

# Responsible and systems-oriented expertise

Workshop4 Group3

Hang Su, Yifan Zhou, Puxi Cao, Chenhao Zhang, and Han Zhang

# The performance order



What are the relevant concepts and methods for undertaking a transdisciplinary research?

-Chenhao Zhang

How systems thinking can be used for transdisciplinarity?

-Hang Su

What's collective thinking, reflective thinking, wicked problems?

-Yifan Zhou

How to move from disciplinarity to transdisciplinarity?

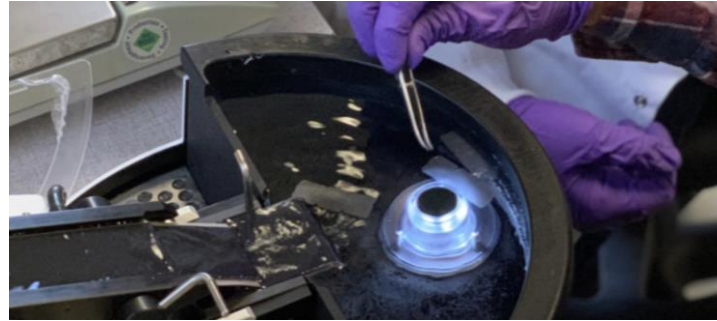
-Puxi Cao

How expert's expertise could be ethical and responsible?

-Han Zhang



Transdisciplinary design in architecture



Transdisciplinary design in AI



Transdisciplinary design in human health

# Concepts and Methods in Transdisciplinarity

# Concepts and Methods in Transdisciplinarity

1. Reflectivity
2. TCI (Theme-Centered Interaction)
3. Co-producing
4. Integration

# Concepts and Methods in Transdisciplinarity

## 1. Reflectivity

1) collaborative deliberation

2) social relevance

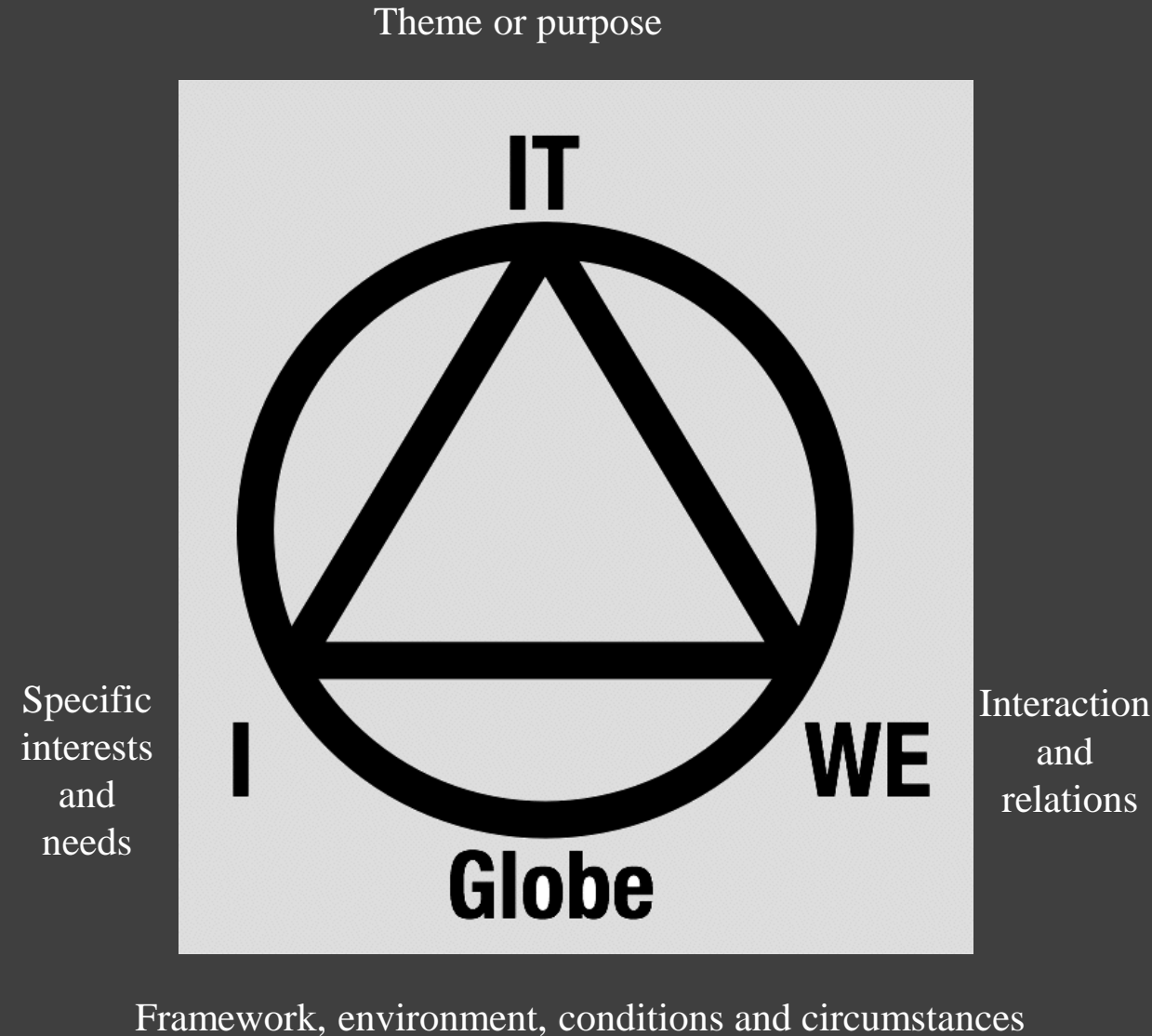
3) social experimentation

4) criticalness and transformation

# Concepts and Methods in Trandisciplinarity

## 2. TCI (Theme-Centered-Interaction)

- Application: definition of four scenarios for the city of Korneuburg





# Concepts and Methods in Transdisciplinarity

## 3. Co-producing

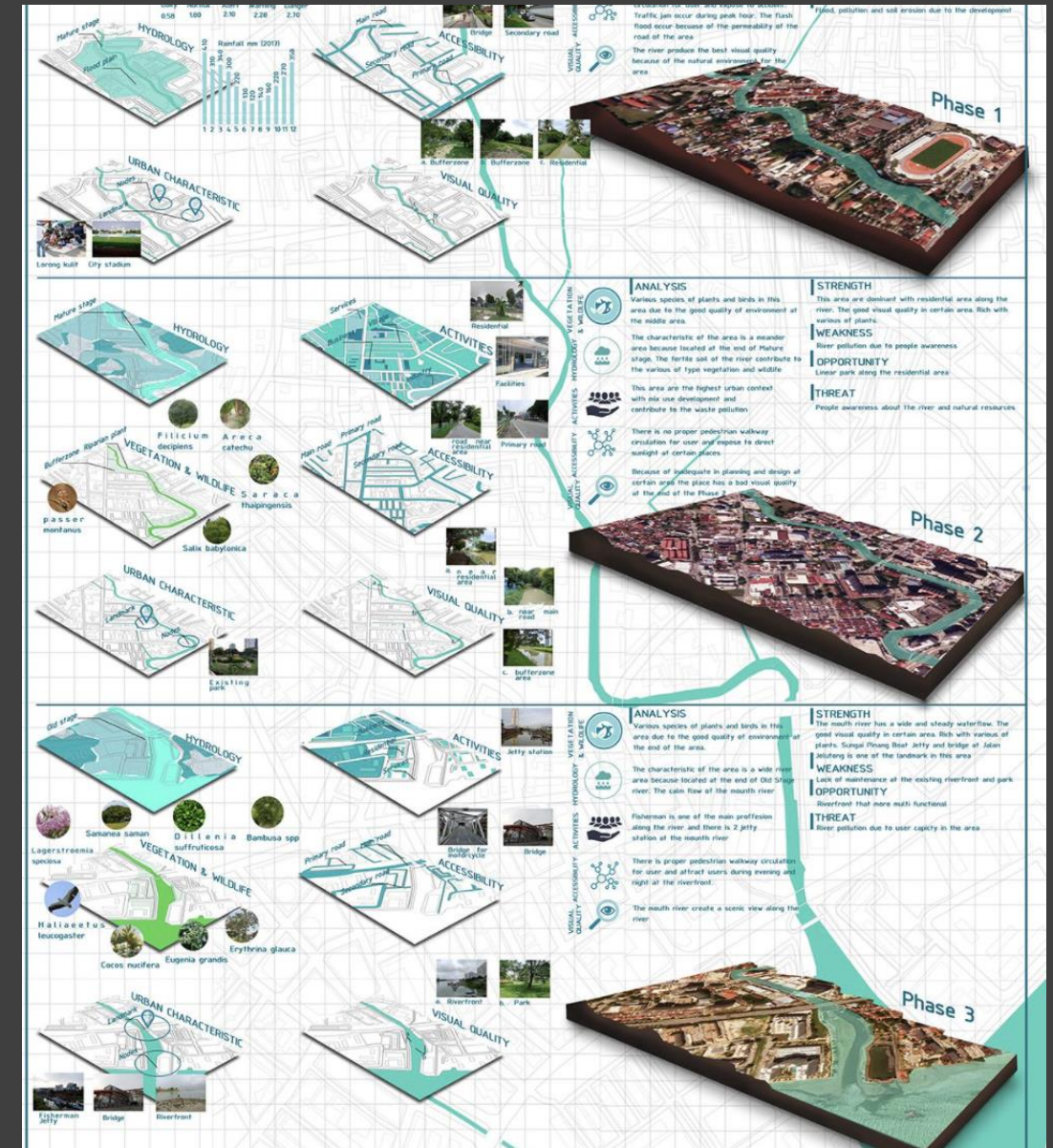
- Inclusion
  - Collaboration
  - Integration
  - Reflexivity
  - Usability
- 
- Application: the Mistra Urban Futures programme in Gothenburg.



# Concepts and Methods in Transdisciplinarity

## 4. Integration

- An instrument that enables the description and structuring of the outcome of a specific research project
- Application: Inventory of Synthesis in geology.







# Take away messages

---

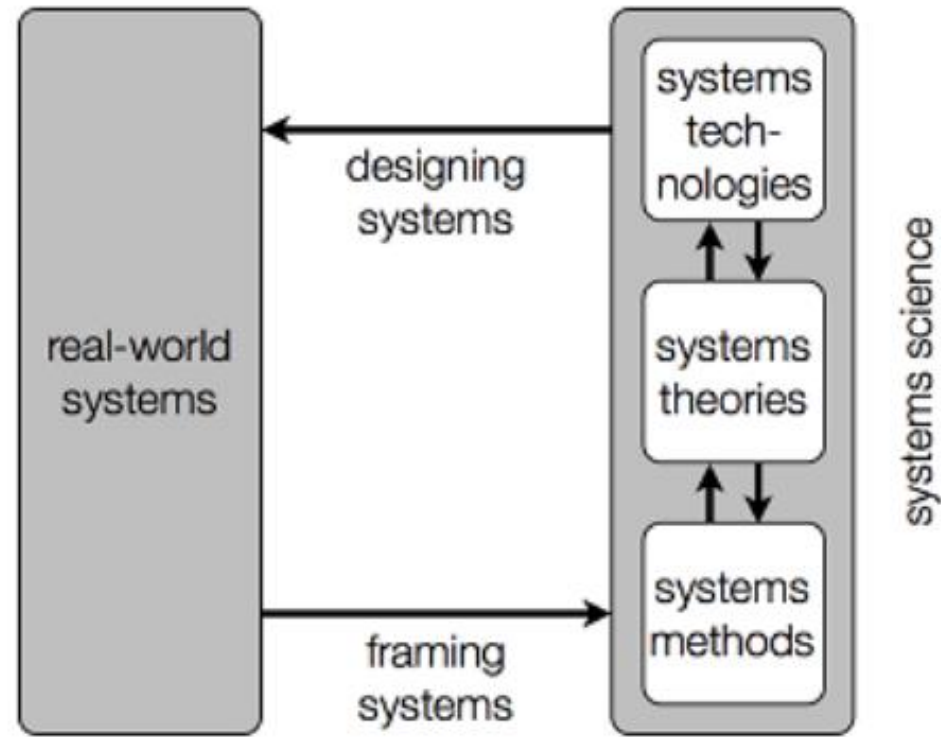
1. Always think of transdisciplinarity
2. Can you use TCI to analysis your project?
3. How to get outcome by using Co-producing?
4. How to integrate the knowledge?

# Transdisciplinarity and Systemism

- Aims: complex problems
- Scope: a bigger picture of reality
- Tools: similarities across disciplines
- Aims: solve complex problems by designing systems
- Scope: mechanisms of real-world systems
- Tools: framing isomorphisms

System thinking is suited for transdisciplinary studies.

## Modelling Systems



Sketch of Systemism

Absolutism

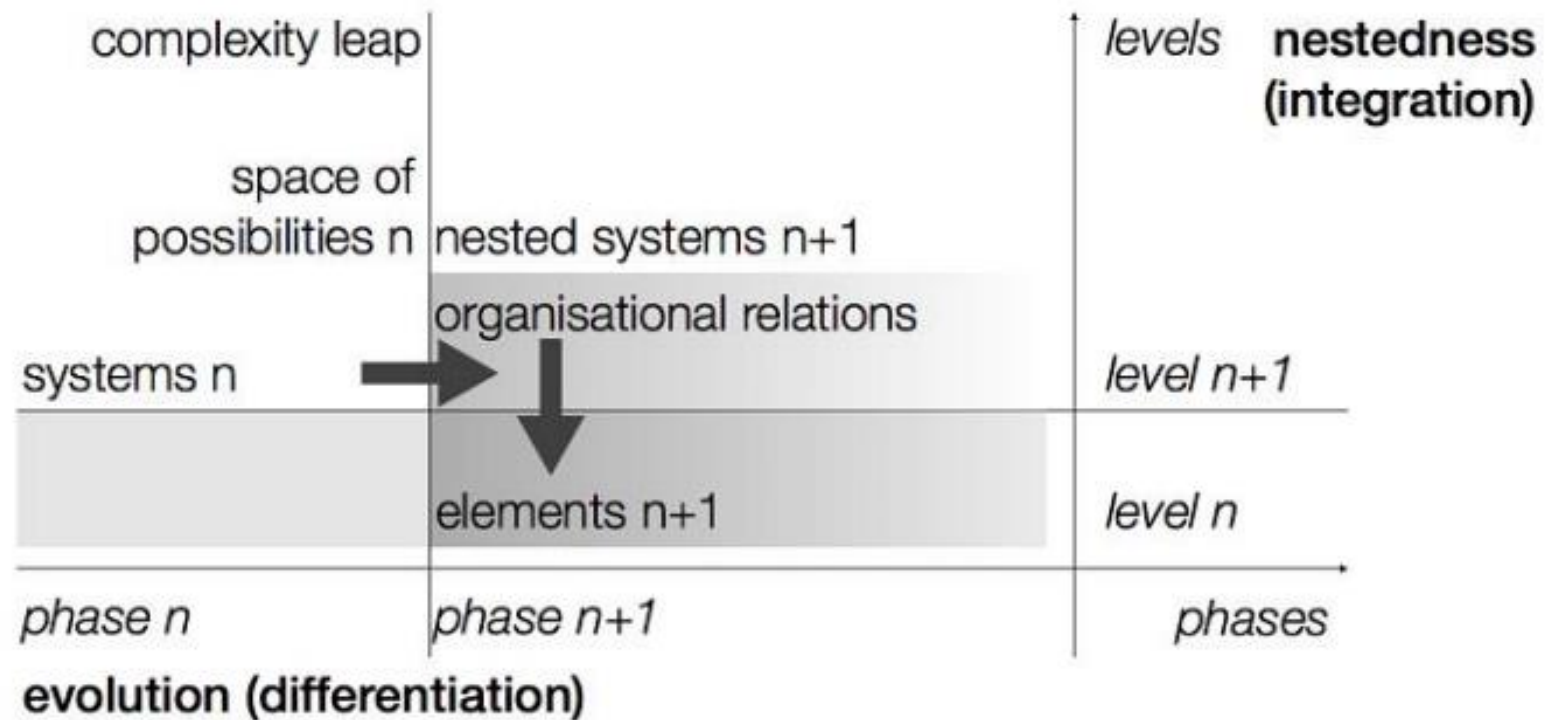


Relativism

Systems methods : integration



# Systems theory: self-organisation



The multi-stage model of evolutionary systems



# The systems technologies: Synergy

---

Meaningful technology is oriented towards the advancement of synergy and hence alleviation of frictions.

# Collective Thinking

## Significance

- Effective way to obtain comprehensive understanding of complex social-environmental issues.
- Can help us to overcome the barriers between the traditional knowledge

## Methodology

- Welcome diversity
- Treating opposite as interdependent relations
- Follow the principle of deep democracy
- Applying different knowledge collectively

# Reflective Thinking

## **General Methodology**

- Observe and analyze based on the acquired experience dynamically and interactively
- Making judgements and plans based on the results of observe and analyze.

## **Kolb's Learning circle (One example)**

- Concrete experience (having a new experience)
- Reflective observation (reflecting on that experience)
- Abstract conceptualization (learning from that experience)
- Abstract experimentation (apply what you've learned from that experience).



# Wicked Problem

- **Features**
- Has many independent factors and a complex system is involved
- Hard to find balanced solutions

## **Example:**

The urbanization process in China:

Stakeholders:

- 1. Government
- 2. Land agents
- 3. Manufacturing industrial entrepreneurs
- 4. The farmers
- 5. The urban middle and low incomes

# Review of Transdisciplinarity

---

*‘Transdisciplinarity requires deconstruction, which accepts that an object can pertain to different levels of reality, with attendant contradictions, paradoxes, and 14 conflicts’*  
(Klein, 2004)

*‘It does, in effect, require a completely different framework of working, unrecognizable to disciplinary organizations or their specific research methods’*  
(Wilby, 2011)

# General System Theory (GST)

## – Unity of Knowledge

GST encapsulates the principles that recur across the Systemics, and hence represents the most general principles behind the kinds of order we find in the concrete world (Von Bertalanffy, 1950).

Different disciplines can share similar ontologies.

Different disciplines can be connected by systems.

GST is the largest system connects everything.

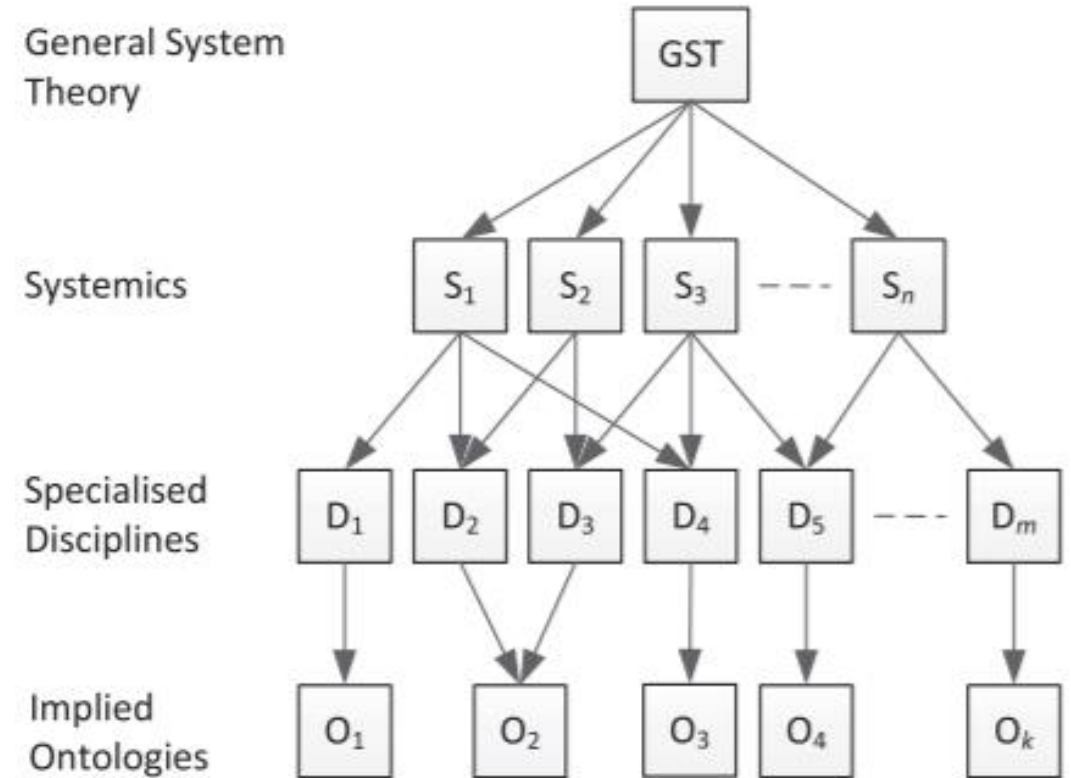


Figure 4 Relationships between Specialized Disciplines and Systems Theories (D. Rousseau, forthcoming b)

# General System Ontology (GSO) - Unity of Nature

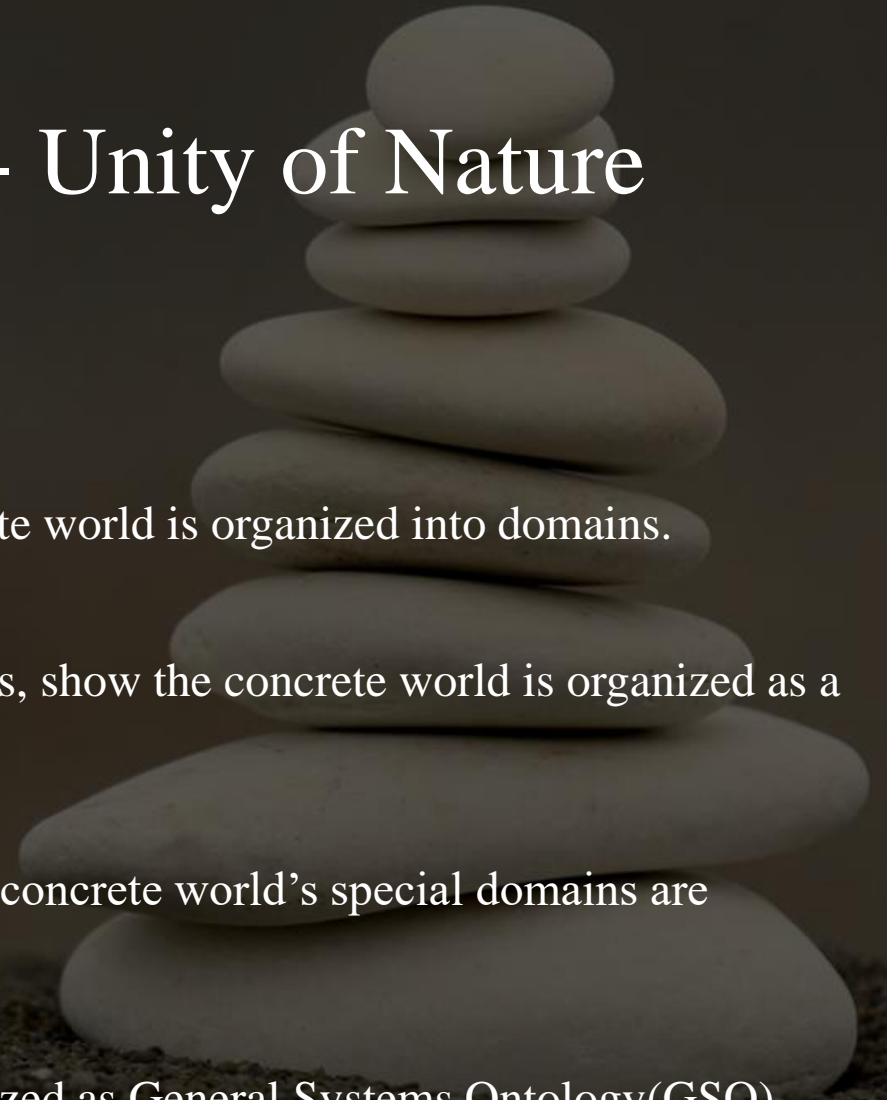
(Laszlo, 1972)

Firstly, the existence of specialized disciplines shows that the concrete world is organized into domains.

Secondly, systemics, by revealing principles occurring across domains, show the concrete world is organized as a whole. Meanwhile, this global organization is reflected by GST.

Thirdly, the existence of global organizing principles entails that the concrete world's special domains are contingent expressions of a unified underlying ordered reality.

1. there is an ordered reality underlying Nature which was characterized as General Systems Ontology(GSO).
2. GST provides a formal model of some of the essential characteristics of this concrete Ultimate Reality.





# Take away message

## How to move from Disciplinarity to Transdisciplinarity

1. an overarching and unifying GST;
  2. an underlying Systems Philosophy model reflecting the unified ultimate ontology (GSO);
  3. a transdisciplinary language;
  4. a non-reductive means of bridging the sciences and the humanities;
  5. a worldview that reflects these systemic insights;
  6. a methodology for using these models and insights to make new discoveries on the nature of the world, ourselves and our place in the scheme of things, and to support our ongoing evolutionary development.
- 
- A 3D puzzle with one red piece standing out. The puzzle is composed of many grey pieces, and one red piece is placed in the center, slightly offset from the others, symbolizing the concept of transdisciplinarity as a unifying element.

# How expert's expertise could be ethical and responsible?

Experts?

Other people?

# For experts:



- Be ethical in research
- Be ethical in practice
- Be responsible in innovation
- Consider all the stakeholders
- Beware of bias

# External factors:



- Establish supervision and punishment systems
- Protect experts from being disturbed
- Treat the expert's expertise as references



# Reference

- 
- Alvargonzález, D. (2011). Multidisciplinarity, interdisciplinarity, transdisciplinarity, and the sciences. *International studies in the philosophy of science*, 25, 387-403.
- Bertalanffy, L.V. (2015). *General System Theory: With a Foreword by Wolfgang Hofkirchner & David Rousseau*. New York: George Braziller.
- Branche, B. (2005). *Reflective thinking*. London: Athena Press.
- Brown, V. and Lambert, J. (2013). *Collective learning for transformational change*. New York: Routledge.
- Choi, B. C., & Pak, A. W. (2007). Multidisciplinarity, interdisciplinarity, and transdisciplinarity in health research, services, education and policy. *Clinical and Investigative Medicine*, 29, 351-364.
- Cohn, R. TCI – Theme Centered Interaction. [https://www.eppler-baden.ch/texte\\_he\\_e/tzi\\_e.htm](https://www.eppler-baden.ch/texte_he_e/tzi_e.htm)
- Douglas, H. (2008). The role of values in expert reasoning. *Public Affairs Quarterly*, 22(1), 1-18.
- Hofkirchner, W. (2017). Transdisciplinarity needs systemism. *Systems*, 5(1), 15.
- Laszlo, E. (1972). *Introduction to systems philosophy: Toward a new paradigm of contemporary thought*. New York: Routledge.
- Li, B., Chen, C. and Hu, B. (2016). Governing urbanization and the New Urbanization Plan in China. *Environment and Urbanization*, 28, pp.515-534
- MISTRA URBAN FUTURES. <https://www.insideflows.org/project/mifra-urban-futures/>
- Muqri Jela. Site Inventory Analysis and Synthesis. <https://www.pinterest.com/pin/770185973754980002/>
- Kerne, A. (2005). Doing interface ecology: the practice of metadisciplinarity. In *ACM SIGGRAPH 2005 Electronic Art and Animation Catalog*, 181-185.
- Klein, J. T. (2004). Prospects for transdisciplinarity. *Futures*, 36, 515-526.
- Klein, J. T. (2010). A taxonomy of interdisciplinarity. *The Oxford handbook of interdisciplinarity*, 15, 15-30.
- Resnik, B. D. (2020, December 23). What Is Ethics in Research & Why Is It Important? National institute of environmental health sciences. <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
- Ritchey, T. (2011). *Wicked problems–social messes: Decision support modelling with morphological analysis*. Springer Science & Business Media.
- Rousseau, D., & Wilby, J. (2014). Moving from disciplinarity to transdisciplinarity in the service of thrivable systems. *Systems Research and Behavioral Science*, 31, 666-677.
- Von Bertalanffy, L. (1950). An outline of general system theory. *British Journal for the Philosophy of Science*, 1, 134–165.

Thank you!

