Know your Ologies

Toolkit for cross-disciplinary research

A MAPPING WORKSHOP

This document provides guidance as to how researchers can “map” their research across some of the categories of philosophy of science, either in the framework of an individual exercise or in the framework of a workshop for participants of research projects. While the mapping exercise is mainly intended for researchers it can be extended to broader audiences, including stakeholders participating in the co-production of knowledge. This document contains 19 pages, first introduces some key concepts and then presents the different steps to conduct the workshop.

Why should I care about Ologies

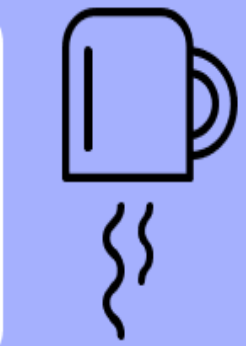
We all do research from a certain perspective, whether we are able to explicitly say what that perspective is or not. In sustainability science, researchers often face the need to consider knowledge generated from different perspectives. Knowing where to situate your own research with respect to the dominant perspectives in sustainability science helps communicating it to others. Knowing your ologies will allow you to situate your own research, that of others, develop collaborations and identify areas of tension.

Wait, but what are Ologies?

Ologies is short for “ontology” and “epistemology”. Ontology is the science of what exists. Our ontological commitments are the fundamental things that we believe to be true about reality. Epistemology refers to the study of what exists and spells out the conditions we believe are necessary for something to be considered knowledge. Methodology is also an ology, although a better known one, that defines the concrete procedures and tools valid to generate knowledge. There are many different perspectives of these three and here we propose to tackle the most common in sustainability science. Through a mapping exercise, we will discover how they relate.

When to do the mapping?

The mapping can be useful for different types of research projects and at different stages of the projects. We conceived of this exercise as a tool for cross-disciplinary teams to become familiar with the different perspectives present in the team and help facilitate building synergies. This clarification exercise may prevent incompatibilities to emerge at a later stage, when contradictions have arised and make comparison and data collection impossible. Individual researchers can also use the map to organise a literature review around a concept on which researchers from different traditions have published.



KEY CONCEPTS

Ontology
A particular commitment to the nature of being or the kinds of things that have existence

Epistemology
The study or a theory of the nature and grounds of knowledge especially with reference to its limits and validity

Methodology
Defines what forms of reasoning are valid in view of arriving at knowledge, defined by an epistemological position

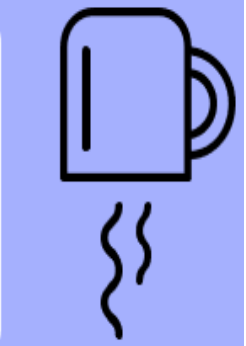
Methods
Data gathering and analysis. There can be many different methods that all comply with a same form of reasoning defined by a methodology

Truth criteria
Defines when we have knowledge

Multidisciplinarity
People from different disciplines working together, each shedding light on a problem drawing on their respective disciplinary knowledge. No integration of knowledge

Interdisciplinarity
Integrating knowledge and methods from different disciplines, using a synthesis of approaches, for example around models or frameworks (e.g. SES framework)

Transdisciplinarity
Integrating knowledge and methods beyond academia, using a synthesis of approaches, from example around novel conceptual frameworks or models.



TRIGGER THE REFLECTION

Suggested Questions

Participants in the workshop might have more or less experience in framing their ontological and epistemological position. Providing them with a list of questions in advance helps them reflect upon these issues in their own terms.

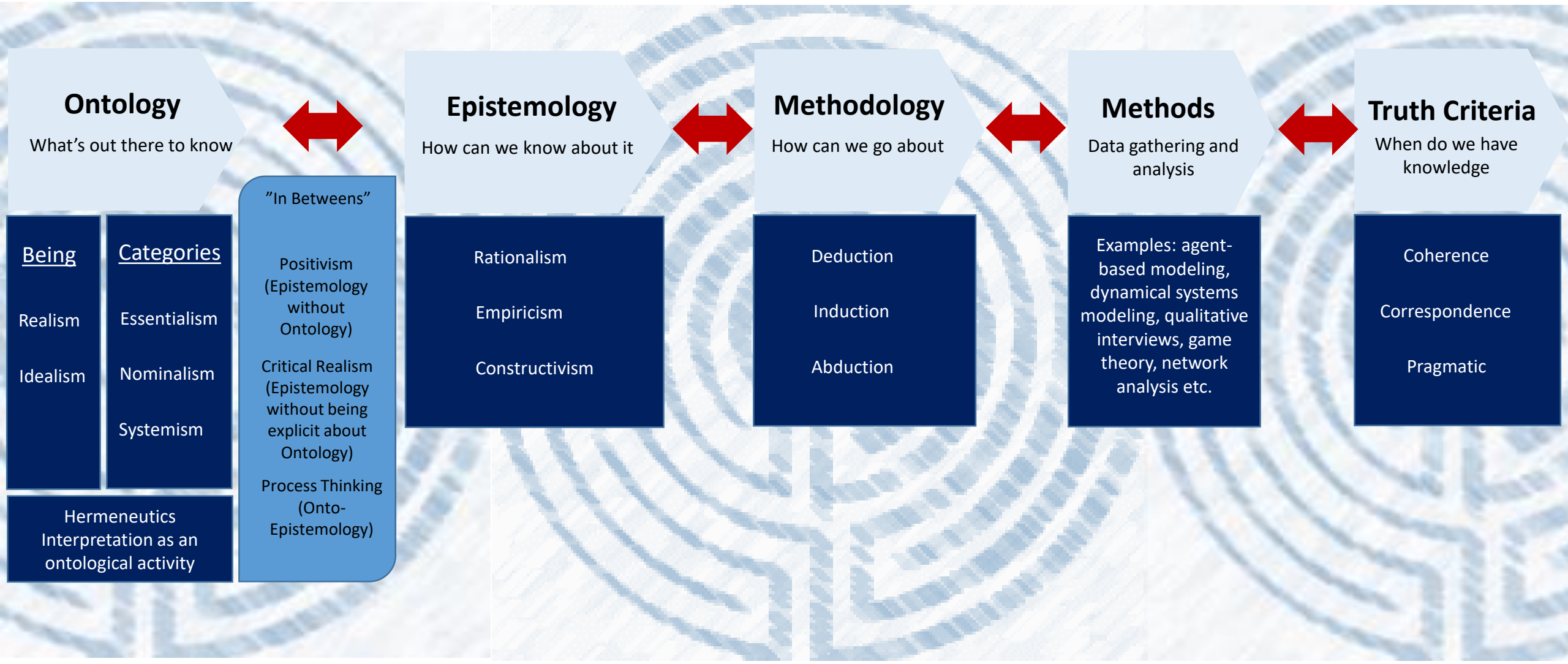
- Did you ever need to define what's out there to know? Has the definition changed over time?
- Did you ever need to define how can we know about the world? Has the definition changed over time?
- What theories or frameworks are you using? Can you briefly explain why.
- What methods do you use in your research and why? What kind of data (empirical and/or simulation / archival / first hand data / large data sets)?
- What implications does it have for sustainability research? How does your own stance impact/enable inter- and transdisciplinary research?

The Map

The map represents key elements of the research process, such as the choice of methods or the criteria to determine what is considered as valid or true knowledge. It presents these different elements as dependent on one another, or rather, following or conditioning each other. It aims at showing that not all epistemological positions are compatible with all ontological positions, nor are all forms of reasoning compatible with epistemological positions. For example, it is unlikely that inductive approaches and rationalism - a position that considers that knowledge comes exclusively from reasoning - go well together.

The map has no beginning and no end, so that different researchers - or researchers at different points in time - can access it departing from anywhere. One can begin with methods, ontologies, methodologies, or even with the data one is mostly working with. This is particularly useful as it doesn't require previous awareness of one's ontological or epistemological position, and thus makes this tool accessible for researchers with different backgrounds.

The Map

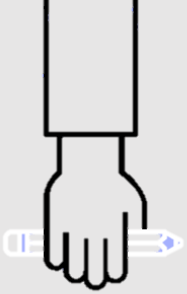

Ontology
What's out there to know
Being
Realism
Idealism
Categories
Essentialism
Nominalism
Systemism
Hermeneutics
Interpretation as an ontological activity
"In Betweens"
Positivism (Epistemology without Ontology)
Critical Realism (Epistemology without being explicit about Ontology)
Process Thinking (Onto-Epistemology)
Epistemology
How can we know about it
Rationalism
Empiricism
Constructivism
Methodology
How can we go about
Deduction
Induction
Abduction
Methods
Data gathering and analysis
Examples: agent-based modeling, dynamical systems modeling, qualitative interviews, game theory, network analysis etc.
Truth Criteria
When do we have knowledge
Coherence
Correspondence
Pragmatic

Before the Workshop

TO DO LIST

- [ ] **Step 1:** *Send questions (see "trigger the reflection") to the participants so that they start reflection upon their own research practice*

- [ ] **Step 2:** *Send a list with the definitions of the terms that will be used during the session to all participants two weeks before the workshop, so that they can become familiar with these terms and start thinking about how they relate to those (see glossary of key concepts).*



Let's review some key positions – Ontology

Being
(how things exist)

Realism: Reality exists independently of our perception and understanding of it

Idealism: Reality does not exist independent of our understanding of it. Instead, it is the mind that holds the components of knowledge. These are often considered ideal and thus have an objective existence (e.g. Platonic ideas)

"IN BETWEEN" (Categories and Being)

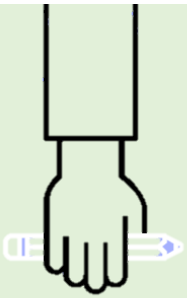
Hermeneutics (in an ontological sense): The meaning of reality should be disclosed as a result of *interpreting* the unique features of it. The activity of interpretation has an ontological dimension.

Essentialism: Each entity has a set of necessary properties/attributes (essences) that defines it

Categories
(what are the things that exist)

Nominalism: Only particulars exist, to be seen in opposition to essentialism

Systemism: Everything is either a system or part of a system. In addition, every system has emergent properties that its parts lack.



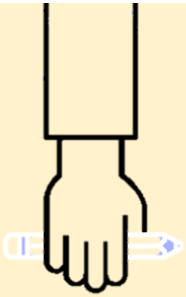
Let's review some key positions – "In betweens"

Ontology or Epistemology? some approaches in-between

Positivism (Epistemology without Ontology): Knowledge is purely based on information that can be derived from sensory experience which can be scientifically verified. This is the only admissible source of all knowledge. In other words, epistemological practice defines the ontological nature of reality.

Critical Realism (Epistemology without explicit Ontology): "a reflexive philosophical stance concerned with providing a philosophically informed account of science and social science which can in turn inform our empirical investigations." (Archer et al. 2016)

Process Philosophy (As an Onto-Epistemology): Process philosophy is based on the premise that being is dynamic and that the dynamic nature of being should be the primary focus of any comprehensive philosophical account of reality and our place within it. It is an ontology as much as an epistemology because the dynamic nature of being is partly due to the evolving apprehension of being in experience (mental, sensory etc.).



Let's review some key positions – Epistemology and Methodology

Epistemology

Empiricism: Knowledge derives from sensorial experience

Constructivism: Knowledge is based on mental constructs. Reality might be independent of human thought but knowledge is always a human construction.

Rationalism: Knowledge derives from reasoning

Deduction: Deduction of particulars from general laws (If the premises are true the conclusion must be true)

Methodology

Induction: Induction/Inference of general laws from particulars (The general law might be true, question of probability)

Abduction: "a creative inferential process aimed at producing new hypotheses and theories based on surprising research evidence" (Timmermans & Tavori 2012).

Let's review some key positions – Truth Criteria

Truth as correspondence: The truth or falsity of a belief or proposition is evaluated according to how well this belief or proposition corresponds with state of affairs in reality. Beliefs or propositions "mirror" reality.

Truth Criteria

Truth as coherence: The truth or falsity of a belief or proposition is evaluated according to how well this belief or proposition fits with,or coheres with the existing body of propositions or beliefs.

Pragmatic theory of truth: The truth or falsity of a belief or proposition is evaluated according to how well this belief or proposition "works". In other words, here, the criteria is not so much whether it corresponds to or coheres with something else, rather, it is about how well the belief or proposition serves a certain purpose.

Running the Workshop

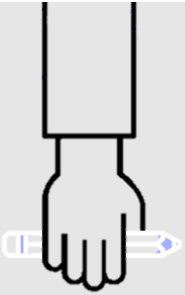
- [ ] **Step 1:** *Debrief on the questions sent to the participants and clarify any doubts they might have about the list of definitions sent - were there positions missing?*

- [ ] **Step 2:** *Uncover the map (if on a board, this was ideally hidden during the discussion) and map two or three positions (examples given on page X)*

- [ ] **Step 3:** *Invite participants to map their approaches, provide guidance if necessary and discuss*

- [ ] **Step 4:** *Invite participants to map the approaches of colleagues (and debrief) or well-known approaches in their sub-fields (and discuss)*

- [ ] **Step 5:** *Guided discussion on disciplinary integration*



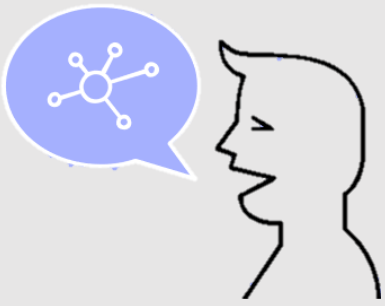
The role of the facilitator: Guiding the mapping

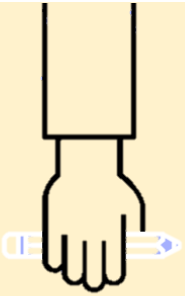
The purpose of this workshop is to encourage discussion about researchers' ontological and epistemological commitments to uncover areas of possible tension and synergies. To ensure that this is achieved, the facilitator needs to guide the mapping of participant researchers through a set of questions.

Why did you choose to enter the map through this category? (For example, methods)

What makes you choose this epistemology? What others would have been possible? Why are these other incompatible?

Do you think that your methods could be associated with other epistemological positions?



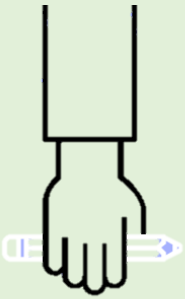


The role of the facilitator: Guiding the final discussion

- "how far" one can go on the journey to cross-disciplinary knowledge integration, given ones current research practice (Examples)
- Becoming aware as to what may potentially limit cross-disciplinary knowledge integration
- Has it been easier to dialogue among researchers coming from different backgrounds? What is still missing? What needs more time?
- Does this help us think about the division of tasks in the project?
- Discussion on the integration of different components
- Provide ways for explaining one's approach to researchers from different disciplinary backgrounds

The role of the facilitator: mapping examples

Ontology	Epistemology	Methodology	Method	Truth Criteria	Implication for cross-disciplinary collaboration
Being: Idealism / Category: Essentialism	Rationalism	Deduction	Orthodox game theory	Coherence	Suited for multidisciplinary research. Essences are rigid and may be incompatible with other worldviews.
Being: Realism / Category: Nominalism or Systemism or ”In betweens”	Mostly Empiricism	Abduction / Induction	Evolutionary game theory	Pragmatic	Suited for multi-, inter- and transdisciplinary research. Methodology, Epistemology and Ontology can to some extent accommodate different worldviews.



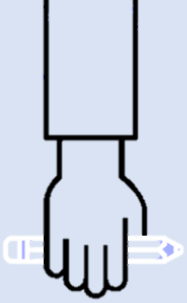
Other complementary tools

Eigenbrode, S. D., M. O'Rourke, J. D. Wulfhorst, D. M. Althoff, C. S. Goldberg, K. Merrill, W. Morse, M. Nielsen-Pincus, J. Stephens, L. Winowiecki, and N. a. Bosque-Pérez. 2007. Employing Philosophical Dialogue in Collaborative Science. *BioScience*57(1):55.

This paper presents a "toolbox for philosophical dialogue," i.e. a set of questions for self-examination of philosophical disparities.

Moon, K., and D. Blackman. 2014. A Guide to Understanding Social Science Research for Natural Scientists. Conservation Biology 28(5):1167–1177.

This work provides an introduction to the basic philosophical principles underpinning social research and provides a guide to navigate the different approaches. The paper is specifically addressed to natural scientists.



Dig even deeper

- Okasha, S. (2016) A very short introduction to the philosophy of science
- Rosenberg, A. (2004) Philosophy of science: a contemporary introduction
- Chalmers, A. (1999) What is this thing called Science?
- Kuhn, T. (1962) The structure of scientific revolutions
- Latour, B. (1991) We have never been modern
- Stengers, I. (2000) The invention of modern science
- Entry on “Critical Theory” in the Stanford Encyclopedia of philosophy (sections one and three) https://plato.stanford.edu/entries/critical-theory/
- Entry on “Post-modernism” in the Stanford Encyclopedia of philosophy (sections one to five) https://plato.stanford.edu/entries/postmodernism/

Team and acknowledgements

The first of these workshops was initially prepared by Tilman Hertz (tilman.hertz@su.se) and María Mancilla García (maria.mgarcia@su.se) for the SES-Link group at the Stockholm Resilience Centre in March 2017.

A second workshop was run with PhD students at the Stockholm Resilience Centre in October 2018.

We would like to warmly thank the SES-Link group (https://www.seslink.org/) and the PhD student cohort for participating in the workshop and providing very useful feedback. Many thanks also to Ashanapuri Hertz for layout & design.

This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 682472 — MUSES) and a core grant to SRC from Mistra.