Identifying the Fundamental Concepts of Systems Thinking

Matt Lloyd

Obligatory ST Presentation Image

The purpose of a system is what it does
based on the perspective of the observer
(Stafford Beer amended by Matt Lloyd)

Everyone agrees (and always have) that systems definitions and boundaries are chosen/ascribed by observers
Patrick Hoverstadt

We are an introverted profession. We do most of our writing and speaking to each other
Russell Ackoff

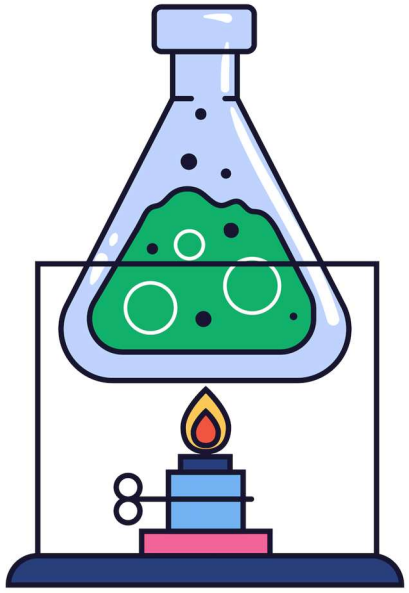
Framing the Presentation

Until we communicate to our potential users in a language they can understand, they and we will not understand what we are talking about.

Russell Ackoff

What is Chemistry?

Chemistry is the study of matter, analysing structure, properties and behaviour to see what happens when there is interaction (within boundaries)



What is Systems Thinking?

Systems thinking is the study of systems, analysing their structure, properties and behaviour to see what happens when they interact (within boundaries)

Systems 'type'	Selected systems approaches
Hard systems	General systems theory (Bertalanfy 1956)
	Classical (first order) cybernetics, 'mechanistic' cybernetics (Ashby 1956)
	Operations research (Churchman et al. 1957)
	Systems engineering (Hall 1962)
	Socio-technical systems (Trist et al. 1963)
	RAND-systems analysis (Optner 1965)
	System dynamics (Forrester 1971; Meadows et al. 1972)
Soft systems	Inquiring systems design (Churchman 1971)
	Second order cybernetics (Bateson 1972)
	Soft systems methodology (Checkland 1972)
	Strategic assumption surface testing (Mason and Mitroff 1981)
	Interactive management (Ackoff 1981)
	Cognitive mapping for strategic options development and analysis (Eden 1988)
Critical systems	Critical systems heuristics (Ulrich 1983)
	System of systems methodologies (Jackson 1990)
	Liberating systems theory (Flood 1990)
	Interpretive systemology (Fuenmayor 1991)
	Total systems intervention (Flood and Jackson 1991a)
	Systemic intervention (Midgley 2000)

Reynolds and Holwell (2010)

What do the “Experts Say”?

The OU teach 5 different approaches

Professor Mike Jackson says that there are 10 approaches

SCiO have 13 approaches in their competency framework

Gerald Midgley has documented 97 different approaches of systems thinking

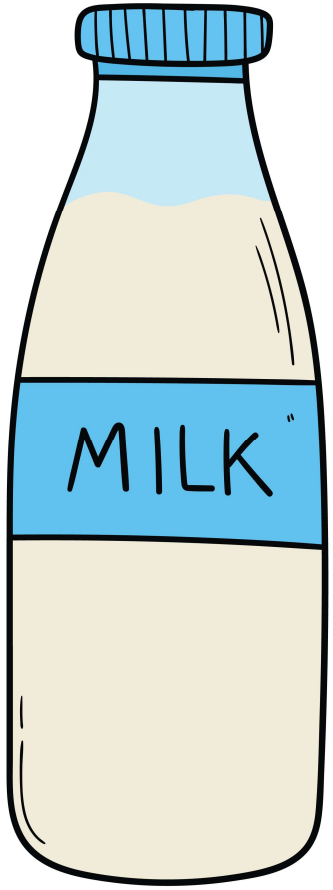
Charles Francois compiled an encyclopaedia with 3,800 entries of systems thinking concepts, theories, methods, and frameworks.

What Makes Tea, Tea?

In order for a beverage to be classified as a tea, it must come from the leaves of the Camellia Sinensis tree

(Not everything called tea is tea. For instance, chamomile "tea" is actually an herbal tisane)

But What About Milk and Sugar?

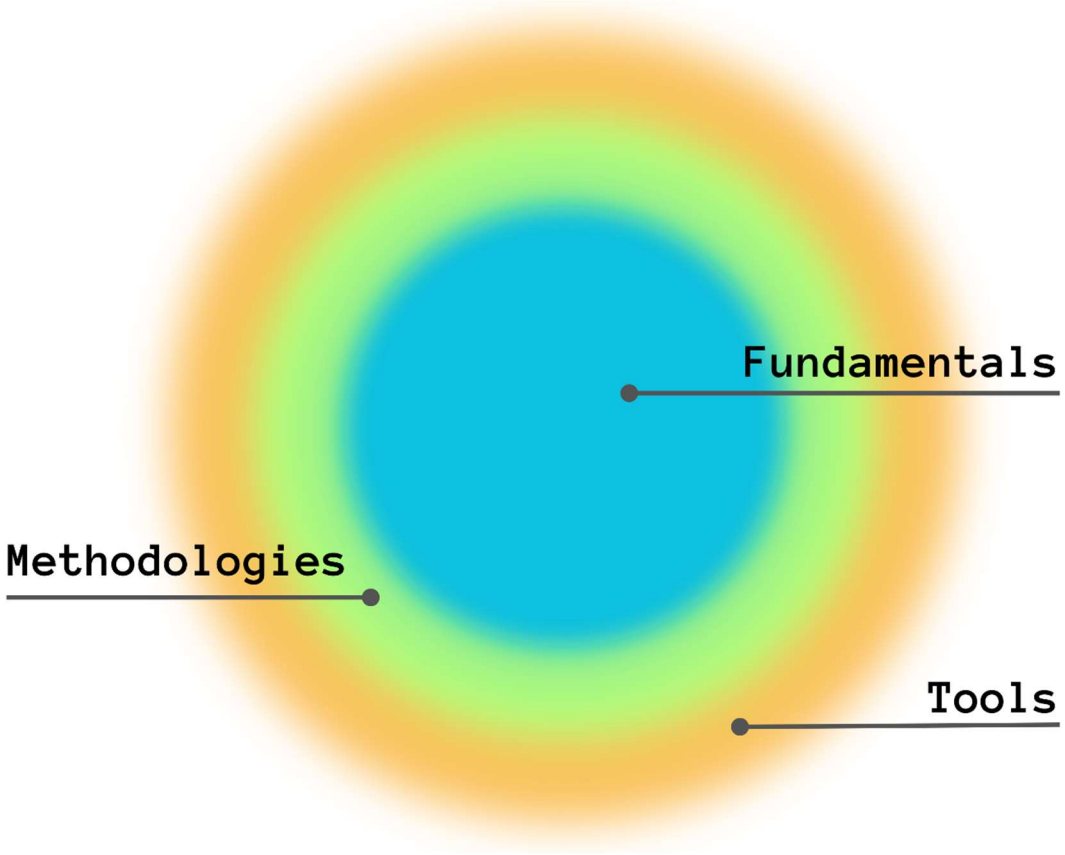


Systems Thinking Elevator Pitch v0.1

Systems thinking is a way of understanding and communicating a situation, so it is possible to see the influences, outcomes and relationships that affect the situation as well as the individuals and organisations that are active within that situation

(It's important to note that everybody has their own elevator pitch, and they can vary due to the situation)

FMT Circle



Fundamentals

These are the basic building blocks

Methodologies

The formal theoretical frameworks

Tools

These are the methods for documenting and communicating output from an investigation

Lloyd and Smith (2024)

Classifying Systems Thinking Fundamentals?

Wholes rather than parts
Dynamic behaviour
System as a cause of its behaviour
Interconnections/interrelationships
Stock and flow relationships
Acknowledging that systems are important
Delays
Non-linear relationships
Feedback loops
System structure generate behaviour

Emergence
Holism
Modelling
Boundaries
Difference
Relating
Dynamics and loops
Complexity
Uncertainty

Recognizing interconnections
Identifying feedback
Understanding dynamic behaviour
Differentiating types of flows and variables
Using conceptual models
Creating simulation models
Test policies

Arnold and Wade (2015) - Hoverstadt (2022) - Stave and Hopper (2007)

But could Systems Thinking be Natural?

It is possible some individuals consider systems thinking to be a gut level decision-making process.

Table 1 Indicated understanding of social systems and use of systems thinking

Indicated understanding of social systems	Percentage of respondents indicating use	Indicated mean systems thinking use
5 (understand completely)	7%	4.5
4 (understand much)	18.6%	3.8
3 (understand enough)	36.6%	3.6
2 (understand little)	26.2%	3.3
1 (no understanding)	10.5%	2.9

Dawidowicz (2012)

Current Research

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Questionnaire	4.27	4.26	4.37	4.09	3.89	4.14	4.15	4.64	4.09	3.62	3.97	4.09	4.08	3.51	3.74	4.11
Interventions	4.17	4.28	4.33	4.11	3.83	3.78	3.89	3.78	3.89	3.67	4.06	4.00	3.94	3.61	3.78	4.59
Difference	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.19	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Average	4.22	4.27	4.35	4.10	3.86	3.96	4.02	4.21	3.99	3.64	4.01	4.05	4.01	3.56	3.76	4.35

Sixteen questions relating to systems thinking fundamentals
e.g. how much do you consider different people views when looking at an issue? This is different from asking do you consider multiple perspectives or using language such as stakeholders but still gives insight into systems fundamentals.

The questions are not trying to understand how well people **actually** understand systems fundamentals but are seeking to understand how people perceive their knowledge of the fundamentals.

Scale used is 1 to 5, with 1 having no knowledge and 5 being the person considers themself an expert.

Lloyd (2024)

Why are the Fundamentals Important?

1. How can we convince people of the value of systems thinking if people already perceive they are “doing systems thinking”
2. Systems thinking is more than just methodologies and tools – it is built on the fundamentals
3. People don’t need to know formal terms, methodologies or techniques to be systems thinkers
4. We need to remove the barriers to people engaging with systems thinking and provide a pathway to them being able to more effective in their systems thinking use
5. There are no experts in the systems approach (Churchman, 1968)

Thank You

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