A Systems Thinking View on Public Health Intelligence

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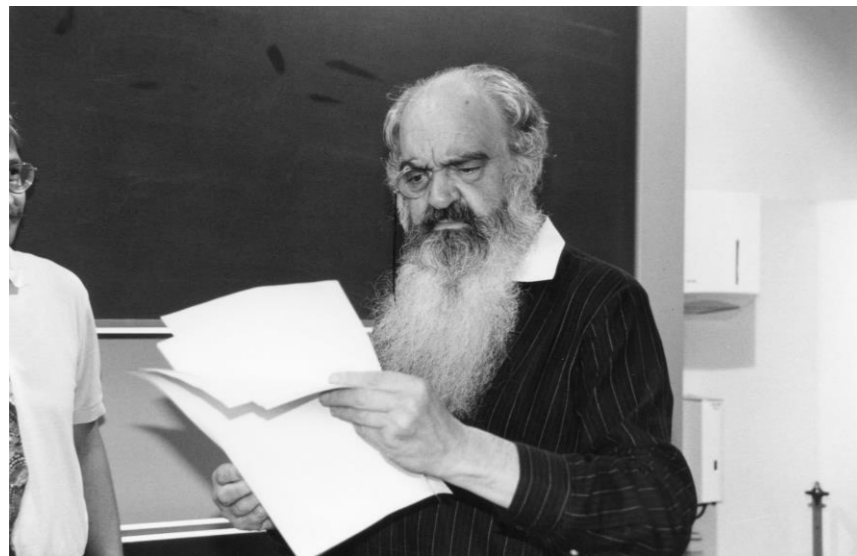
What is systems thinking?

Donella Meadows (2008, p.2) defines a system as

*"a set of things – people, cells, molecules, or whatever – **interconnected** in such a way that they **produce** their own pattern of **behaviour over time"**.*
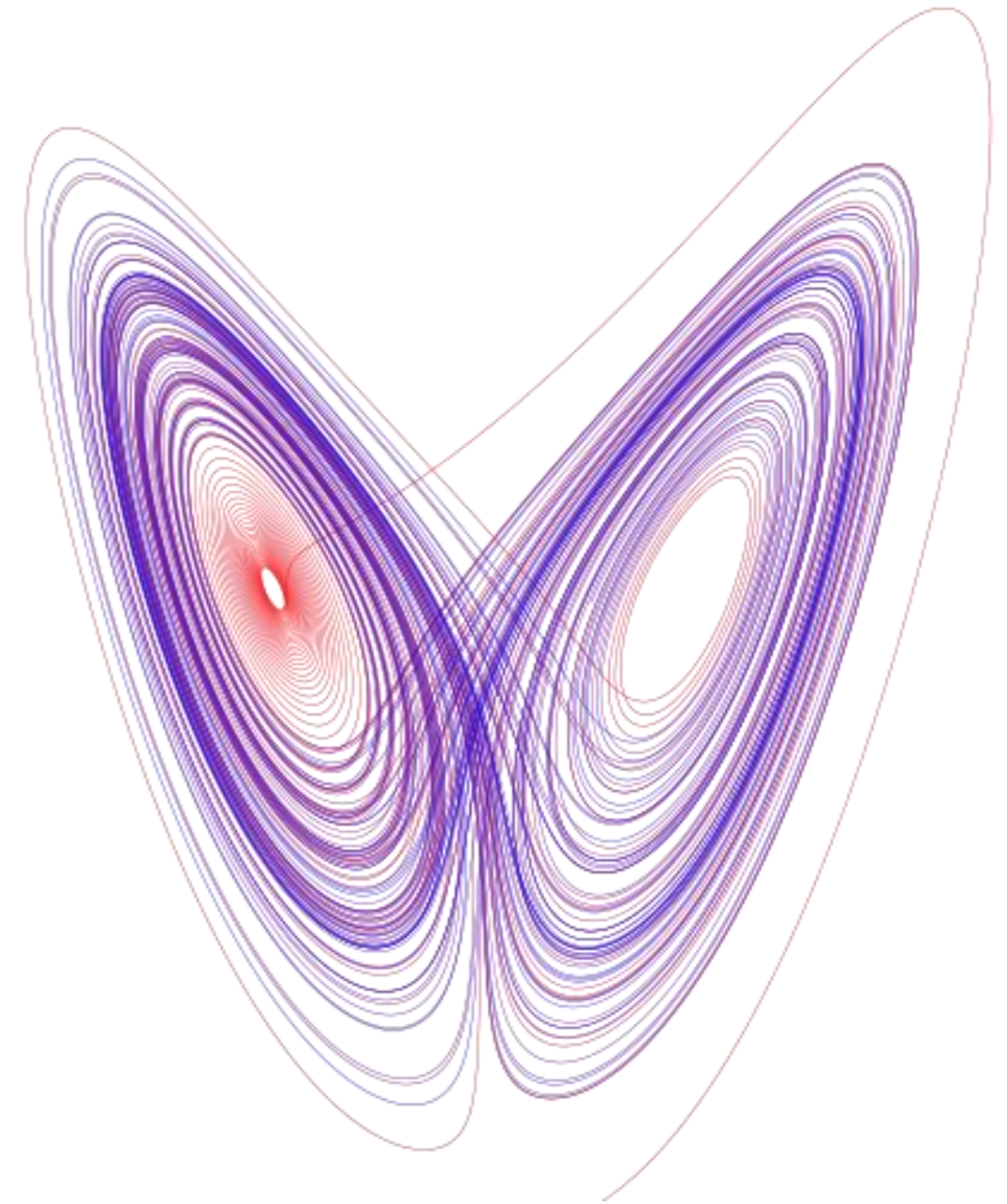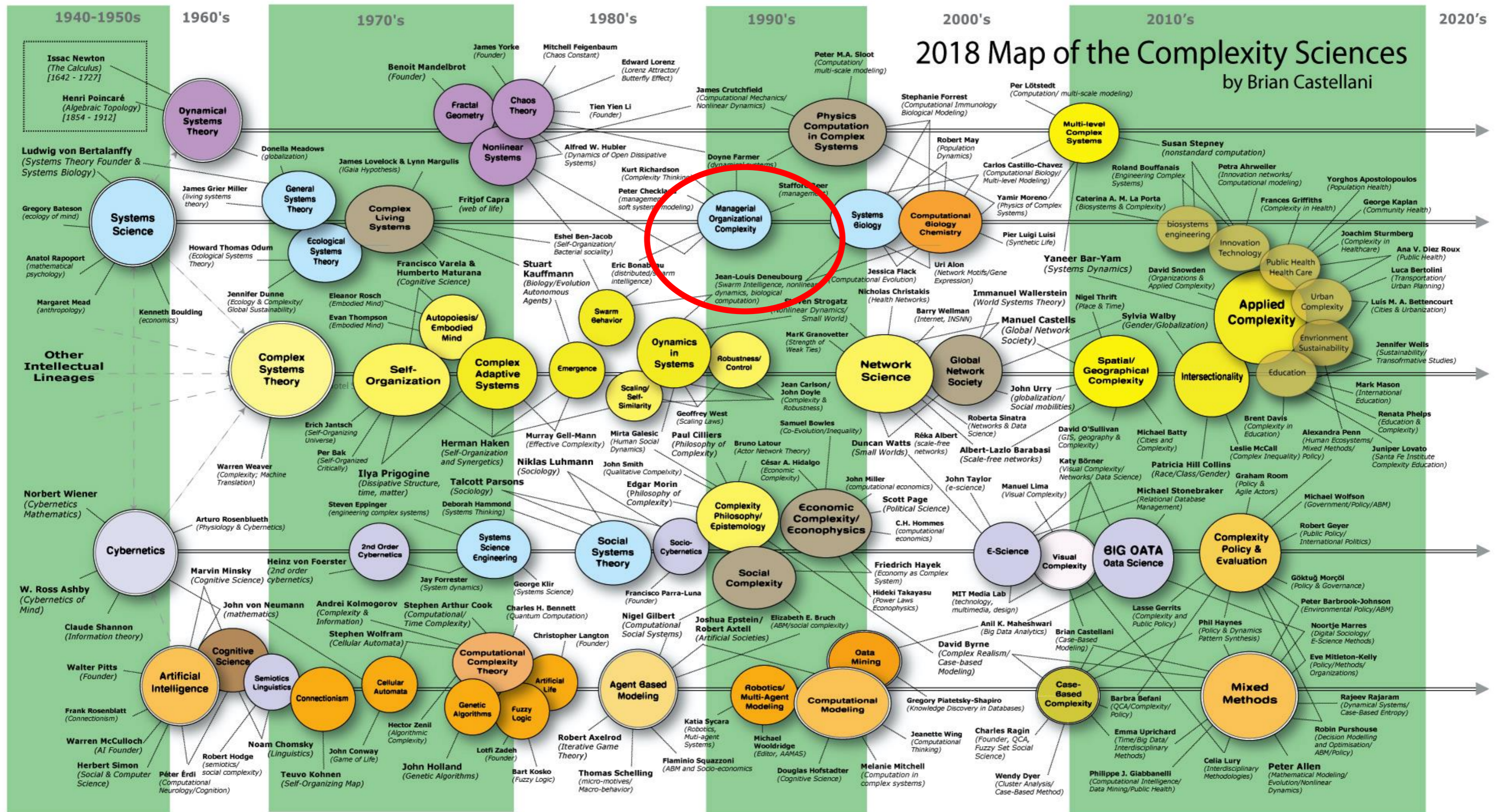
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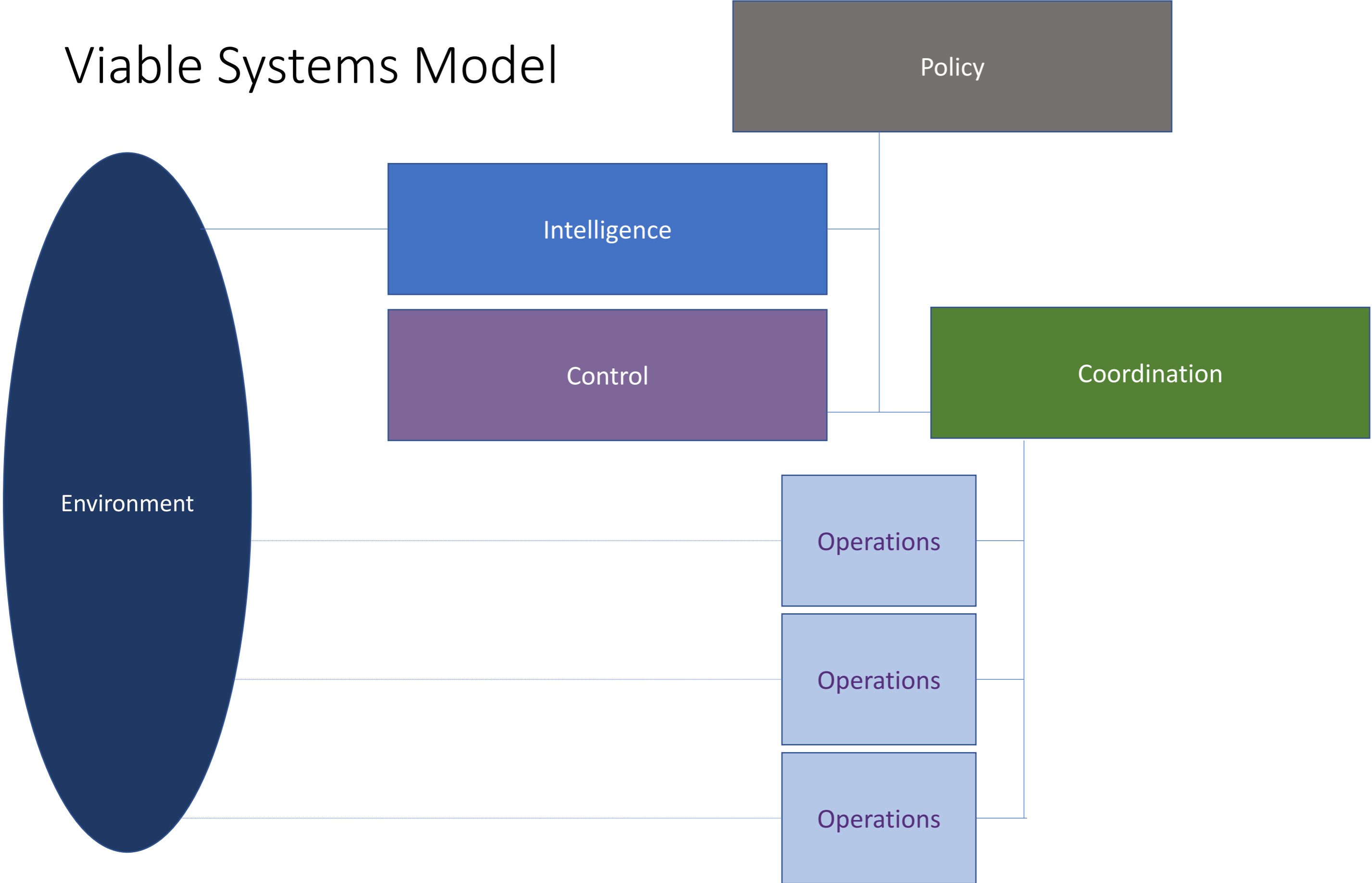
Viable Systems Model

Stafford Beer

Developed in the 1970's

Concerned with organisational design

How does an organisation function within a changing environment?

Viable Systems Model

Viable Systems Model - implications

Information supports multiple functions:

- Operations need to be able to 'see' other operations through coordination
- Control needs to understand use of resources across operations
- Intelligence needs to identify changes within operating environment and support policy considerations about goals and operating rules

Increasing complexity should be assumed

- Increased understanding of environmental risk and protective factors
- Greater attention to equity requiring view of smaller populations

Organisational responses need to match complexity

- Avoid ideas of 'getting back to basics' or focus on 'core' services
- Increase view of multiple causal pathways and co-benefits

Critical System Heuristics

Different to Viable Systems Model in considering what a system is

Viable Systems Model

A system is a real collection of activities interacting within a broader operating environment

Focus on organisational structure and practices

Critical System Heuristics

A system is defined by the boundaries we put around an issue to make sense of it

Focus is on different perspectives and who has power to define an issue

Critical System Heuristics

Ulrich identified four domains and 12 questions to ask within a Critical System Heuristics analysis:

DOMAINS	QUESTION AREAS
Sources of motivation	Who benefits What is the purpose How is improvement measured
Sources of control	Who makes decisions How are resources allocated
Sources of kowledge	Who is considered an expert What expertise is accessed
Sources of legitimacy	Which worldviews have power How are those most impacted accounted for

Critical System Heuristics - implications

What are the goals?

Who gets to define the goals?

How are those most impacted included?

Who gets to decide which information is relevant?

What areas are thrown into shade?

How is dialogue supported?

Example: Surveillance using wastewater epi

ESR conducted scoping research on perspectives of wastewater epidemiology for population surveillance using critical system heuristics

CSH Domains	Summary of findings
Motivation	Undertaken for benefit of NZ rather than use of private company Done with view of improving equity, not stigmatising populations More support for public health uses compared to justice
Control	ESR must have robust policies and procedures to support positive uses of information
Knowledge	ESR viewed as trusted experts Research into communities should include members of those communities
Legitimacy	Wastewater epi viewed as legitimate part of public health surveillance approach in context of findings against Motivation, Control and Knowledge

Manning, Suzanne; Walton, Mathew (2021). Ethical and responsible development of wastewater-based epidemiology technologies. Institute of Environmental Science and Research. Report. https://doi.org/10.26091/ESRNZ.16825243.v1

Systems Thinking Lens on Public Health Intelligence

Outcomes of interest are always the result of interaction of many parts

Viable Systems Model – intelligence supports different types of functions that must work together for a system that supports health within a changing operating environment

Critical System Heuristics – intelligence reflects and supports perspectives and values that act to give (and remove) legitimacy

Systems Thinking and public health ethics

Ethical principles

Avoid doing harm *(non-malfeasance)*

Provide benefit to others *(beneficence)*

Does our work support diverse responses to complex environments?

Does our work support support dialogue between perspectives?

Thank you

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