

# Complex systems in the social world

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# Introduction – Systems?

- Science and Social Science
- Policy systems (**macro**) – situated in an environment
- Organisational systems(**meso**)
- Cognitive systems (**micro**)



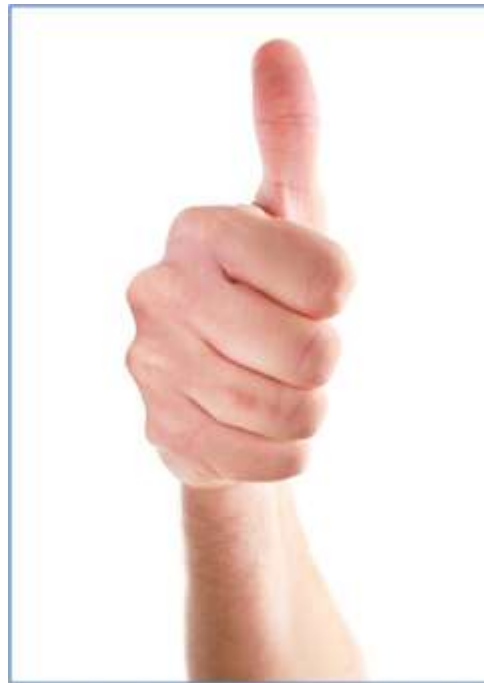
# System theorists

- von Bertalanffy
- Durkhiem
- Luhmann
- Meadows
- Cilliers
- Byrne



# Strengths of systems approaches

- Holistic
- Synthesis
- Interactions, relational
- Challenge reductionism
- Interdisciplinary
- Mixed methods
- Creative, innovative
- Theory - practice



# Weaknesses of systems approach

- Science based, 'value free?'
- Meta theoretical, grand narrative
- Lack of empirical evidence
- Conceptual 'metaphors'
- Abstraction
- Theory over practice



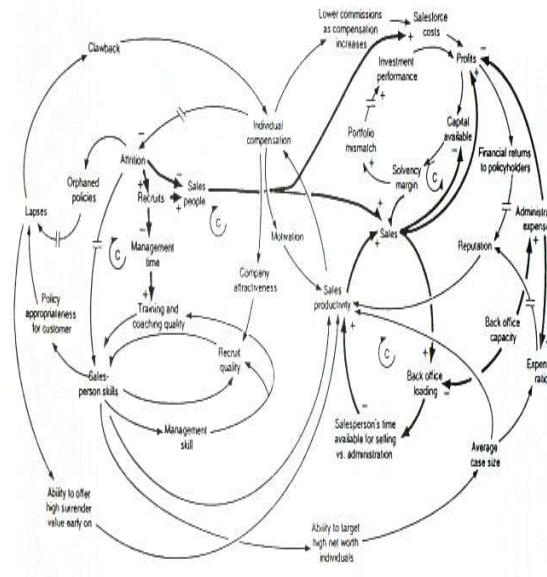
# Application of Systems approaches

- **Description**
  - Describe the system
- **Prescription**
  - Intervene in the system



# System Description

- People
- Boundaries – geography
- Structures
  - Formal
  - informal
- Processes
- Culture: values and beliefs



# System Mechanisms

- Object and production based
- Content, Events,
- Delivery
- Language (spoken, written)
- Behavioural outcomes





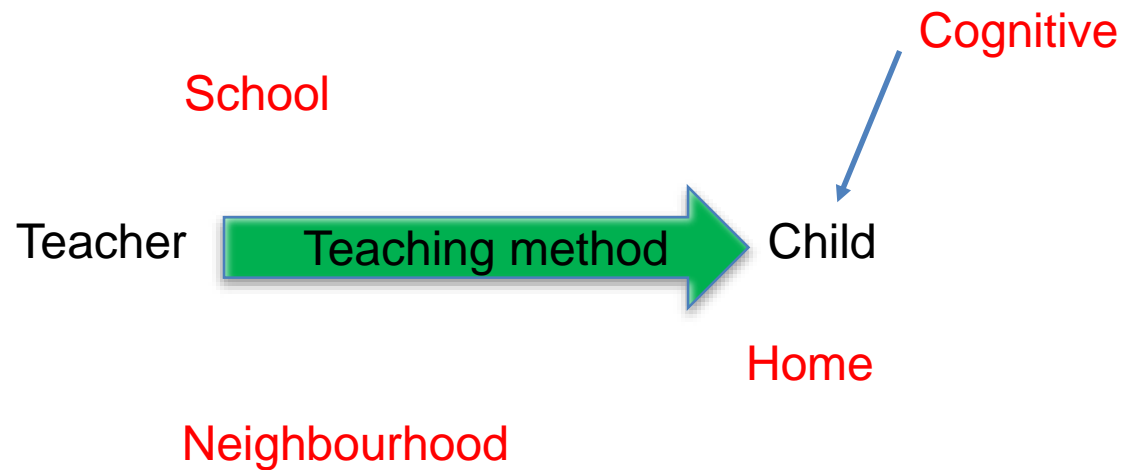
# Systems Context

- Subject and purpose based
- Values
- Beliefs
- Cognitions
- Culture



# Realist

- Context
- Mechanism



# Equifinality: causality

- A and B = Y
- A and E = Y
- B and D = Y
- No singularity
- Different patterns



# complex systems

- Unpredictable
- Unstable
- Dynamic
- Levels



## TIME: Evolution towards complexity



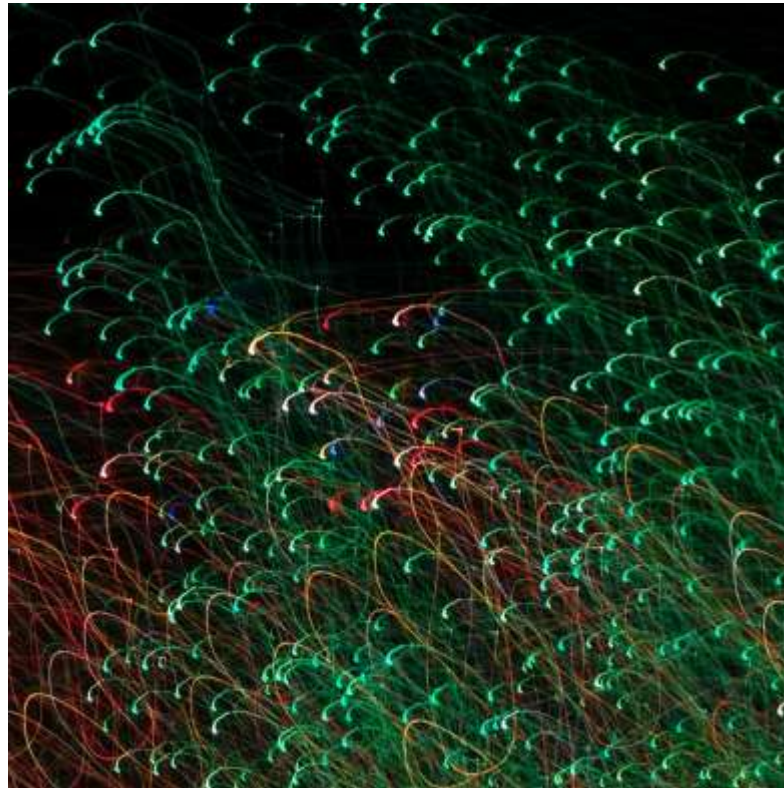
Source: Hubble Telescope  
[http://hubblesite.org/gallery/album/the\\_universe](http://hubblesite.org/gallery/album/the_universe)



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# Complex systems and Science

- Weather
- Particle physics
- Neural networks





Weather systems can only be forecast with precision in the short term, and in the locality



## Complicated (mechanical)



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## Complex (interactive)



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# Definition of 'complex' system

1. Many **cases** and **elements**
2. Many **dynamic interactions**
3. Respond to **limited information**
4. Feedback – reinforcing (+) - checking (-)
5. **Patterns of interaction** (ie: local and short range dominates)
6. Open – with **limits to openness**
7. **Dynamic flows** of energy
8. **History** in part defines the system



# System dynamics

Change

Episodic, not linear

Always some instability and change

BUT Often corrected by other elements of the system that are stable

Some instability gets scaled up – macro level

Potential tipping points



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# The butterfly effect

Small things always have the **potential** to cause large scale change

**Chaos theory,**

But, most often they don't!

So, **how do we spot a butterfly effect?**



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# Tipping points

*Too much feedback/checking*

**Individual** - a critical point, shifts the overall dynamic

**Organisation** - use of key connector/people

**Macro – society** - ‘stickiness’ factor

Build up of similar behaviour that cannot be sustained

Key connectors and their networks change it



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# Complex systems and social science

Most social systems are complex systems

- Global and National Economy
- Organisations
- Brain/mind



# The Angie Hart challenge...

- *Reconcile systems theory with resilience theory and practice*

Resilience Framework (Children & Young People) Oct 2012 – adapted from Hart & Blincow with Thomas 2007					
	BASICS	BELONGING	LEARNING	COPING	CORE SELF
SPECIFIC APPROACHES	Good enough housing	Find somewhere for the child/YP to belong	Make school/college life work as well as possible	Understanding boundaries and keeping within them	Instil a sense of hope
		Help child/YP understand their place in the world			
	Enough money to live	Tap into good influences	Engage mentors for children/YP	Being brave	Support the child/YP to understand other people's feelings
	Being safe	Keep relationships going		Solving problems	
	Access & transport	The more healthy relationships the better	Map out career or life plan	Putting on rose-tinted glasses	Help the child/YP to know her/himself
		Take what you can from relationships where there is some hope		Fostering their interests	
	Healthy diet	Get together people the child/YP can count on	Help the child/YP to organise her/himself	Calming down & self-soothing	Help the child/YP take responsibility for her/himself
		Responsibilities & obligations			
	Exercise and fresh air	Focus on good times and places	Highlight achievements	Remember tomorrow is another day	Foster their talents
	Enough sleep	Make sense of where child/YP has come from		Lean on others when necessary	
	Play & leisure	Predict a good experience of someone or something new	Develop life skills	Have a laugh	There are tried and tested treatments for specific problems, use them
	Being free from prejudice & discrimination	Make friends and mix with other children/YPs			
NOBLE TRUTHS					
ACCEPTING		CONSERVING	COMMITMENT		ENLISTING

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# Levels

- Environment
- Organisation
- Person

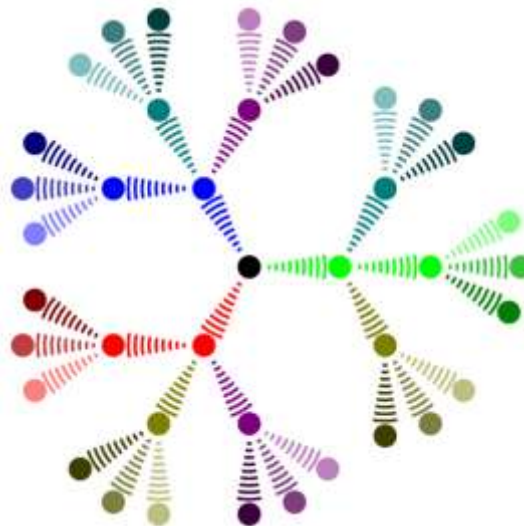


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# Interactions in complex systems

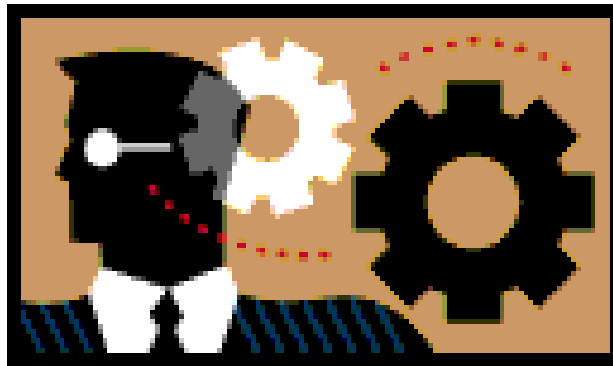
- Relational and interactive
- Feedbacks
  - Reinforcing
  - Checks and Balances
- Self organisation
  - Conservative
  - Dissipative



# Personal system - thinking

## System 1

- Fast
- Instinctive
- Feelings
- Emotions
- Personal
- History
- Values
- Assumptions



Kahneman, D.  
(2012)

## System 2

- Slow
- Rational
- Deliberative
- Conscious reflection



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# Cognitive system

## Cognitive insight

Understanding of one's own thought processes and their relationship with our behaviour

But

Large scale pressures from external systems

How helpful are insights? – collective needs in terms of system change



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# The cognitive dynamic

Cognitive dissonance

Constantly trying to reconcile inconsistencies in  
the analysis of systems

Never finished work

Mental interaction process



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# Thinking (cognitions) as interactions

- The mind as a system
- Thinking processes (cognitions) that relate to the higher system/s
- Guard against system 1
- Promote shared system 2
- Promoting emotional intelligence
- Promoting collective/shared decision making



# Intervening in cognitive systems

Reinforcement

Checks and balances; **boundary setting**

Motivational interviewing: **cognitive reframing, coaching**

Working with someone to develop their 'checks and balances'

Cognitive dissonance



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# The Higgs Boson of human systems?

- Beliefs and values
- Their influence on behaviour



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# What is a complex organisational system?



- External environment
- Relates to other systems
- Sub systems within
- Multiple and sometimes contradictory aims and functions

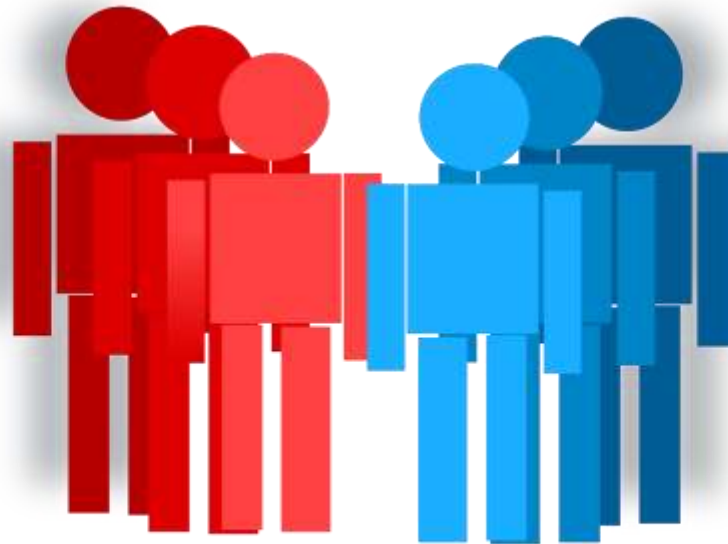


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# System Interactions and Relationships

- Roles
- Tasks
- Power
- **Communications**
- Formal links
- Informal links



# The organisation's environment

- Dependencies
- Interdependencies
- Independence



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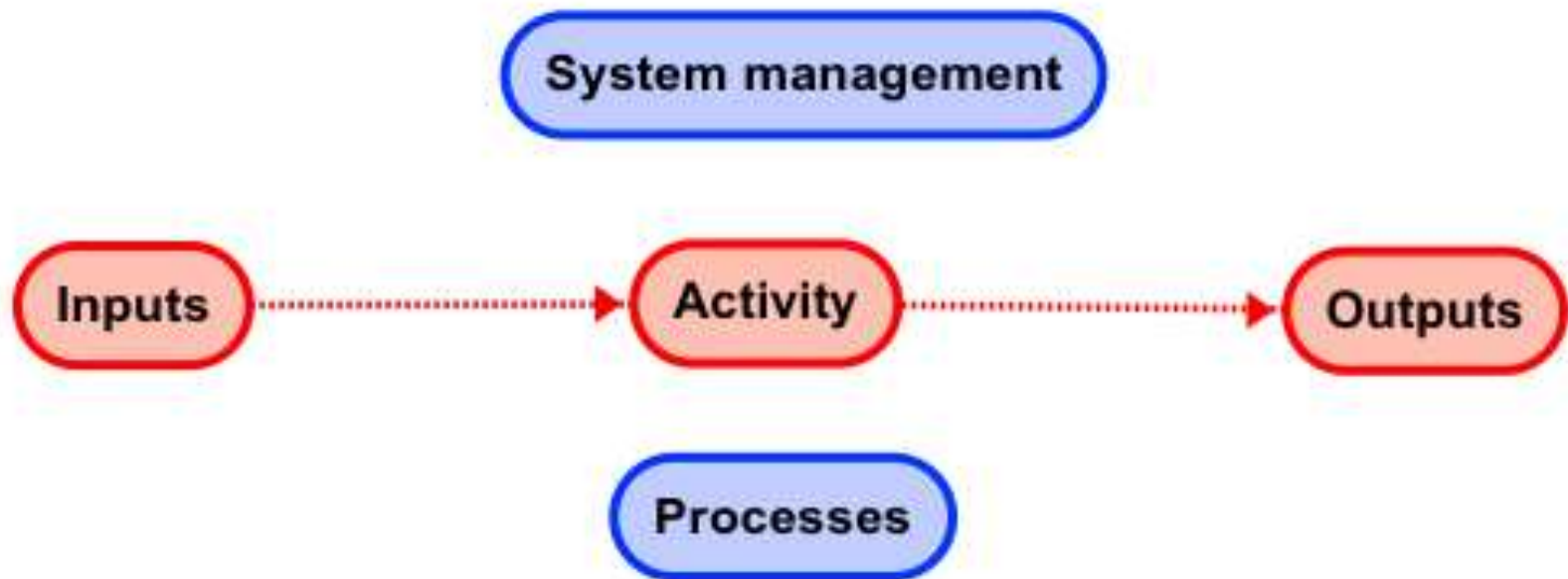
# The Organisation

- Context
- Culture
- Structures
- Strategies



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# The System Process



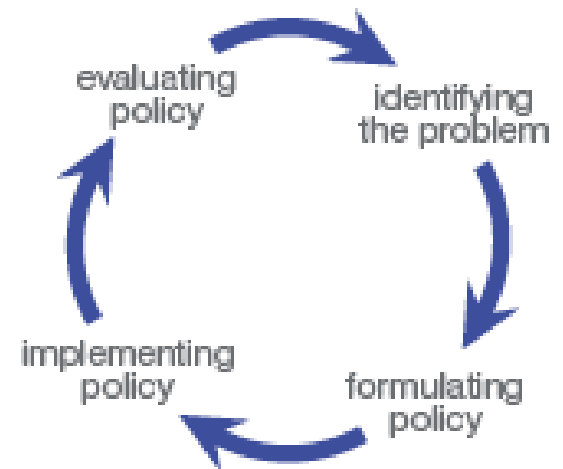
# System inputs

- Demand Management
- Need versus demand
- Demand Failure
- *The relational experience*

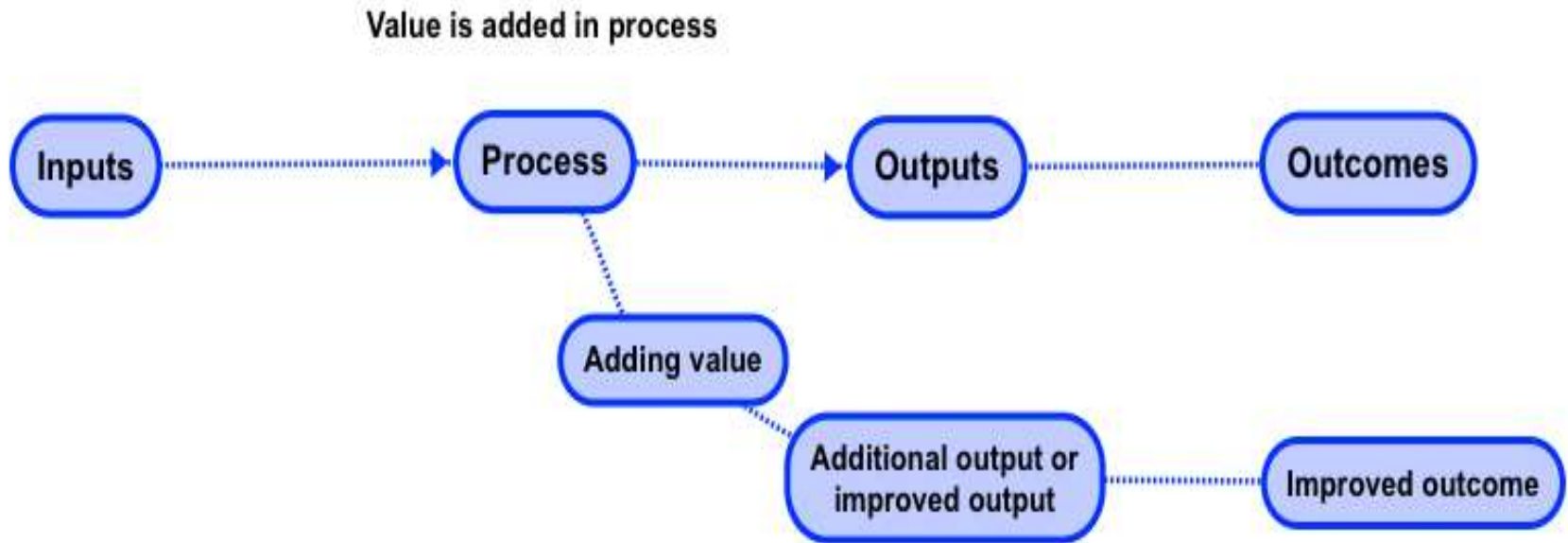


# System throughput

- Activities, processes and outputs
- Evolution towards process complexity
  - Simplification and clarity of process
- Decision making – relational
  - Co-production of outputs



# Adding value in the process



# Internal relations

- Organisational relationships and change
  - Adaptation
  - Decision making
  - Self organisation





# The constituents: people

- Different perceptions and understanding
- Many interactions and feedbacks
  - Are these patterns stable?
  - Or - unstable changing patterns?



# System outputs and outcome

- Hard outputs and outcomes
- Soft outcomes
- System scale ups, added exit value



# Managing Complex Organisations

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How can we fit our management approaches to deal better with complexity?



# How can we manage a complex system?

- Understand it better
- Interact and communicate with it: 'relate to it'
- Simplify processes
- Intervene in systems in appropriate places



# Management Approaches

Simple	Complicated	Complex	Chaos
Predictable	Analyse to predict	Unpredictable	Unstable change
Clear cause and effect	Hidden cause and effect	Minimal cause and effect	No cause and effect
Use known facts	Discover and use facts	Identify and use patterns	Crisis short term interventions

Source: Snowden and Boone, 2007: 73



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# Interventions

The decision about where, when, how to intervene

- Qualitative judgement
- Values
- Synthesis



# Meadows: system interventions

Resource distribution

Stocks, buffers, flows

Regulating negative/balancing feedback

Driving positive/reinforcing feedback

Flows, timing, delays

Rules

Goals

Beliefs and values



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# THE ICEBERG MODEL

Use this tool to  
help you think  
more systemically!



## EVENTS

What is happening?

## PATTERNS OF BEHAVIOR

What trends are there over time?

## SYSTEMS STRUCTURE

How are the parts related?

What influences  
the patterns?

## MENTAL MODELS

What values,  
assumptions, +  
beliefs shape  
the system?

Increasing  
Leverage

Source:  
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Meadows Institute

<http://www.donellameadows.org/systems-thinking-resources/>



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# Brighton Complex Systems Toolkit Framework

- Resources and their use
- Identify types of change
- Use of Information
- Setting the rules
- Empowering Self Organisation
- Directions and Purpose
- Radical Change: a values paradigm



# Macro relations

- Relating to the external, bigger picture
- External environment
- Neighbouring systems



# System Resilience (Anti Fragile)

Dispersed resources: don't be dependent on one thing/person

Connection with history: understand how you got there

Risk consequence: weigh risks and probabilities carefully

Fragile dependencies what are we over dependent upon?

Need for an open/transparent matrix of relations/communications

'Key node overload' mother, carer, GP, classroom teacher, middle manager



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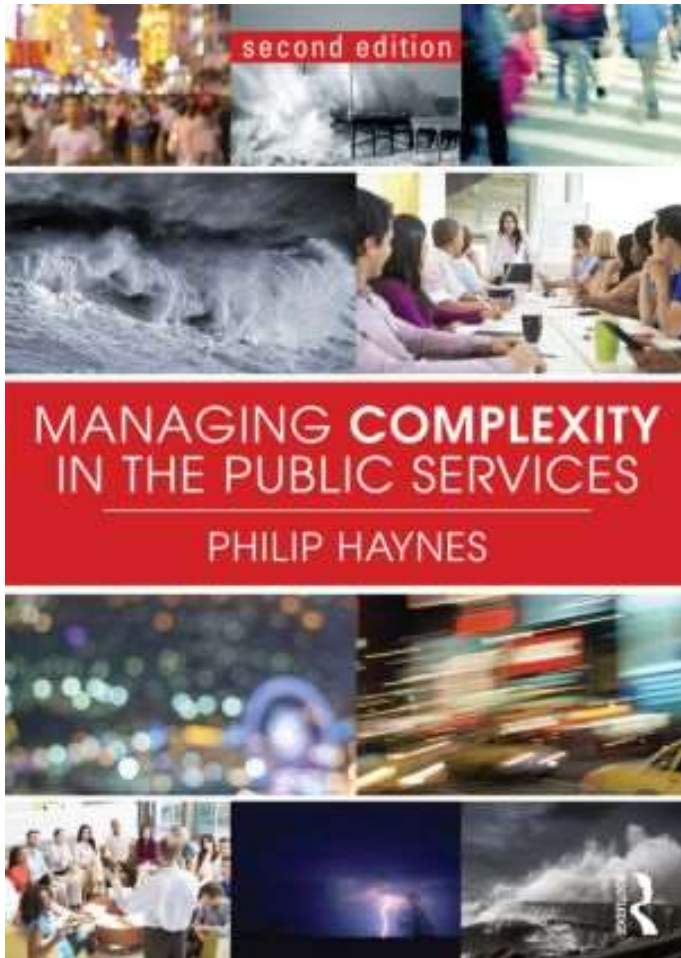
# Conclusion

- Understand the system and its context
- Build resilience (and stability)
- Culture – values, beliefs
- Promote and support good decision making
- Simplification of processes
- Adaptation of strategy and behaviour



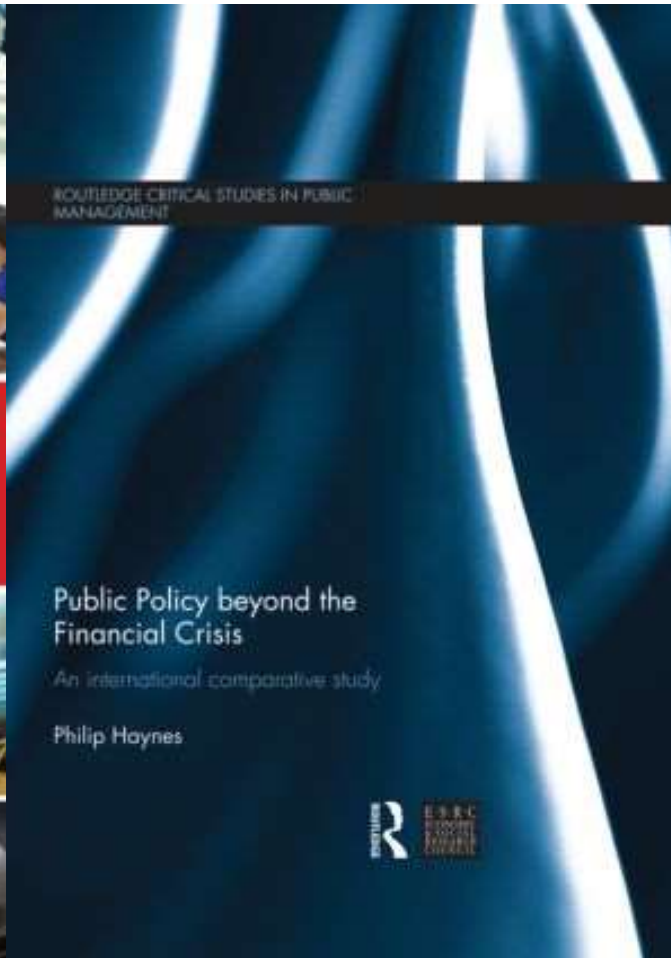
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# Publications



## MANAGING COMPLEXITY IN THE PUBLIC SERVICES

PHILIP HAYNES



<https://www.routledge.com/products/9780415739269>



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