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Feeling into Systems: Reclaiming Intuition in Systems Thinking Education

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CEDON – KU Leuven
Higher Education Summit 19/11/2025

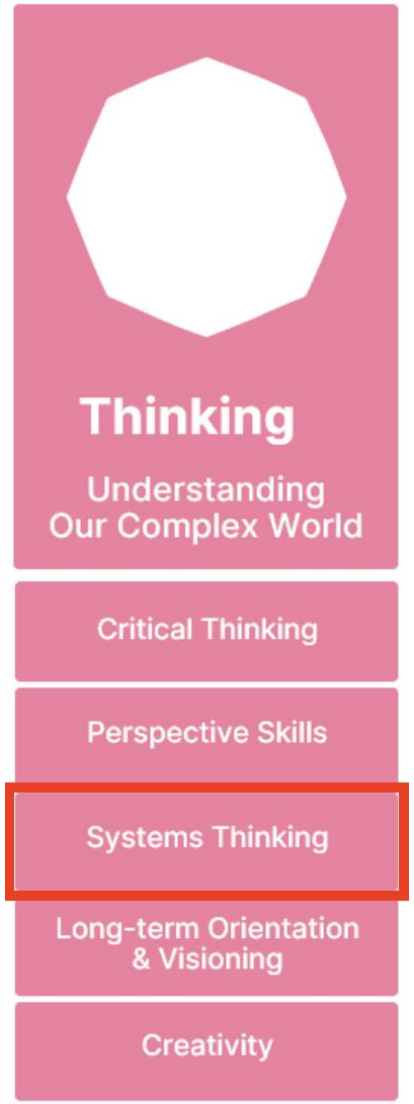
Content

- Theoretical background:
  - Introduction in systems thinking and sustainability
  - Applications in higher education
- Intuition in systems thinking
- Applications
  - Camp fire exercise
  - Narrative exchange

1. Introduction

Link systems thinking and sustainability

- Skill for complex problem-solving
  - Wicked problems: climate change, social inequality, … (Meadows, 2009)
  - Decision-making and adaptation in dynamic business environments (Senge, 1990)
- Systems thinking is a (future) key competence
  - Sustainable Competences (Roorda, 2010; Wiek et al., 2011)
  - Sustainability mindset (Kassel & Rimanoczy, 2018),
  - Inner Development goals (IDG alliance, 2021),
  - Education for Sustainable Development (UNESCO, 2020)



innerdevelopmentgoals.org/guide/

Journal of Cleaner Production 48 (2013) 65–73

Contents lists available at SciVerse ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

The integration of competences for sustainable development in higher education: an analysis of bachelor programs in management

Wim Lambrechts [a,*], Ingrid Mulà [b], Kim Ceulemans [a], Ingrid Molderez [a], Veerle Gaeremynck [c]

Table 5
Analysis of the individual competence matrices.

Competence Matrix of Individual Bachelor Programs \ Competences for SD (Roorda, 2010)	Responsibility	Emotional Intelligence	System Orientation	Future Orientation	Personal Involvement	Action Skills
Bachelor in Business Management						
KHL – Accounting – Fiscal studies	3	2	2	1	2	3
KHL – Finance & Insurance	3	3	2	1	2	3
KHL – Marketing	3	3	2	1	2	2
HUB – Business Management	2	3	1	1	1	1
Bachelor in Office Management						
KHL –Office Management	2	2	2	1	1	1
HUB – Office Management	2	3	1	1	1	1
Bachelor in Applied Information Technology						
KHL – Applied Information Technology	2	2	2	2	1	2
HUB – Applied Information Technology	2	3	1	1	1	1

Legend:		
	1	little or no integration
	2	minimal integration
	3	moderate integration
	4	good integration

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Innovation

Why You Need Systems Thinking Now

It's the best way to anticipate the many secondary effects of change in an interconnected world. by Tima Bansal and Julian Birkinshaw

From the Magazine (September–October 2025)

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'OVERVIEW IS CRUCIAL'

Systemic thinkers are the engineers of the future

FEBRUARY 28, 2025

The High Tech Systems Center (HTSC) recently hosted a symposium on systems engineering in conjunction with NXTGEN Hightech.

World Health Organization Health topics Our work Newsroom Data

New WHO collaborating centre in France to promote systems thinking and innovation for noncommunicable disease prevention

14 September 2025 | News release | Reading time: 2 min (560 words)

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EDUCATION AND SKILLS

Systems thinking has great potential in education. Here are 5 ways to deliver it

Nov 21, 2024

Forbes

LEADERSHIP > LEADERSHIP STRATEGIES

We Must Embed Systems Thinking In Education. Here's How

By World Economic Forum, Contributor.

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What is a system?

Different definitions:

Raworth, 2017:

“A set of things that are interconnected in ways that produce distinct patterns of behaviour and it is the relationships between the individual parts that give rise to their emergent behaviour.”

Meadows, 2009:

“An interconnected set of elements that is coherently organized in a way that achieves something”

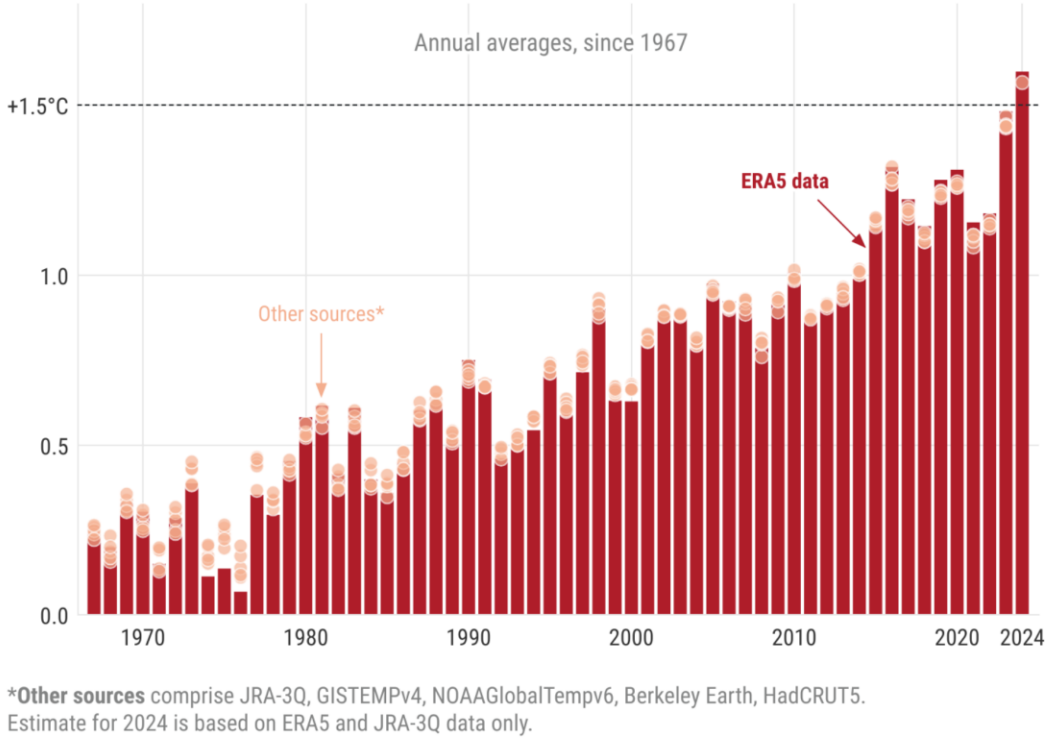
What is systems thinking?

- Different definitions (Arnold and Wade, 2015):

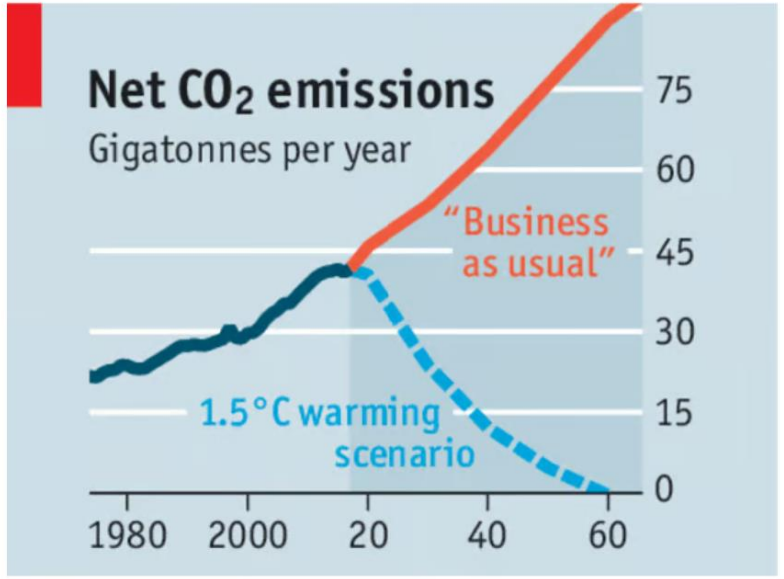
> Management perspective: "*A framework for seeing **interrelationships** rather than things, for seeing **patterns** of change rather than static snapshots*" (Peter Senge, 1990)

> Sustainability: "*The ability to recognize and understand **relationships**, to analyze **complex systems**, and to find **leverage points** for intervention*." (Wiek, Withycombe & Redman, 2011)

Example: global warming as a system



(López Astudillo, 2014)



(The Economist, 2018)

World exceeds 1.5°C threshold for entire year for the first time

www.rmets.org/metmatters/world-exceeds-15degc-threshold-entire-year-first-time

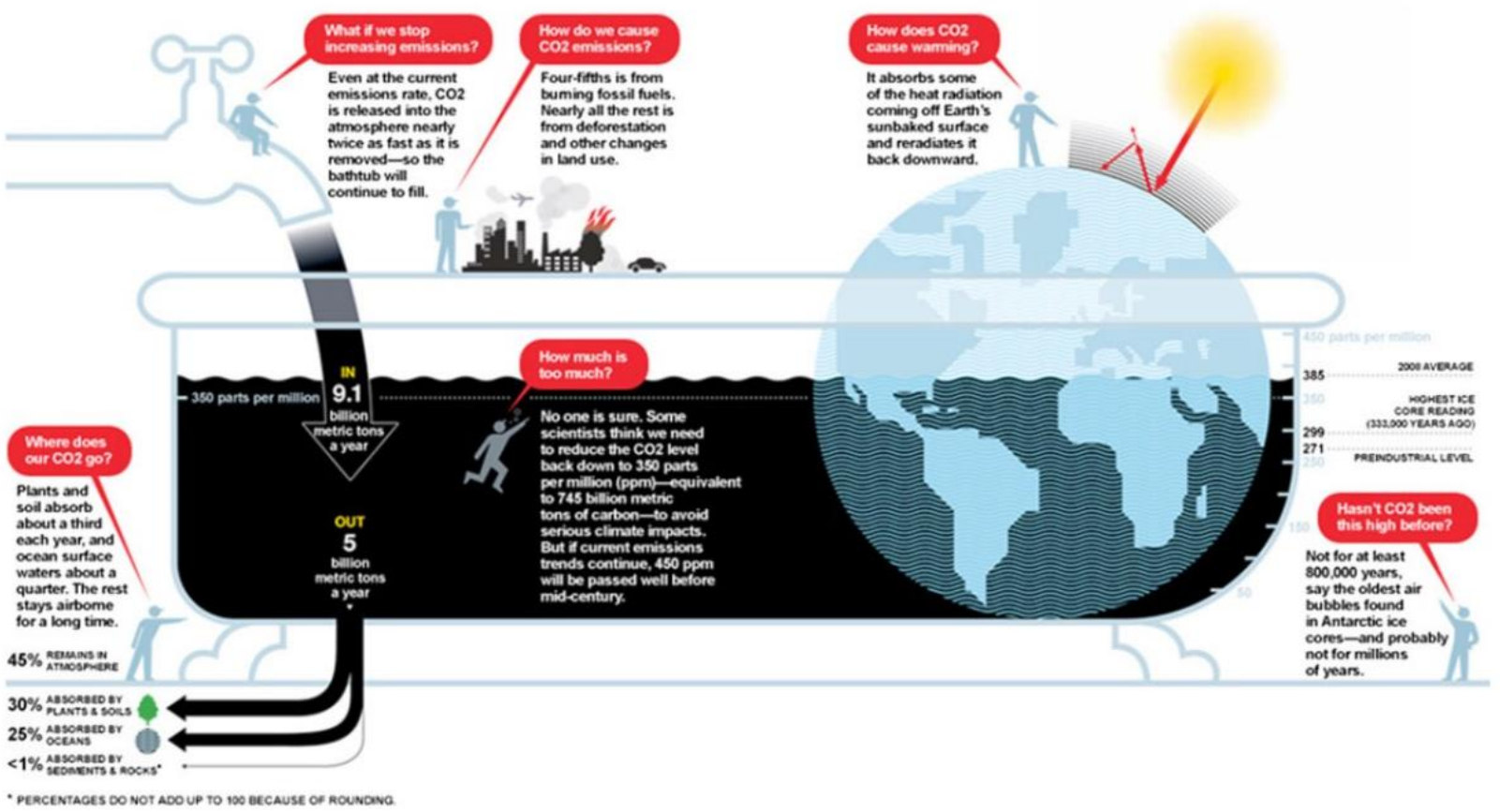


Fig. 2 Portraying stocks and flows: The "Carbon Bathtub" (Source: Graphic: Nigel Holmes. Sources: John Sterman, MIT; David Archer, Univ. of Chicago; Global Carbon Project. *National Geographic*, Dec. 2009; available at ngm.nationalgeographic.com/big-idea/05/carbon-bath)

822 Climatic Change (2011) 108:811–826

Source: Sterman, 2011, p. 822

Applications HE: Beer Distribution Game (MIT, 1960s)

Experiential simulation

Supply chain; each making ordering decisions with limited information.

- Shows how structure drives behaviour
- Tiny changes create upstream oscillations due to delays, feedback, and limited information
- Players underestimate delays, overreact, and amplify volatility.
- Participants feel frustration, urgency, and feedback delays

Entry point:

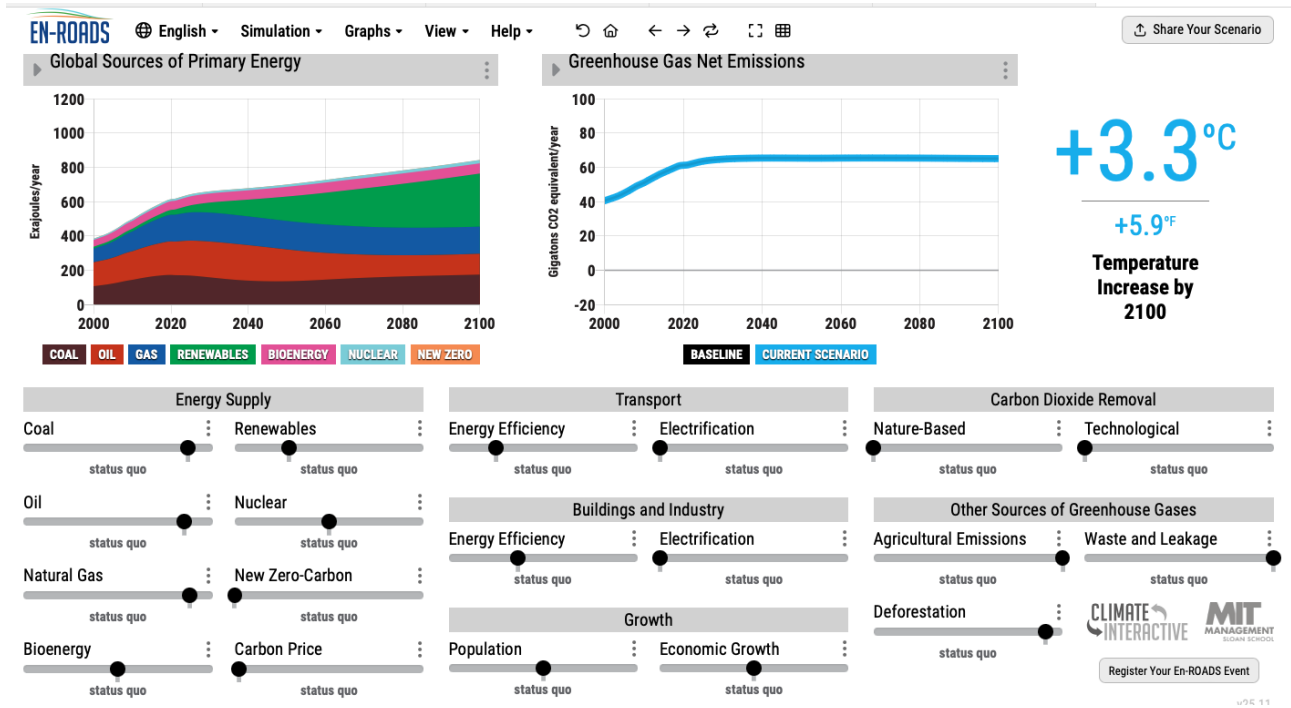
- Small system with clear rules
- Focus on structure, feedback, delays and systemic interdependence
- Before moving to messy “outer system” problems (climate, society, transitions)

https://zensimu.com/templates/beer-distribution-game/

Applications HE: EN-ROADS

Interactive climate-energy simulation

- Test climate policies in real time.
- It reveals the structure of the global climate-energy system
- It shows delayed and nonlinear system behavior
- It challenges assumptions about policies
  - “Just add renewables,”
  - “Technological innovation fixes it,”
  - “Planting trees is enough,”
- Evidence-based system feedback



https://en-roads.climateinteractive.org/scenario.html?v=25.11.0

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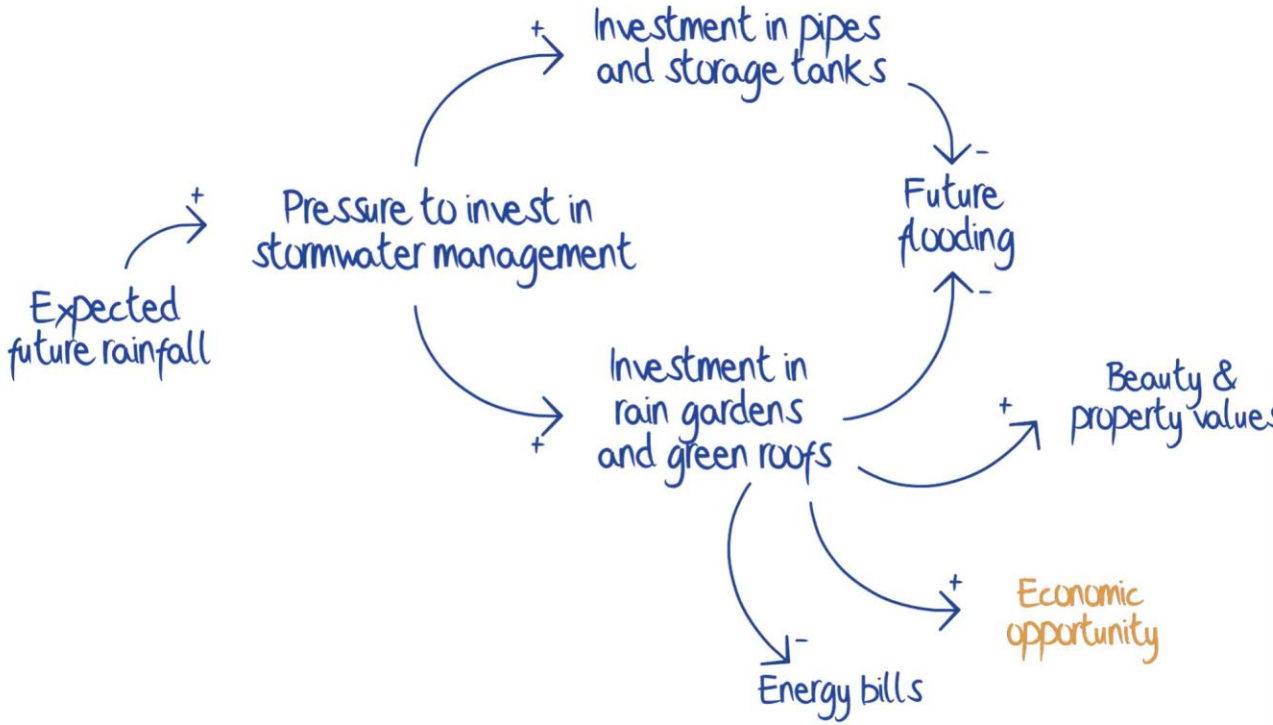
Applications HE: causal loop diagram

Visual map

Shows how variables in a system influence one another through cause-and-effect relationships.

- Makes feedback, delays, and interdependencies visible
- Helping us understand why a system behaves the way it does.
- Variables, arrows (+ -), feedback loops (reinforcing and balancing), delays

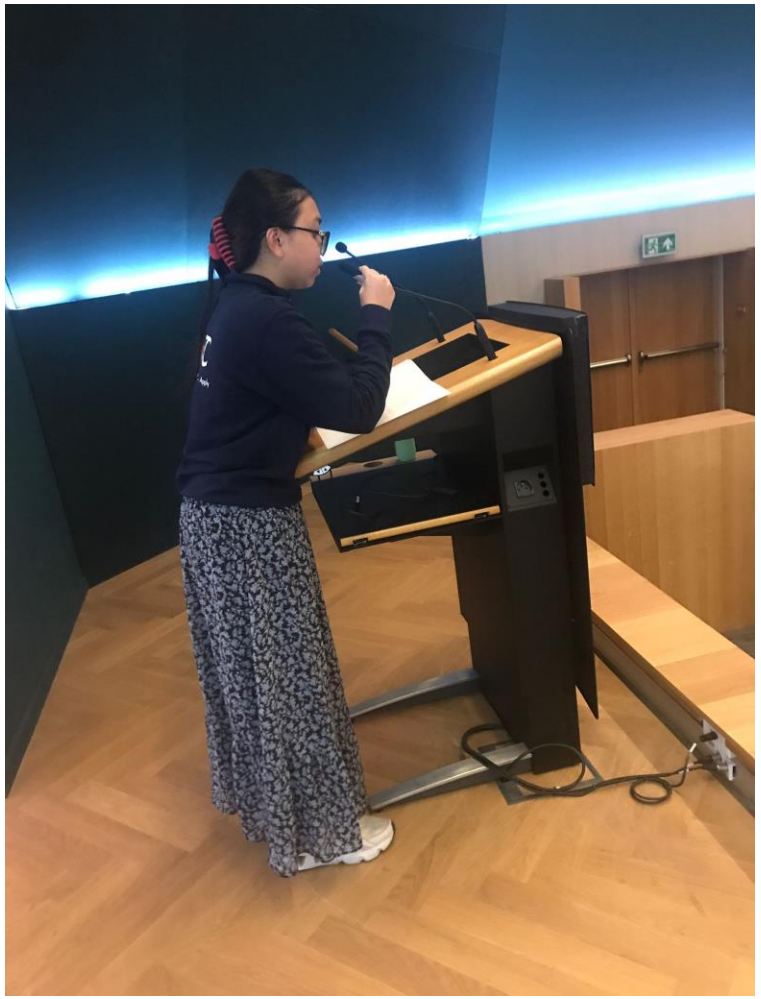


Source: Causal Diagrams [The Climate Leader]

Applications HE: causal loop diagram

As a group assignment

- Possible with every wicked problem
- There is no single right map
  - Externalize mental models
  - Learning from each others' perspectives
  - Values multiple perspectives
  - Be curious*:* ask questions
- Embracing uncertainty and ambiguity
  - Students question the relevance
  - Can make students feel uncomfortable



Different factors in a system

- Distinction between technical and contextual factors:
  - **Technical factors**: concrete, task-oriented elements
    - science/engineering knowledge, tools & processes (e.g., heating systems, insulation, distribution)

    → Not much space for various interpretations.

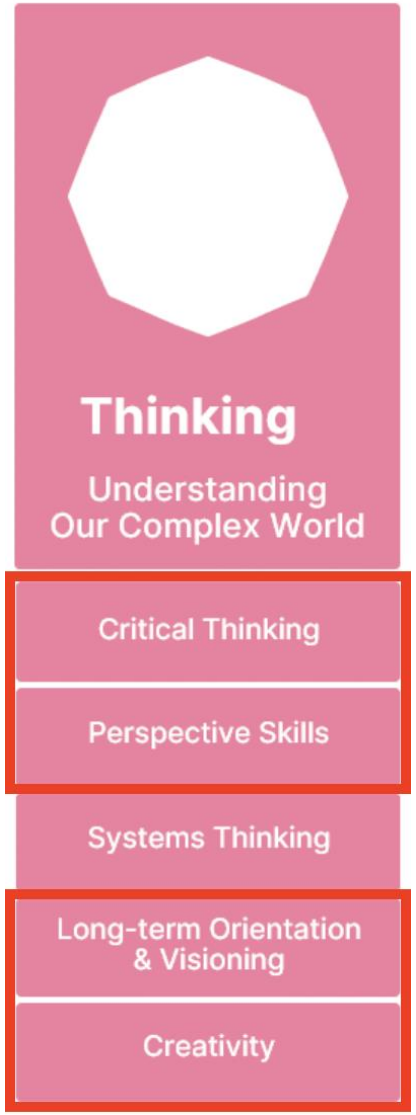
    → Biggest focus in systems thinking exercises
  - **Contextual factors**: societal conditions
    - Social, economic, political/legal, cultural (e.g., affordability, regulations, values)
    - The environment of constraints, norms & power around technical solutions

    → Much space for various interpretations

(Grohs et al., 2018)

Contextual factors

- Crucial for the societal and cultural part of wicked problems
- Individuals see the context differently.
  - Their view depends on their own mental model of society.
- Interconnected with other competencies
  - Collaborating across viewpoints trains **perspective skills**
  - Builds **critical thinking**: learn to question their own assumptions
  - **Long-term thinking & visioning**: contextual understanding is the bases of imagine futures
  - Linked to **creativity**: meaning-making, and other possibilities.



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What do we want to address?

Outer sustainability: visible systems we create: policies and governance, economic markets, built environment, ecological systems and ecosystem health

→ Teaching technical factors

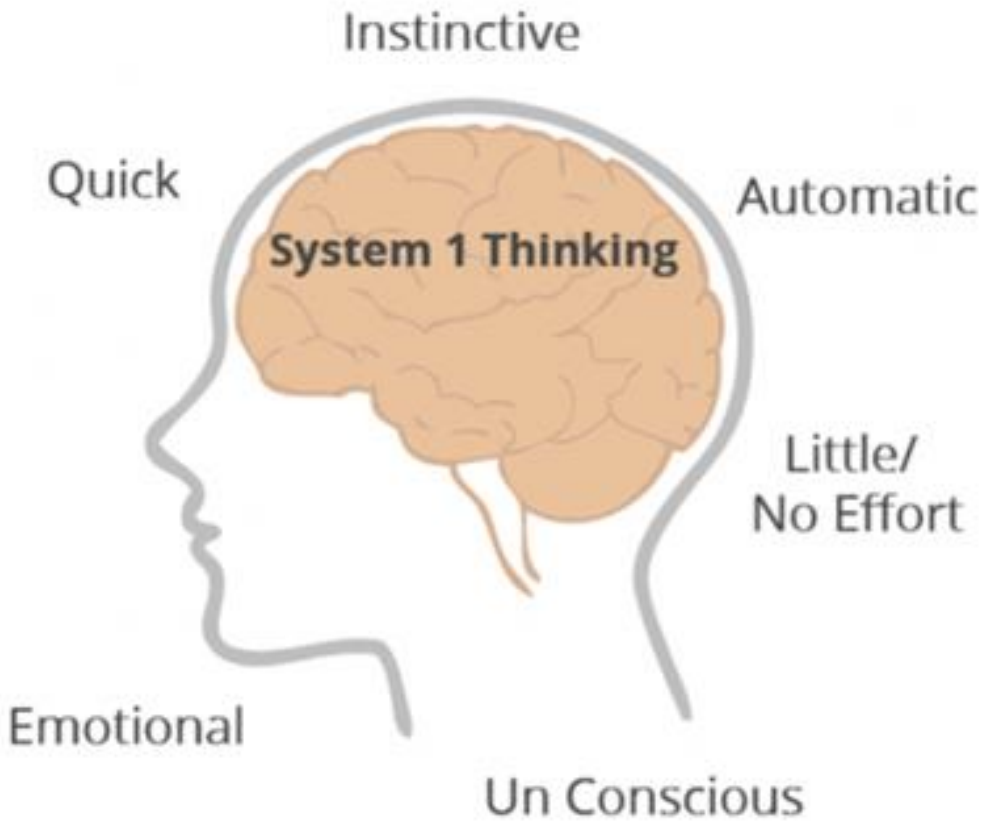
Inner sustainability: to the internal, non-observable aspects of human existence: worldviews, paradigms, beliefs and values, thoughts and emotions.

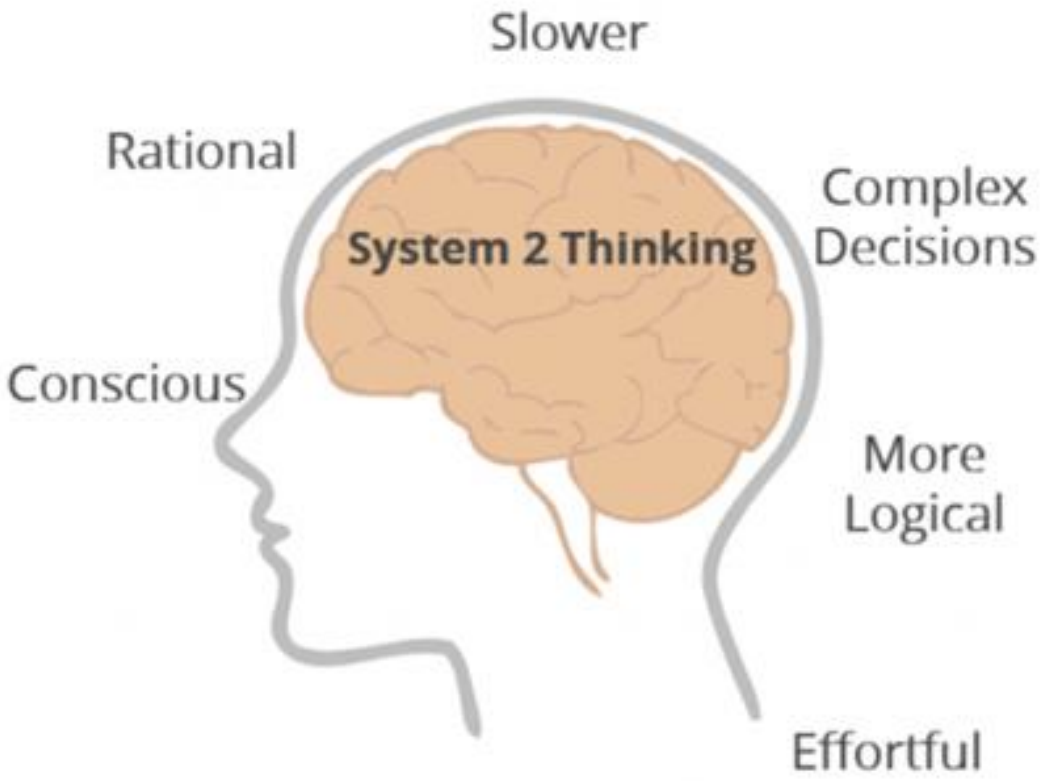
→ Teaching contextual factors

Gibbons (2020): Sustainability efforts have failed largely because they ignored inner realms and focused only on outer systems.

(Gibbons, 2020)

DANIEL KAHNEMAN'S SYSTEMS OF THINKING

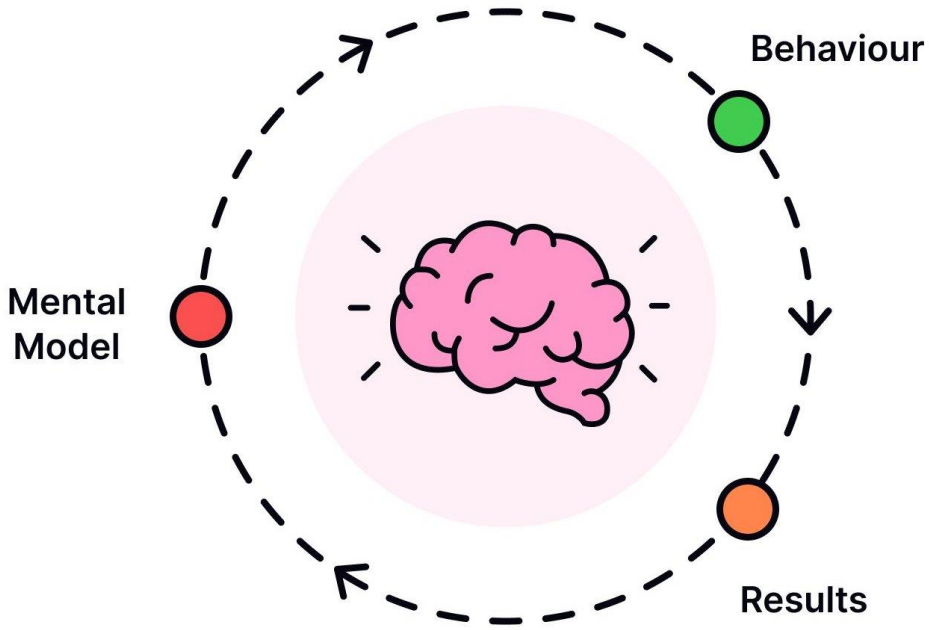




Inner dimension in systems thinking

Intuition: fast, experience-based pattern recognition about system behaviour

- Pattern recognition from experience
- Detects system shifts before formal data
- Shaped by our mental model of the world
- Filters what we notice, ignore, or misinterpret.



(Klein, 1998; Senge, 1990)

Intuition as inquiry

- Embodied and emotional; draws on tacit, lived experience
- Supports sense-making, early warning, and hypothesis generation
- In systems thinking,
  - it helps spot anomalies
  - fuels creativity
  - guides inquiry when data is missing
- **But** must be questioned, tested, and complemented by structured tools

(Arnold and Wade, 2015; Meadows, 2009)

The intuition trap

Intuition is unreliable in complex systems.

- Systems behave counterintuitively

→ delays, nonlinearities, feedback loops

- Intuition is easily distorted

→ biases, fears, stereotypes and assumptions

- Social systems can hijack this

→ populism, conspiracy thinking, fake news

- In the post-truth era, the emotional reactions often override evidence

→Dismissing intuition dismisses lived insight

(McIntere, 2018; Meadows, 2008; Sterman, 2000)

Dealing with intuition

Systems thinking requires abstract thinking and working with fuzzy boundaries.

Training abstract thinking by drawing:

- Makes the gut feeling explicit to reflect on it
- Makes you slow down to interrupt fast judgments
- Way to communicate and add multiple perspectives
- Possibility to develop it is a causal loop diagram:
  - Use intuition as an early signal
  - Test intuition against structure

(Kahneman, 2011; Sweeney & Sterman, 2000; Schön, 1987; Squires et al., 2011)

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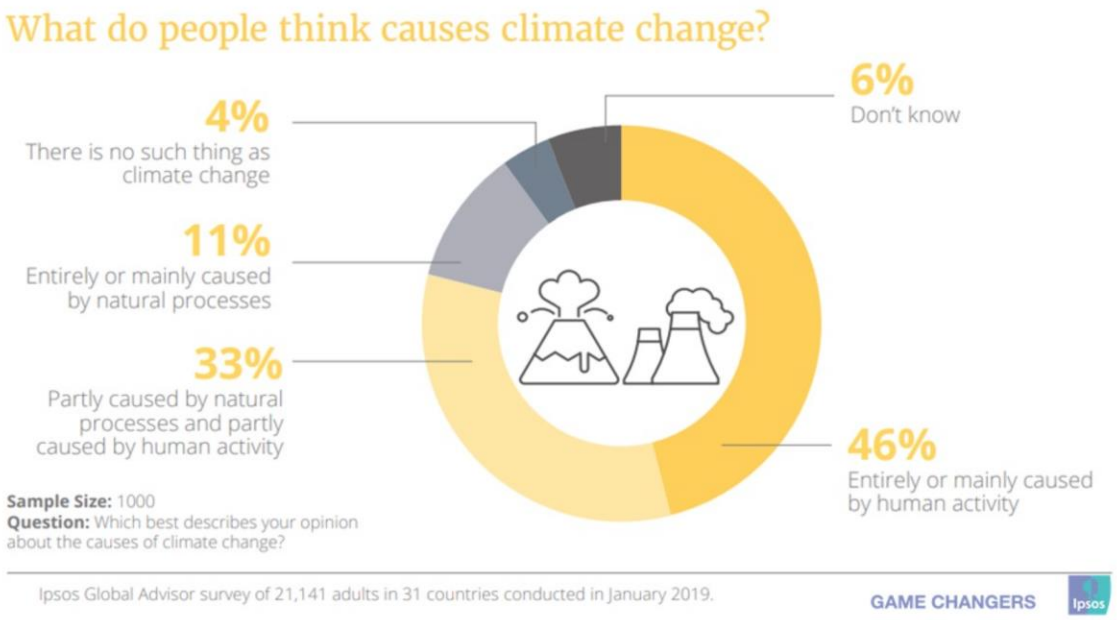
Campfire exercise

Drawing the System



Purpose: Access your intuitive, embodied understanding of a wicked system, and translate this into a visual, metaphorical pre-map.

Topic: Trust in Science about environmental issues

1. Close your eyes and sense the system as a living, wicked system

Drawing the system

2. Draw the system intuitively and feel into the dynamics

- Where does energy accumulate?
- Where does something resist change?
- Where do things get stuck?
- What flows?
- What returns?
- Looks stable on the surface but unstable underneath?

Interpret your drawing

- *If this system were a landscape, where are:*
  → slopes (reinforcement)
  → valleys (stability)
  → storms (conflict)
  → fog (uncertainty)
  → fire (motivation, pressure)
- *Who is at the centre? Who stays at the edges?*
- *What grows fast? What withers? What keeps returning?*

Interpret your intuitive systems map

- What reinforcing dynamics do you see in your drawing?
- What balancing dynamics or resisting forces appear?
- Where are delays, bottlenecks, or loops?
- What elements of a wicked problem show up?
  - conflicting goals
  - no clear cause-and-effect
  - behaviours changing over time
- This bridges from *felt sense* → *conceptual system*.

Narrative exchange

Personal Narrative Exchange

Purpose: recognise how the *same intuitive signals* you used in your drawing also appear in real-life experiences and how they help us sense early patterns within societal wicked problems.

Step 1: Recall a Moment (5 min)

Think of a moment that relates to the wicked problem of “trust in science” where you sensed something.

Examples:

- Sensing doubt even when others agreed
- Confusion about what source to trust
- Feeling contraction or tension when messages didn’t align
- Noticing emerging trust or mistrust
- Feeling uncertainty about explanations, data, or advice
- Sensing openness or resistance in a (group) discussion

2. Personal Narrative Exchange

Step 2: Personal Storytelling

Share your story (~2 min each):

- What was happening?
- What did you sense in the moment?
- What inner signals appeared?
  (tension, openness, heaviness, warmth, contraction, confusion, energy shifts…)
- What happened next?
- How did your intuition guide or warn you?

2. Personal Narrative Exchange

Step 3: Group Reflection

- Which inner signals appeared across stories?
- How did these signals help you understand the situation earlier or differently?
- Which cues only made sense in hindsight?
- How might similar signals show up in the wicked problem you chose?

Reflections?

Survey about systems thinking exercises:
https://survey.kuleuven.cloud/3?lang=en