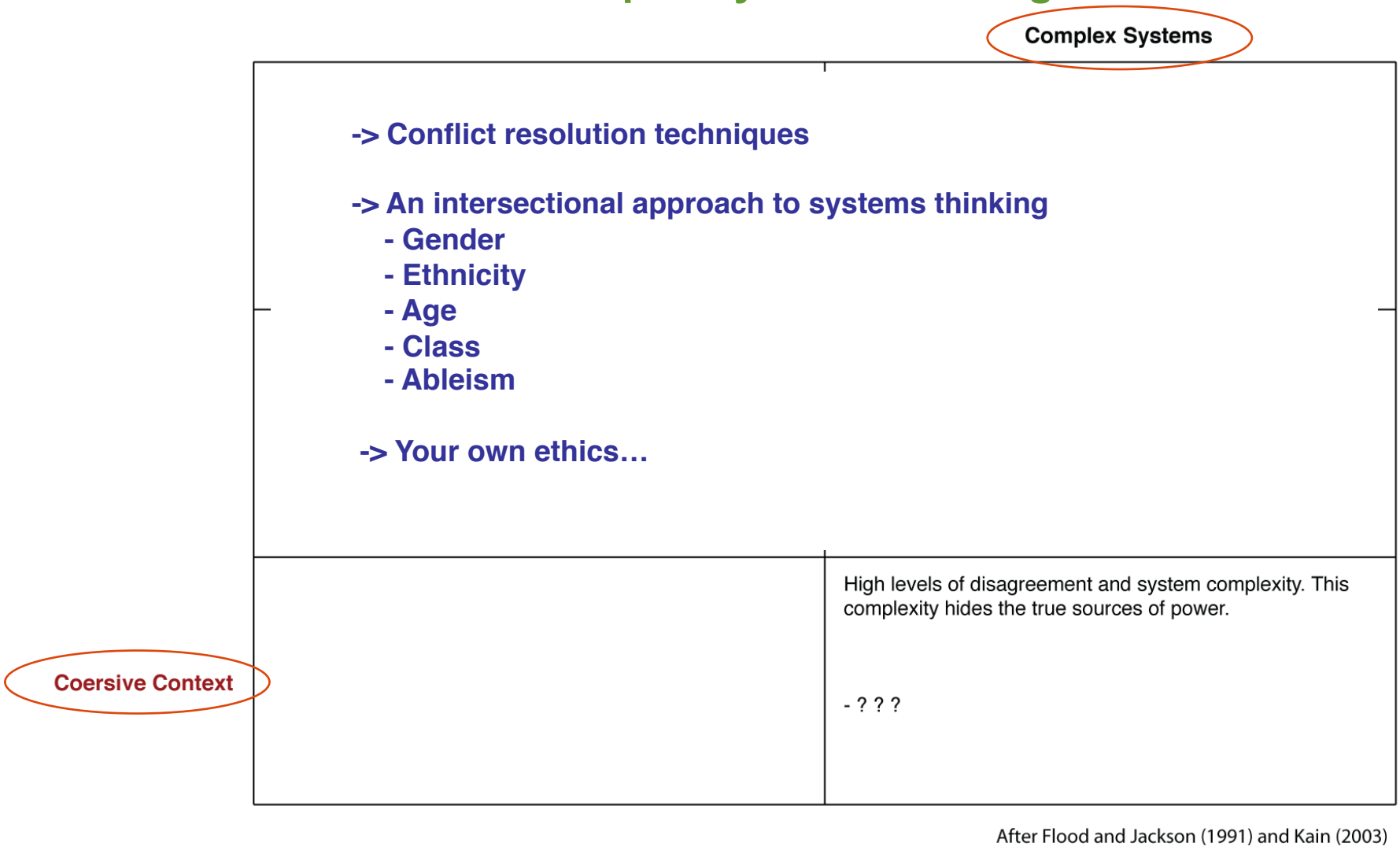

After Flood and Jackson (1991) and Kain (2003)

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An introduction to Systems Thinking

A road map to systems thinking

	Simple Systems	Complex Systems
Unitary Context	Easily established objectives (unitary) residing within a defined system. This system can be represented in quite simple, quantitative or highly structured models. - Operational Research - Systems Analysis - Systems Engineering - Systems Dynamics (Hard Syste… …roaches)	Complex systems containing many closely interrelated elements, with behaviour difficult to predict. The systems are open to the environment and include purposeful parts. There is agreement concerning the objectives (unitary). - Viable Systems Diagnosis - General System Theory - Sociotechnical Systems Thinking - Large Technological Systems
Pluralist Context	The participants disagree about the objectives (pluralist) but organisations can be understood as machines (simple) once the pluralism is resolved. - Social Systems Design - Strategic Assumption Surfacing and Testing	…o consensus exists on goals and objectives (pluralist) but …promise is possible. It is also necessary to deal with di… …es originating from the complexity of the context. - Interacti… …nning - Soft Syste… …ethodology - Strategic Cho… …Approach
Coersive Context	Real disagreement on objectives and participants try to use power to impose their strategies (coercive). The sources of the participants' power are however easy to identify (simple). - Critical Systems Heuristics	High levels of disagr… …ent …nd system complexity. This complexity hides the t… …rces of power. - ? ? ?

After Flood and Jackson (1991) and Kain (2003)

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When systems thinking in design work?

	Simple Systems	Complex Systems
Unitary Context	**"Traditional" design projects** …if the design object is well-defined A piece of furniture The interior of a restaurant	**"Traditional" architecture projects** …if its location etc is not contested Low-scale housing areas A commercial shopping mall
Pluralist Context	**User-oriented projects** …with local implications An urban green space School yard refurbishing	**Public participation projects** …with "global" implications Housing area renewal A local shopping centre
Coersive Context	**Use-optimization projects** …where "the boss" is bossing Work place architecture Housing area up-grading, turn-around	**Complex architecture/city renewal** …shaping a city's identity Public private partnership in urban development projects

After Flood and Jackson (1991) and Kain (2003)

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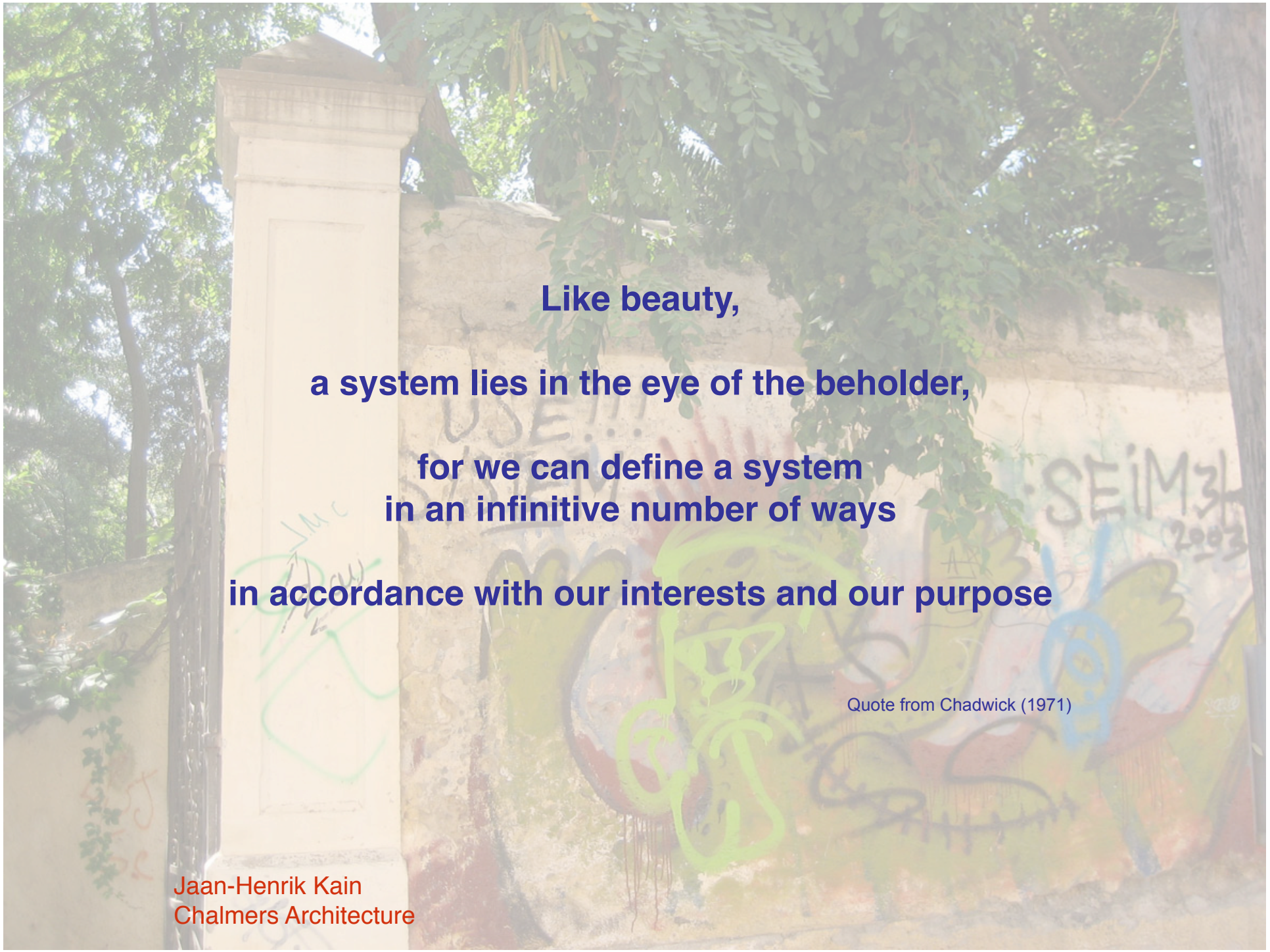

Like beauty,

a system lies in the eye of the beholder,

for we can define a system
in an infinitive number of ways

in accordance with our interests and our purpose

Quote from Chadwick (1971)

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