Sustainable Futures

Strong Transdisciplinarity and Mediated Modelling

Anthony Cole and Bronwyn Maxwell

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Context

- Find pathways to sustainable futures
- Mediated modelling
- Emerging problems
- Strong transdisciplinarity

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Presentation

- Evaluation and synthesis
- Theorising
- Narrative
- Research results *to* …

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Aim

- Re-think the role of mediated modelling from a strong transdisciplinary perspective

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Contents

- Modelling approach & research context
- Emerging problems
- Strong transdisciplinarity
- Mediated modelling – an evaluation
- From theory to practice

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Modelling Approach

& Research Context

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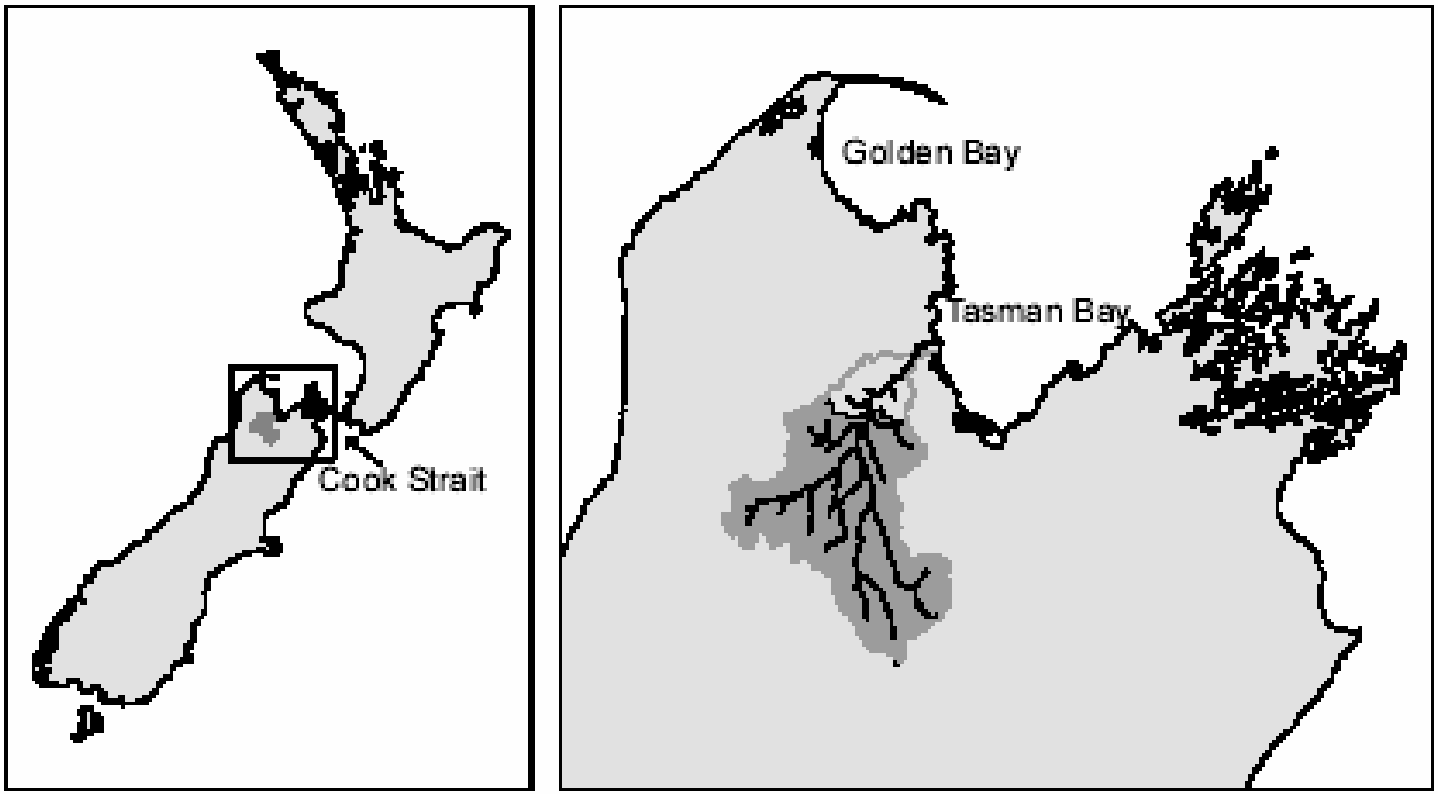

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The Motueka Catchment

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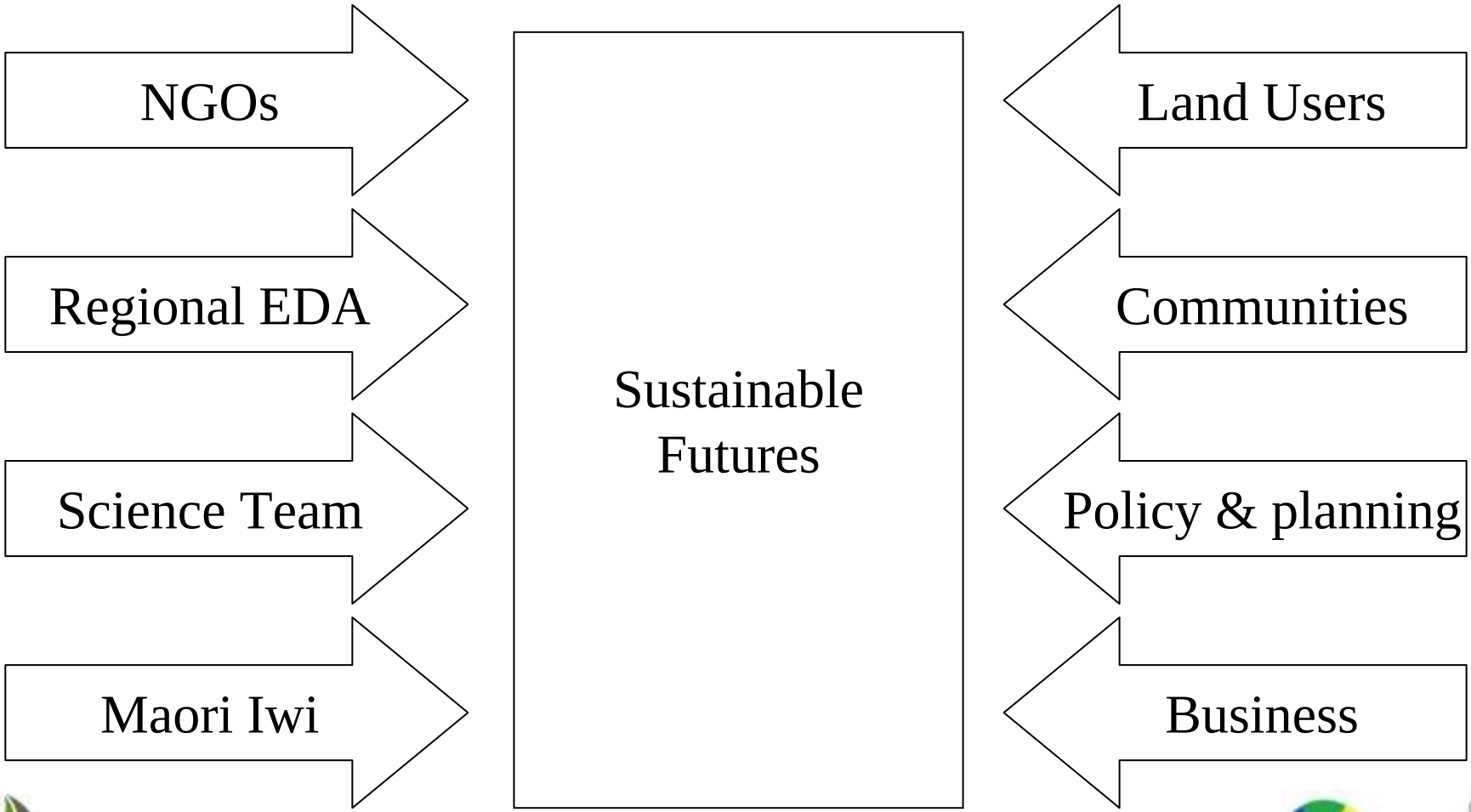
Stakeholder Community



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Community Goals

- A safe place to play and live
- Pristine character and beauty
- Identity, economic and ecological balance
- Economic viability for business development
- Exceptional climate
- Biological, community and landscape diversity & coastal integrity

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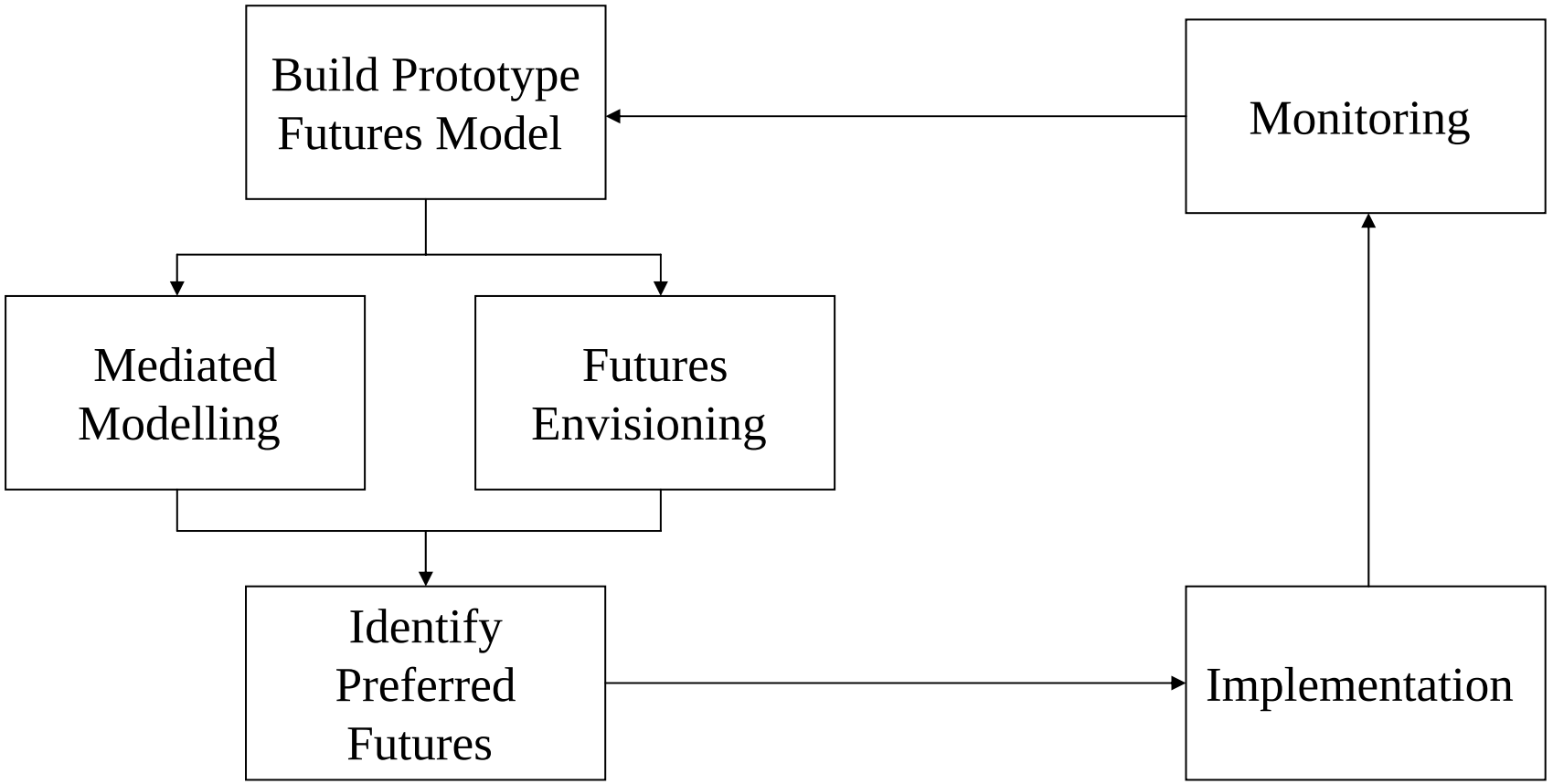
Research Approach



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Mediated Modelling Goals

- Joint problem solving
- Complexity
- Collaboration
- Learning
- Consensus building

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Emerging Problems

Emerging Problems

- Stakeholder representation – *there is no single representative stakeholder or stakeholder group*
- Logical contradictions – *are associated with the numerous worldviews and interests of the stakeholder community*
- Many questions – *emerge from both of the above problems*

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Science Team

- Desire empirical rigor and models
- Integration of empirical models
- Real world problem focus
- Scientifically defensible
- Legally defensible
- Ethically strong (sustainability)
- Prefer qualitative growth

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Community Residents

- Technical simplicity
- Issue focus
- Multiple scales (Local …. Global)
- Ethically strong
- Language of hard economic realities
- Sustainability = economic growth that minimises environmental impacts

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Policy Makers & Planners

- Spatially explicit models
- Real world issues at regional *scale*
- Accountability – legislative requirements
- Ethically strong
- Language of sustainability & social fairness
- Work involves tradeoffs not advocacy
- Speak the language of economic growth

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NGOs

- Collaborative models and decisions
- Accountable to legislation
- Concerned with ecological realities
- Ethically strong
- Strong sustainability
- Qualitative economic growth

Business Managers

- Pragmatic (simple, linear model approx.)
- Want scope and detail (were necessary)
- Landscape = profit (productive potential)
- Economic growth and markets
- Sustainability = mitigation or business
- Accountable to partners / shareholders
- Weak environmental ethics

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Regional EDA

- Economic models
- Multiple scale futures models
- What is sustainability?
- The region needs economic growth – How?
- Accountable to Council

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Indigenous Peoples

- Kaupapa Mäori science
- Culture is narrative based
- Metaphorically rich
- Cultural knowledge is encoded in Te Reo Mäori
- Dialogue based (government by consensus)
- Te ao Mäori (deeply connected with nature)
- No linguistic analogue for sustainability
- Wary of Western value systems

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Questions

- What type of model?
- Which definition of sustainability?
- Which culture? (Mäori or English)
- Which scale? (local, regional, global etc)
- Which worldview?
- Contradictions

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Logical Contradictions

- Economic growth
- Simple models
- Spatial models
- Macro-physical
- Precautionary
- Ethically strong
- Land Use

- No Economic growth
- Complex models
- Aspatial models
- Meta-physical
- Pragmatic
- Ethically weak
- Land Preservation

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Emerging Problems

- How to reconcile contradictions?
- The adequacy of consensus building?
- Model structure and drivers?
- Is sustainability the only complexity?
- Integrating indigenous knowledge?
- Is the GIRA principle really appropriate?
- Adequacy of mediated modelling?

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Strong Transdisciplinarity

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Across

Transdisciplinarity

Between

Beyond

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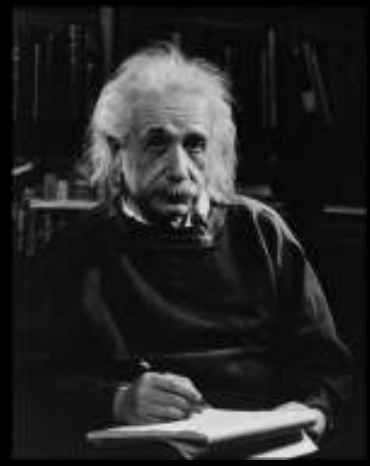
Across

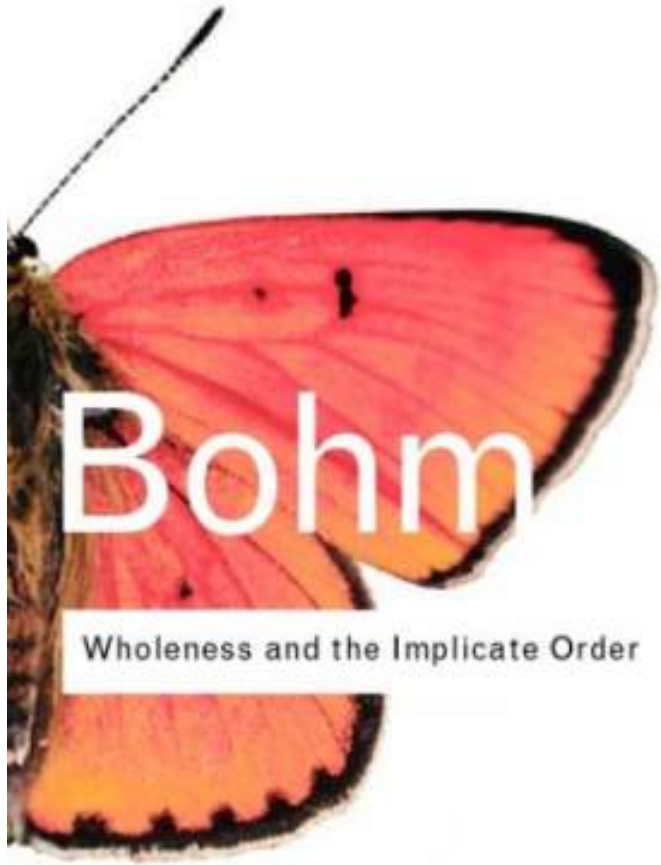
Disciplinarity

Between

Beyond

The Quantum Revolution





Bohm

Wholeness and the Implicate Order

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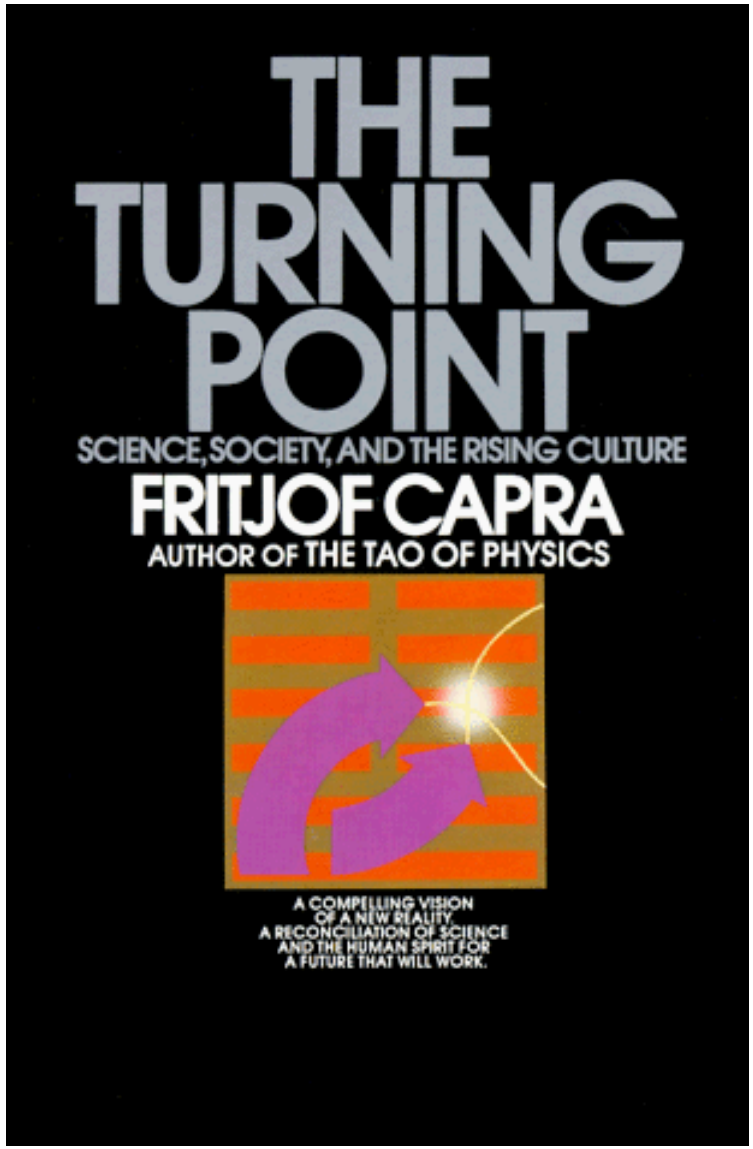
THE TURNING POINT
SCIENCE, SOCIETY, AND THE RISING CULTURE
FRITJOF CAPRA
AUTHOR OF THE TAO OF PHYSICS
A COMPELLING VISION OF A NEW REALITY. A RECONCILIATION OF SCIENCE AND THE HUMAN SPIRIT FOR A FUTURE THAT WILL WORK.

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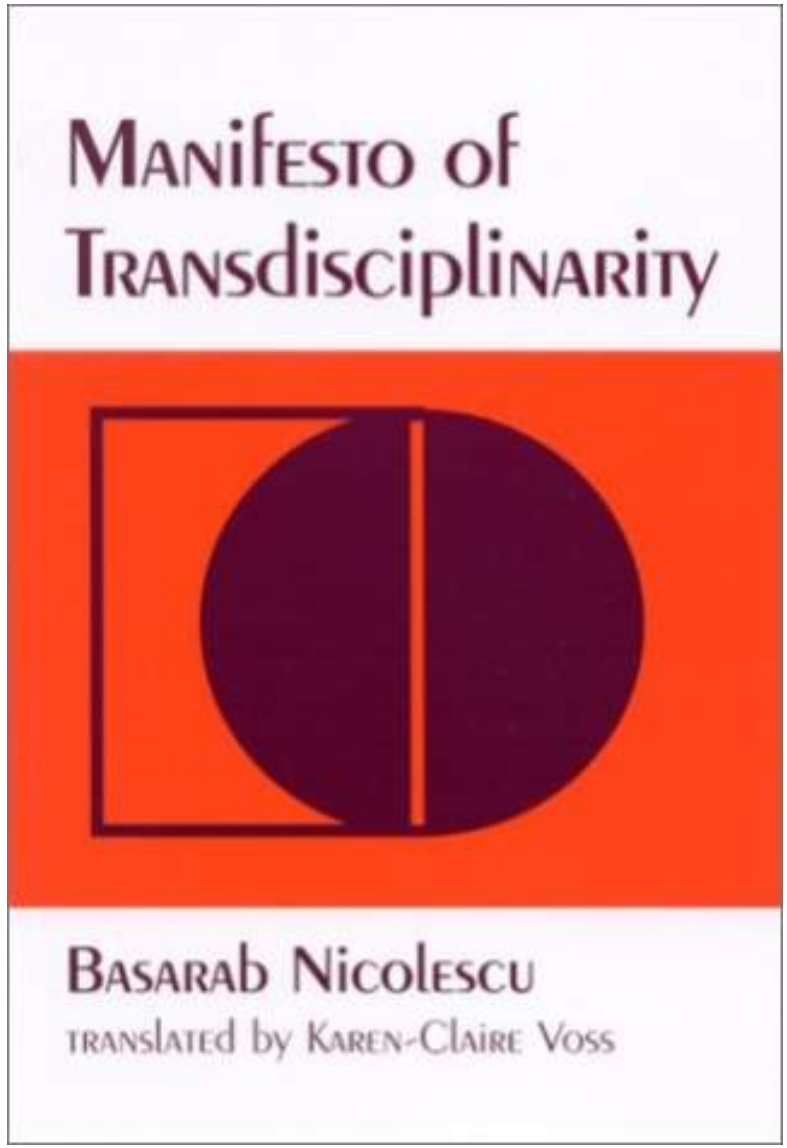
Manifesto of
Transdisciplinarity
Basarab Nicolescu
translated by Karen-Claire Voss

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COMMENTARY

Foundations of transdisciplinarity

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Transdisciplinarity

1. Ontological axiom

   - *separation of scientific object and subject*

2. Logical Axiom

   - *logic of the included middle*

3. Complexity axiom

   - *typology of complexity*

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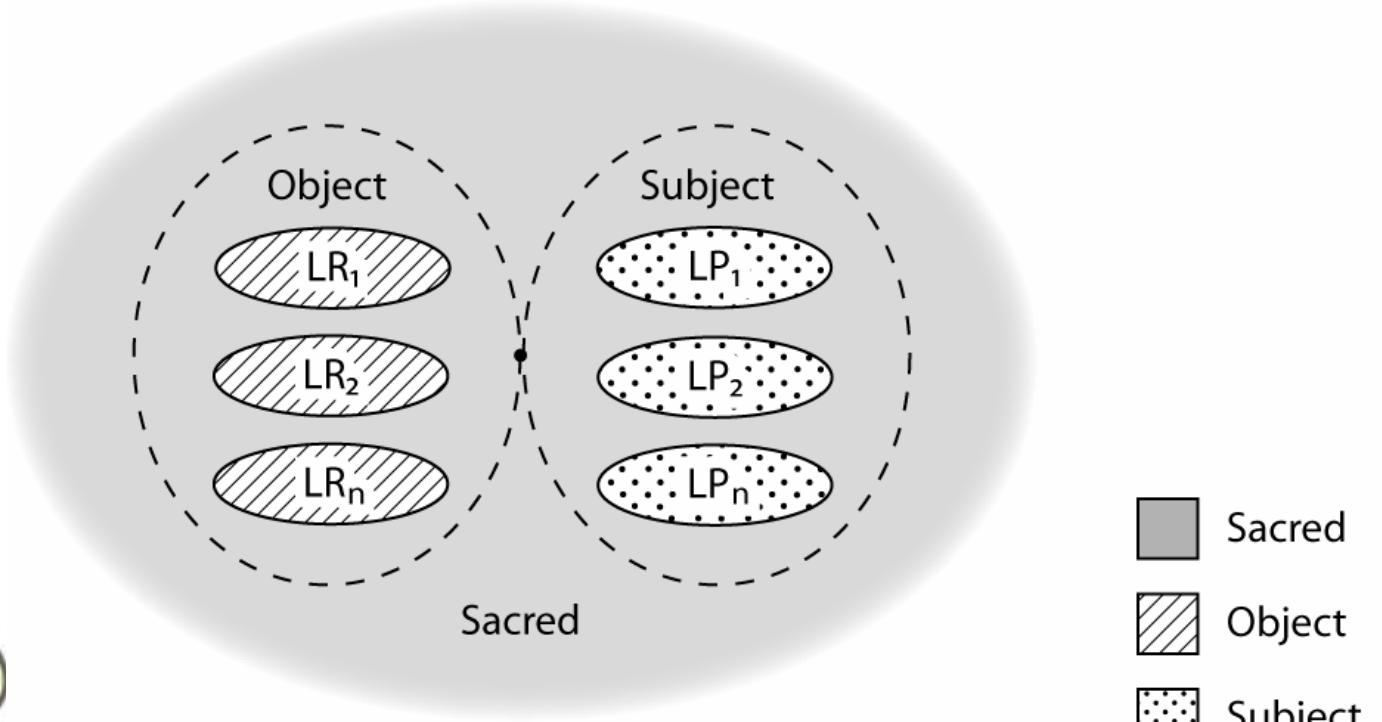
Axioms of Transdisciplinarity

1. The ontological axiom: There are in Nature and in our knowledge of Nature, different levels of Reality and, correspondingly, different levels of perception



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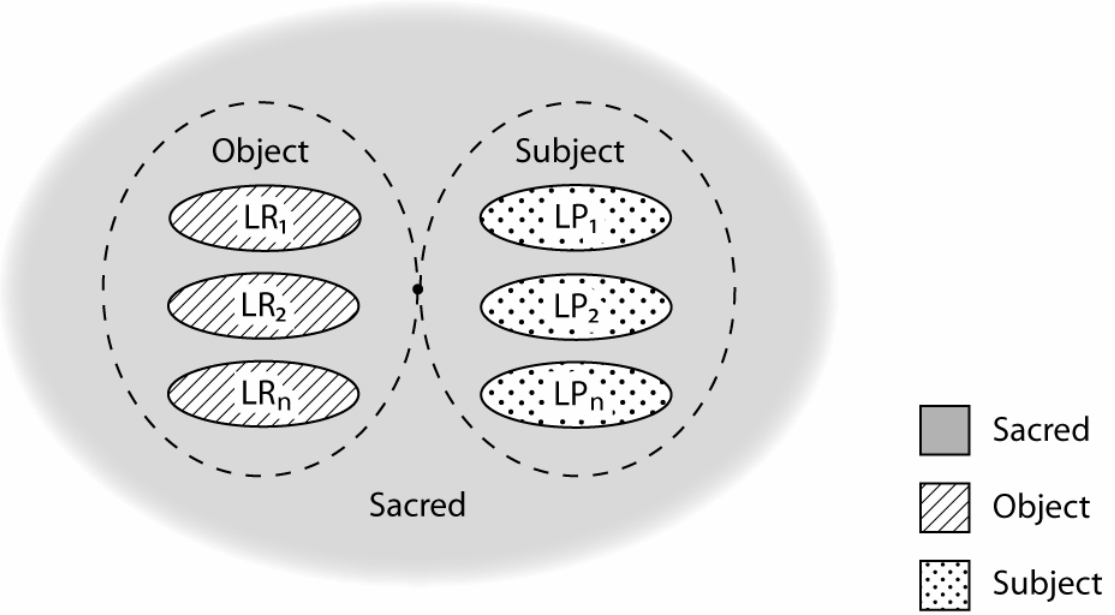
A Level of Reality

- “Two different levels of reality are different if, while passing from one to the other, there is a break in the laws and a break in fundamental concepts like, for example, causality”. (Nicolescu, 2000)



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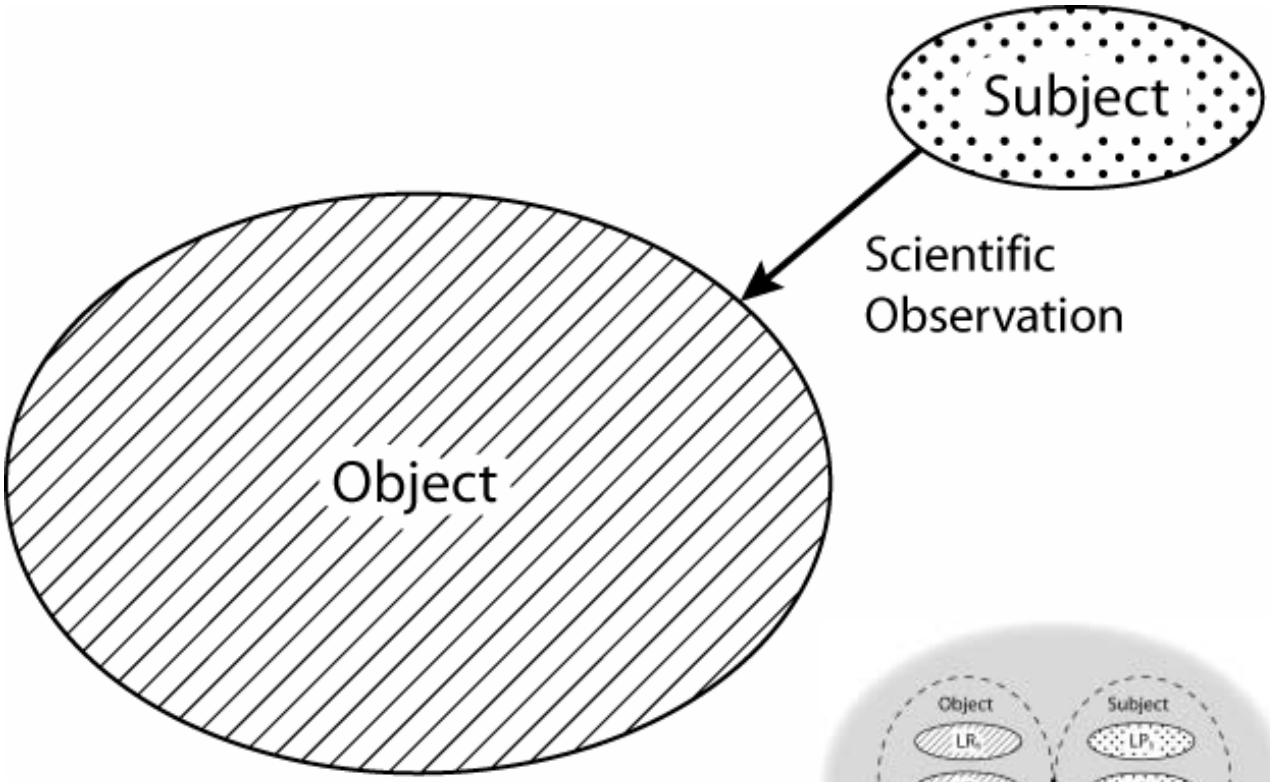
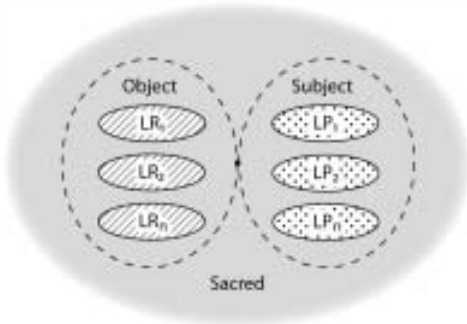
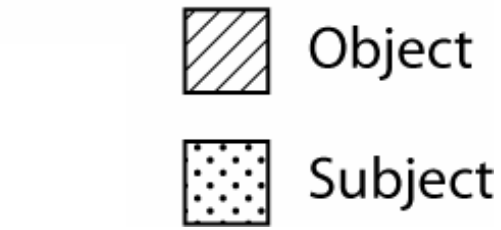
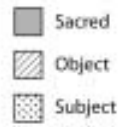
Classical Scientific Model









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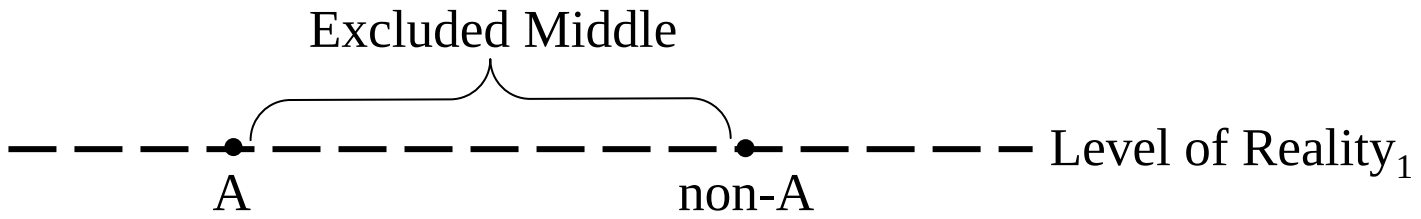
Axioms of Transdisciplinarity

2. The logical axiom: The passage from one level of Reality to another is insured by the logic of the included middle

Classical Scientific Logic

1. The axiom of identity: A is A
2. The axiom of non contradiction: A is not non-A
3. The axiom of the ***excluded middle*** –

   there exists no third term T, that is simultaneously A and non-A



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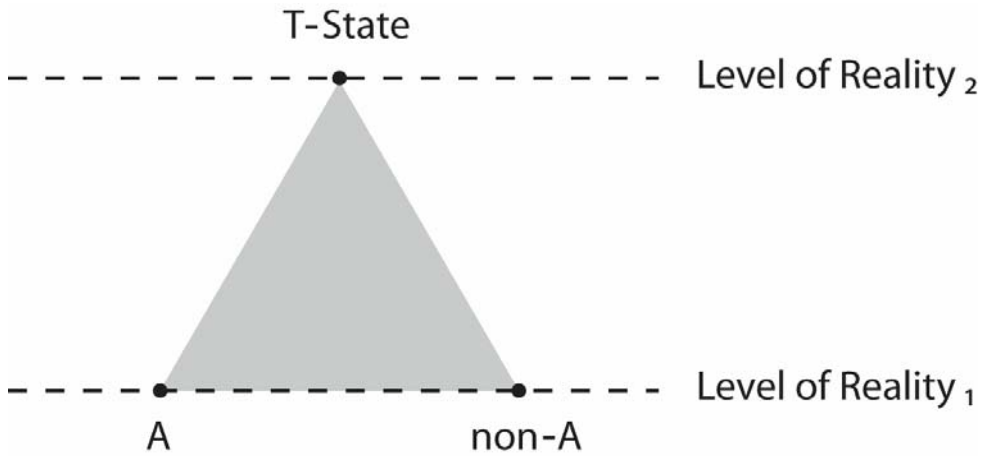
Transdisciplinary Logic

1. The axiom of identity: A is A
2. The axiom of non contradiction: A is not non-A
3. The axiom of the ***included middle*** –

   there *exists* a third term T, that is simultaneously A and non-A



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Axioms of Transdisciplinarity

3. The complexity axiom: The structure of the totality of levels of Reality or perception is a complex structure: every level is what it is because all the levels exist at the same time. (Nicolescu, 2005)

There exists no one privileged position from which to view all levels of reality (Nicolescu, 2005)

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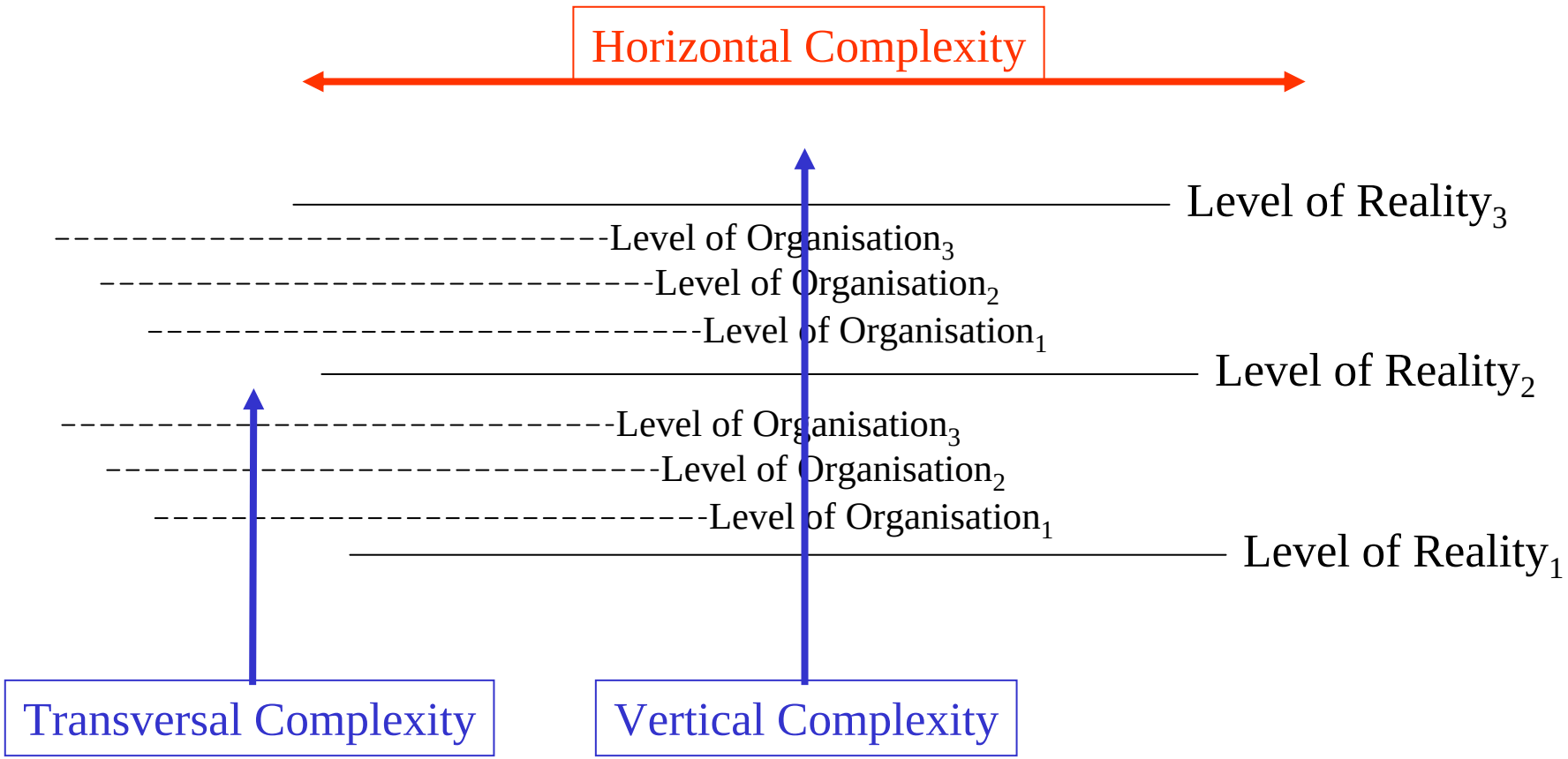
Complexity



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Summary

- Across, between and *beyond* disciplinarity
- Levels of reality
- Logic of the included middle
- Vertical, horizontal and transversal complexity
- Weak and strong (Manfred Max-neef)

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Weak Transdisciplinarity

Complexity	**Reality**	**Logic**
Transversal	Level of reality	Logic of exclusion
	Level of perception	
Horizontal	Subject is separate from object	

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Strong Transdisciplinarity

Complexity	Reality	Logic
Transversal	Levels of reality	Logic of inclusion
Vertical	Levels of perception	
Horizontal	Subject is a part of the object	

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Mediated Modelling

An Evaluation

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Levels of Reality

- Operates within a single level of reality as dictated by the modelling approach

- Problem:
  - Existence of levels of reality not acknowledged

- Motueka Catchment
  - At least 7 different levels of social reality

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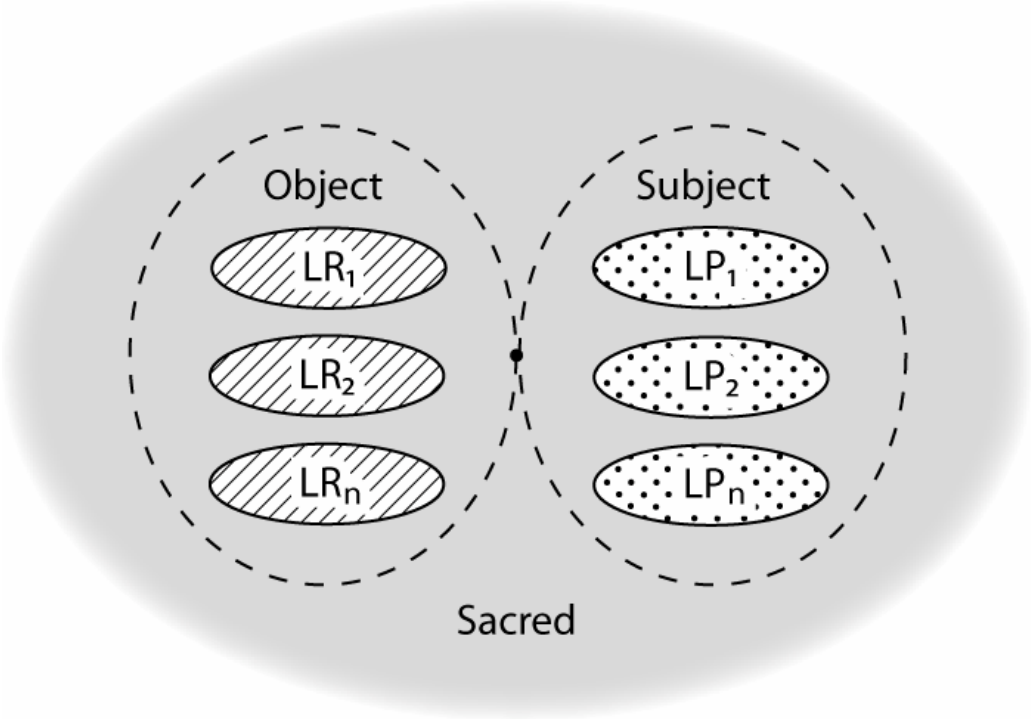
Levels of Perception

- Levels of perception exist in a one-to-one relationship to levels of reality (Max-neef, 2004)



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Perception

- Ability to acquire knowledge
- Intelligence (IQ) is a form of perception
- Traditional belief (2 principle intelligences)
- Howard Gardner (Multiple intelligences)

Multiple Intelligences

- Logical Mathematical
- Linguistic
- Intra-personal
- Inter-personal
- Spatial
- Musical
- Bodily Kinaesthetic
- Spiritual
- Existential
- Naturalist

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Mediated Modelling

- Logical Mathematical
- Linguistic
- Intra-personal
- Inter-personal
- Spatial
- Musical
- Bodily Kinaesthetic
- Spiritual
- Existential
- Naturalist

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Teele Inventory (TIMI)

1A

1B

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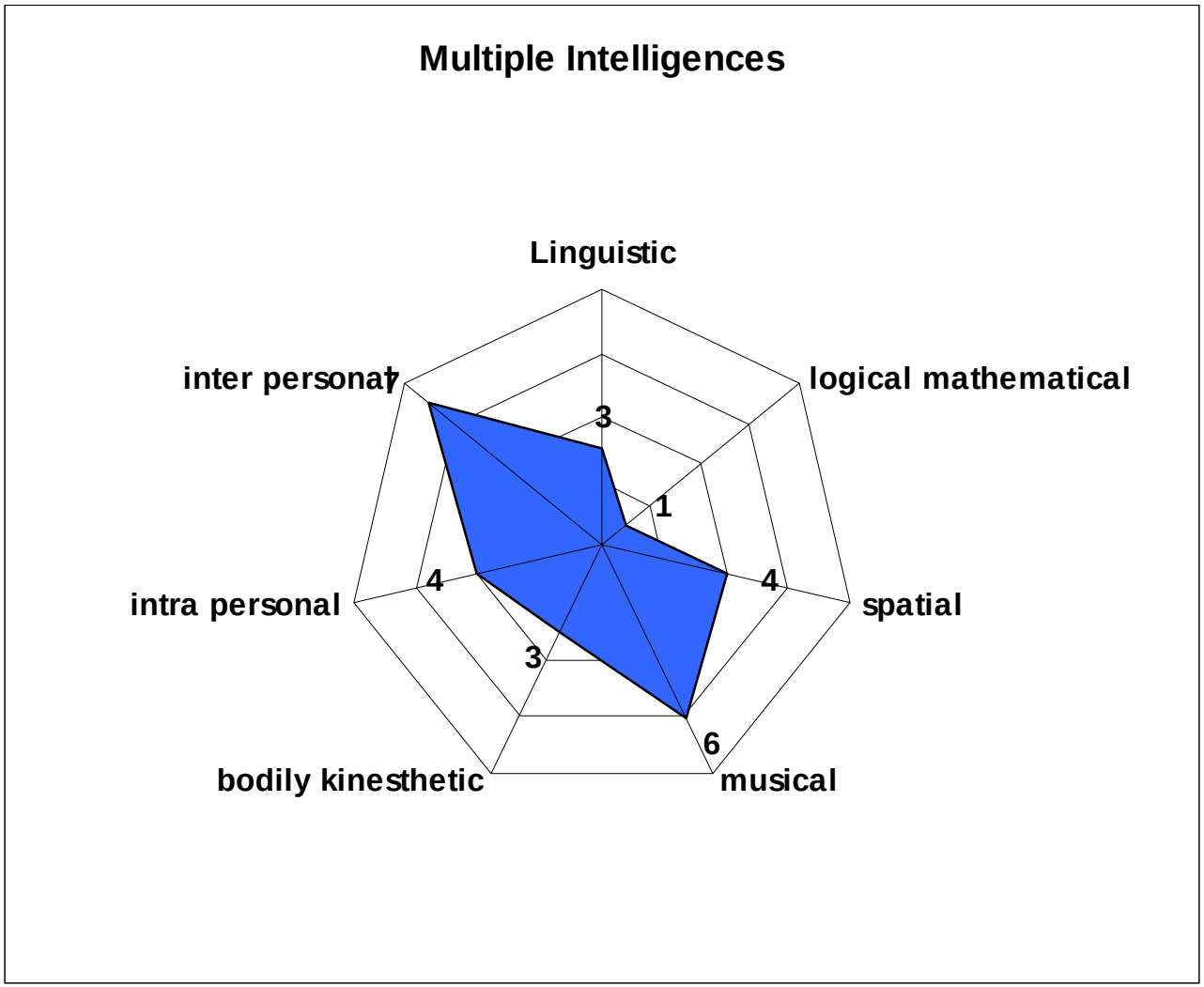
TIMI



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TIMI (non-Science/Policy)

	Highest Score						Lowest Score
	7	6	5	4	3	2	1
Non-science	Interpersonal	Spatial	Linguistic	Bodily-K	Intrapersonal	Musical	logical-M
Non-science	Linguistic	Spatial	Interpersonal	Musical	Intrapersonal	Logical-M	Bodily-K
Non-science	Intrapersonal	Interpersonal	Linguistic	Musical	Spatial	Logical-M	Bodily-K
Non-science	Interpersonal	Bodily-K	Spatial	Linguistic	Intrapersonal	Logical-M	Musical
Non-science	Linguistic	Spatial	Interpersonal	Intrapersonal	Musical	Logical-M	Bodily-K
Non-science	Interpersonal	Linguistic	Intrapersonal	Spatial	Bodily-K	Logical-M	Musical
Non-science	Interpersonal	Musical	Intrapersonal	Spatial	Bodily-K	Linguistic	Logical-M
Planning/Policy	Intrapersonal	Interpersonal	Bodily-K	Linguistic	Musical	Spatial	Logical-M
Planning/Policy	Interpersonal	Bodily-K	Linguistic	Spatial	Logical-M	Intrapersonal	Musical
Planning/Policy	Interpersonal	Bodily-K	Spatial	Intrapersonal	Linguistic	Musical	Logical-M
Planning/Policy	Logical-M	Linguistic	Interpersonal	Spatial	Bodily-K	Intrapersonal	Musical

Logical
Mathematical

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TIMI (Science)

	Highest Score						Lowest Score
	7	6	5	4	3	2	1
Science	Linguistic	Spatial	Intrapersonal	Logical-M	Musical	Interpersonal	Bodily-K
Science	Interpersonal	Logical-M	Bodily-K	Linguistic	Spatial	Intrapersonal	Musical
Science	Interpersonal	Bodily-K	Logical-M	Linguistic	Spatial	Intrapersonal	Musical
Science	Musical	Linguistic	Spatial	Logical-M	Bodily-K	Intrapersonal	Interpersonal
Science	Intrapersonal	Interpersonal	Spatial	Logical-M	Musical	Bodily-K	Linguistic
Science	Logical-M	Interpersonal	Linguistic	Spatial	Intrapersonal	Musical	Bodily-K
Science	Interpersonal	Musical	Logical-M	Linguistic	Intrapersonal	Spatial	Bodily-K
Science	Bodily-K	Logical-M	Linguistic	Spatial	Intrapersonal	Interpersonal	Musical
Science	Interpersonal	Logical-M	Linguistic	Spatial	Musical	Bodily-K	Intrapersonal

Logical Mathematical Intelligence

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Logic of the Included Middle

- Based on a logic of exclusion
- Problem:
  - *Logic of inclusion is not acknowledged*
- Motueka
  - *Numerous logical contradictory pairs*

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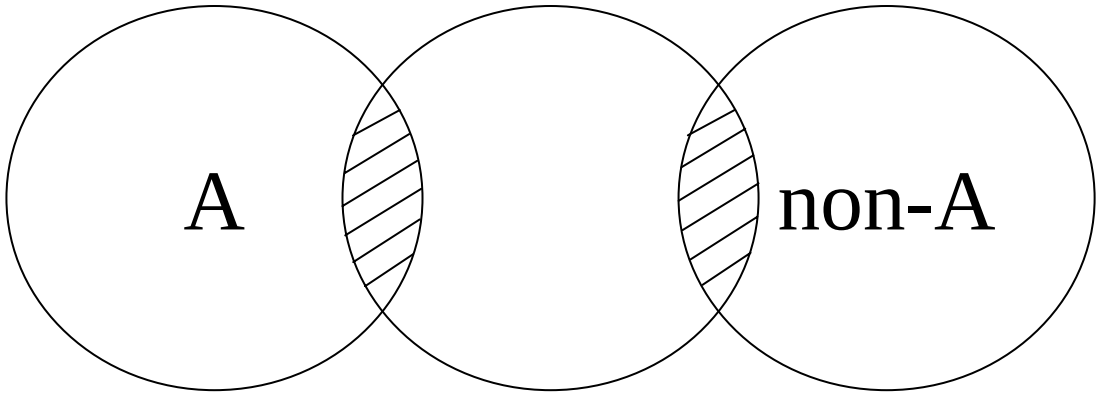
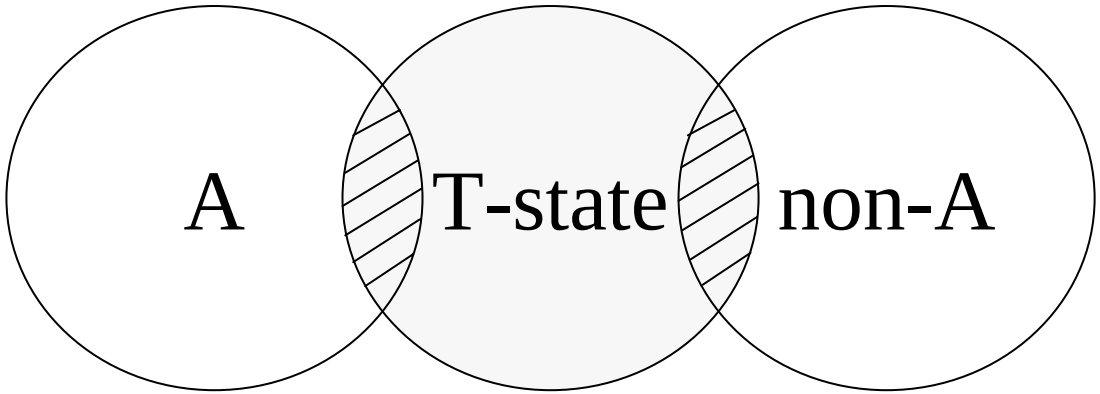
Logic of Exclusion

- Attempt to reconcile contradictory pairs using consensus building.
  - *Agreement based on what we have in common*



Logic of Inclusion

- Attempt to reconcile contradictory pairs using the logic of the included middle
  - *Includes that which is at once A and non-A*
  - *Includes that which is neither A or non-A*



Complexity

- Focus on transversal complexity
- Problem:
  - *Vertical complexity is not considered*
- Motueka
  - *At least 7 different levels of reality*

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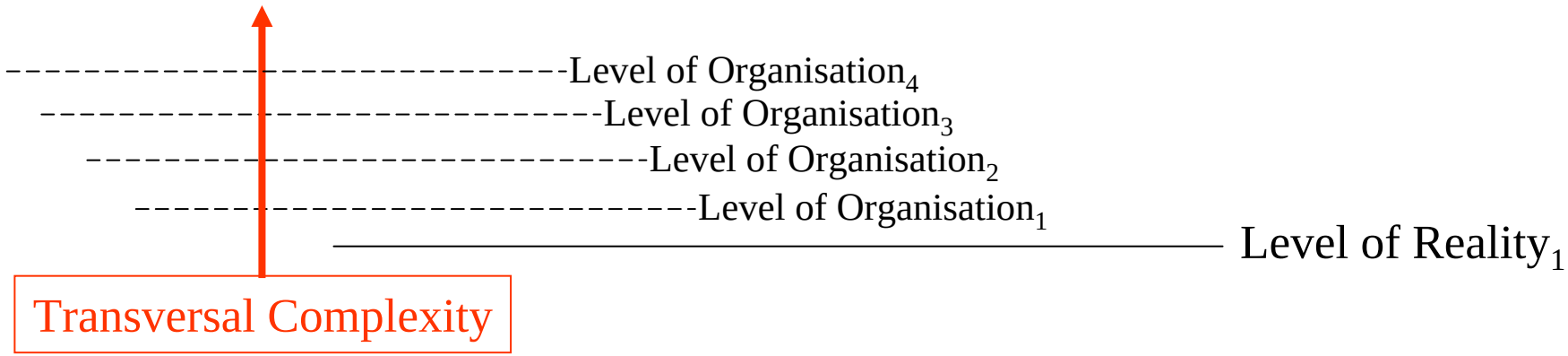
Mediated Modelling

- A focus on transversal complexity



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Summary

- Mediated modelling makes an important contribution in understanding a part of complexity
- Weak transdisciplinarity
- But in isolation its *incomplete*
- There are domains of application in which it can be successfully utilitsed (e.g. technical modelling group, inter-science)
- Compliments a strong transdisciplinary approach

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From Theory

To Practice

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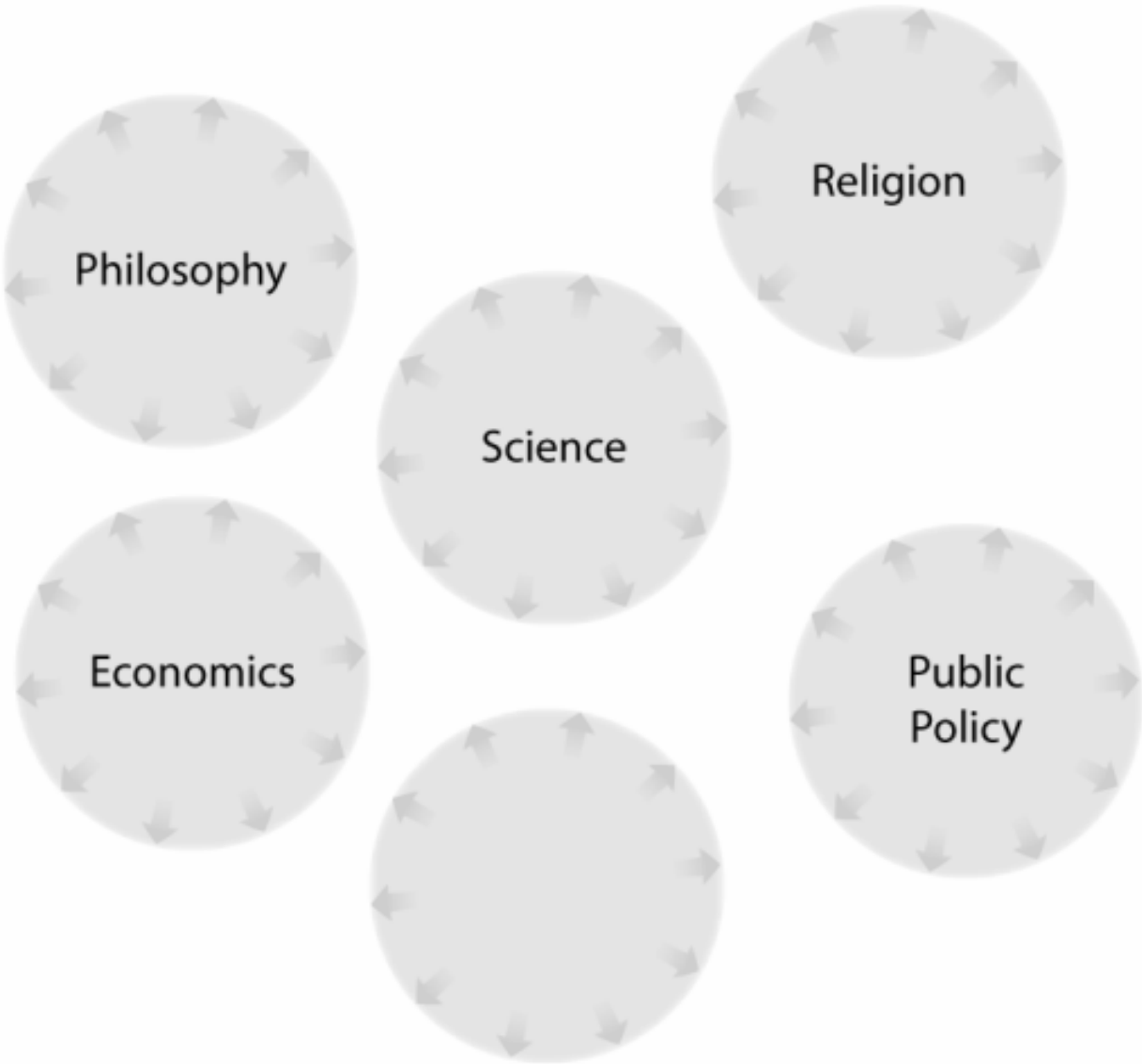

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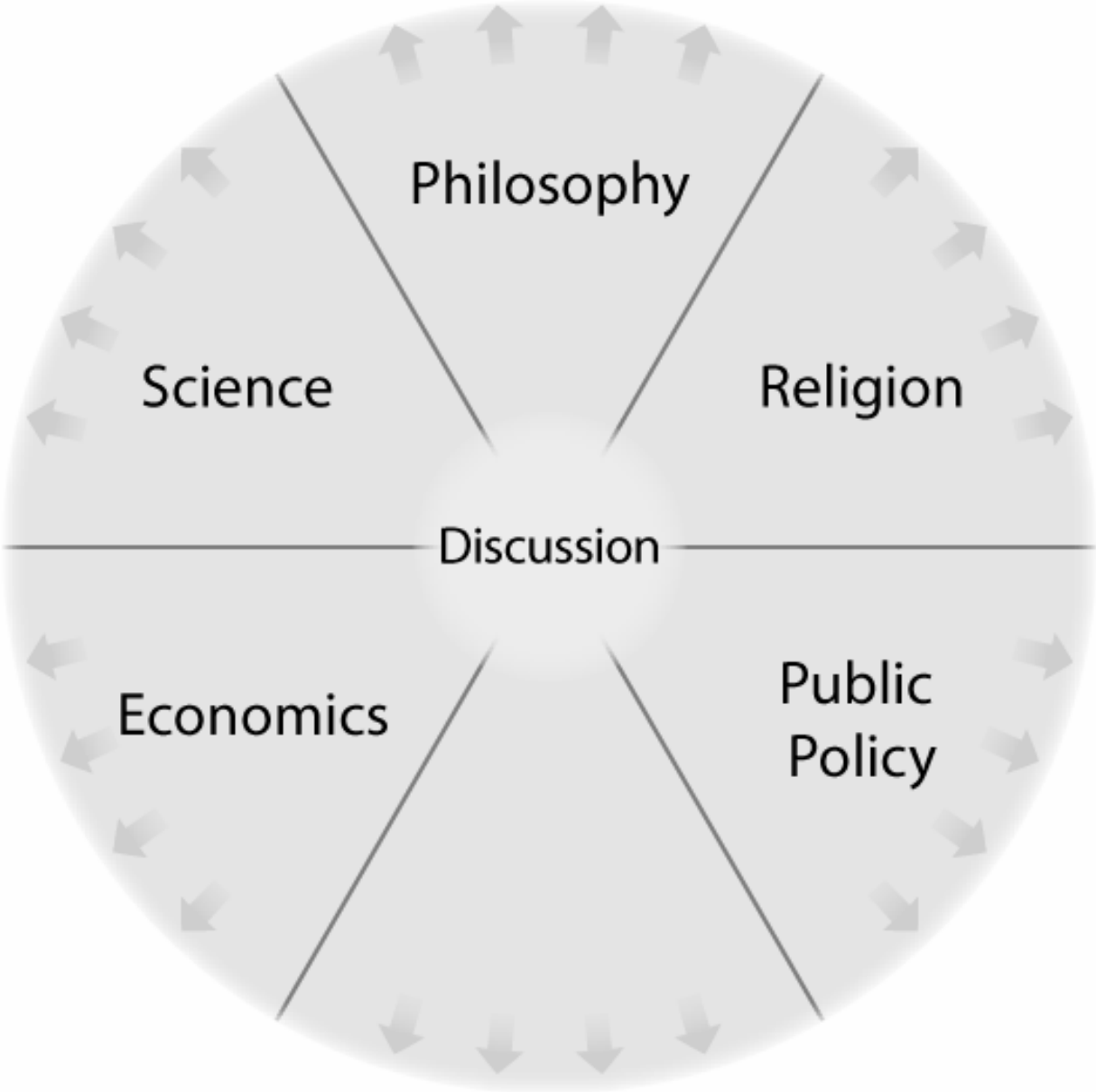

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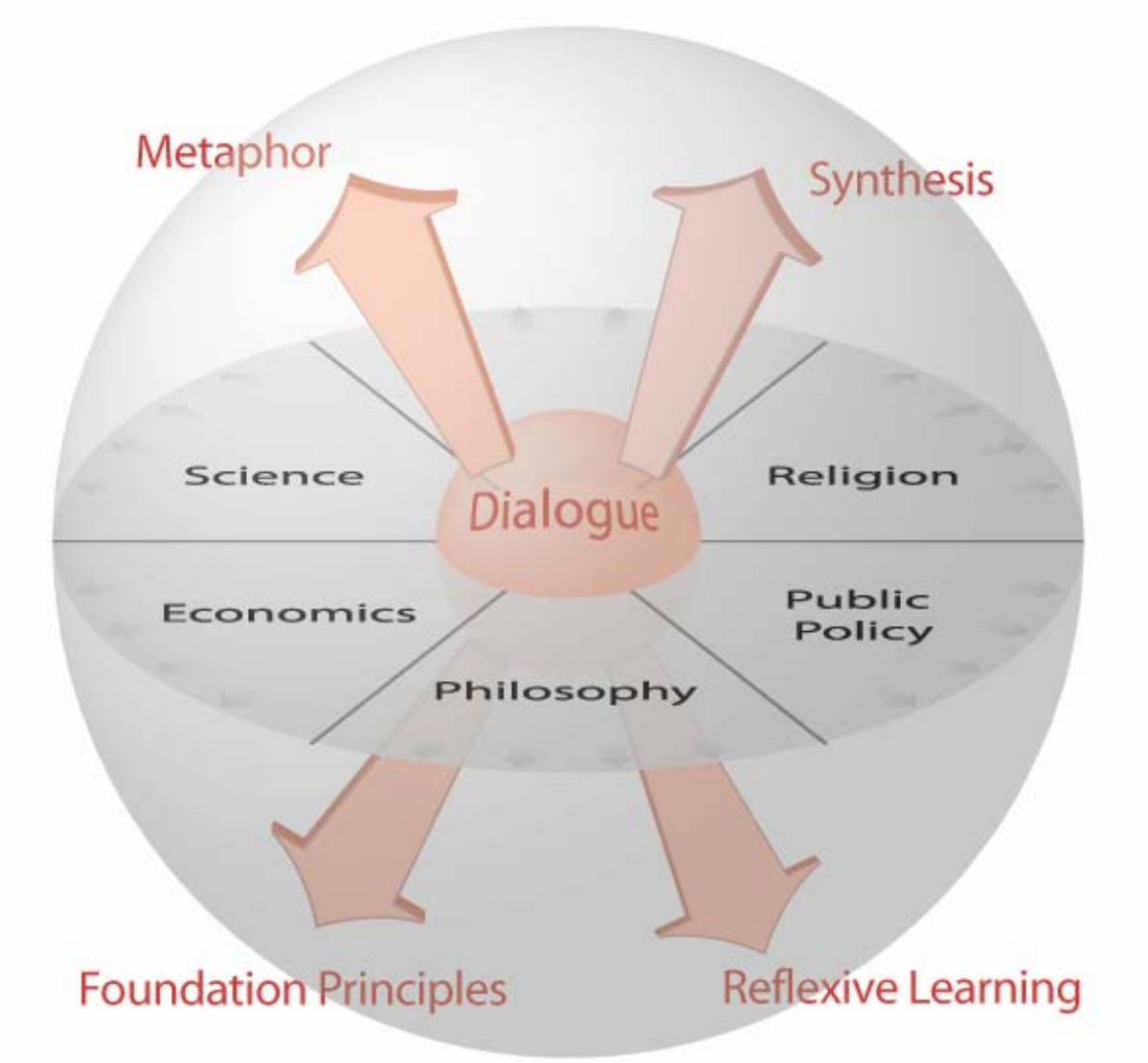

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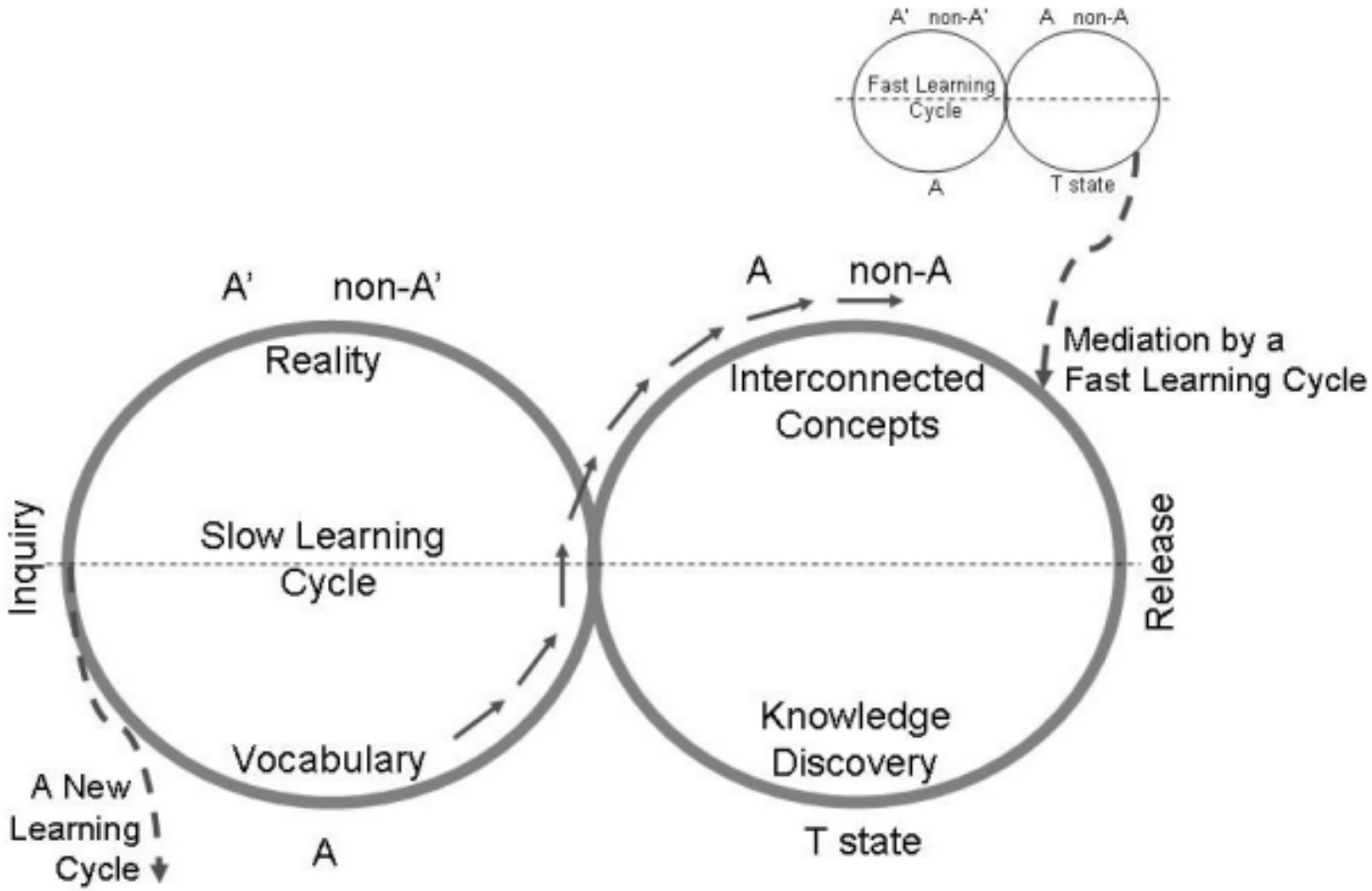
Reflexive Learning



The Role of Mediated Modelling

- Weak transdisciplinarity
- Contributes a part
- Complimented by a strong transdisciplinary approach
- In isolation it is an incomplete contribution towards the discovery and creation of sustainable futures

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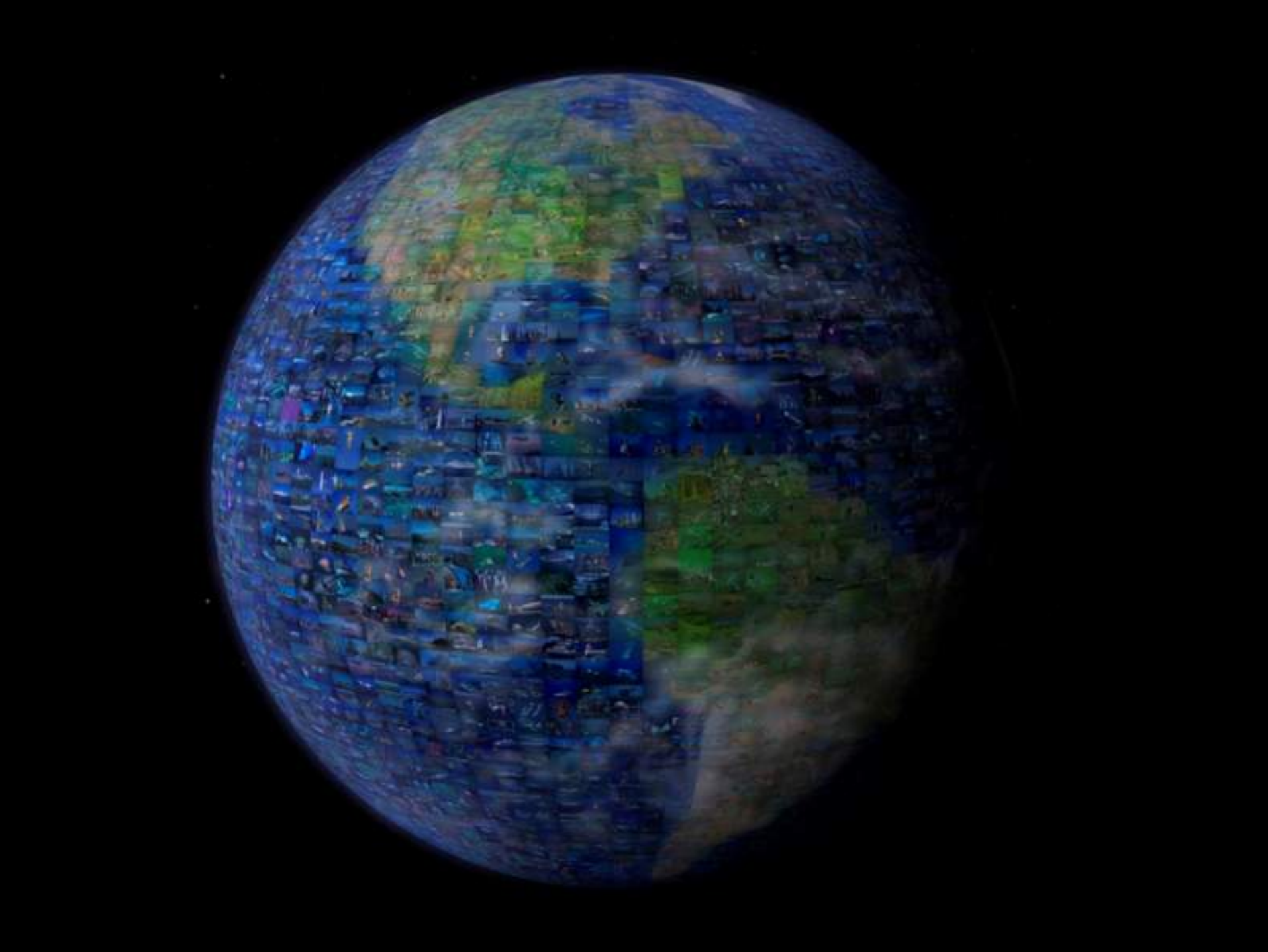

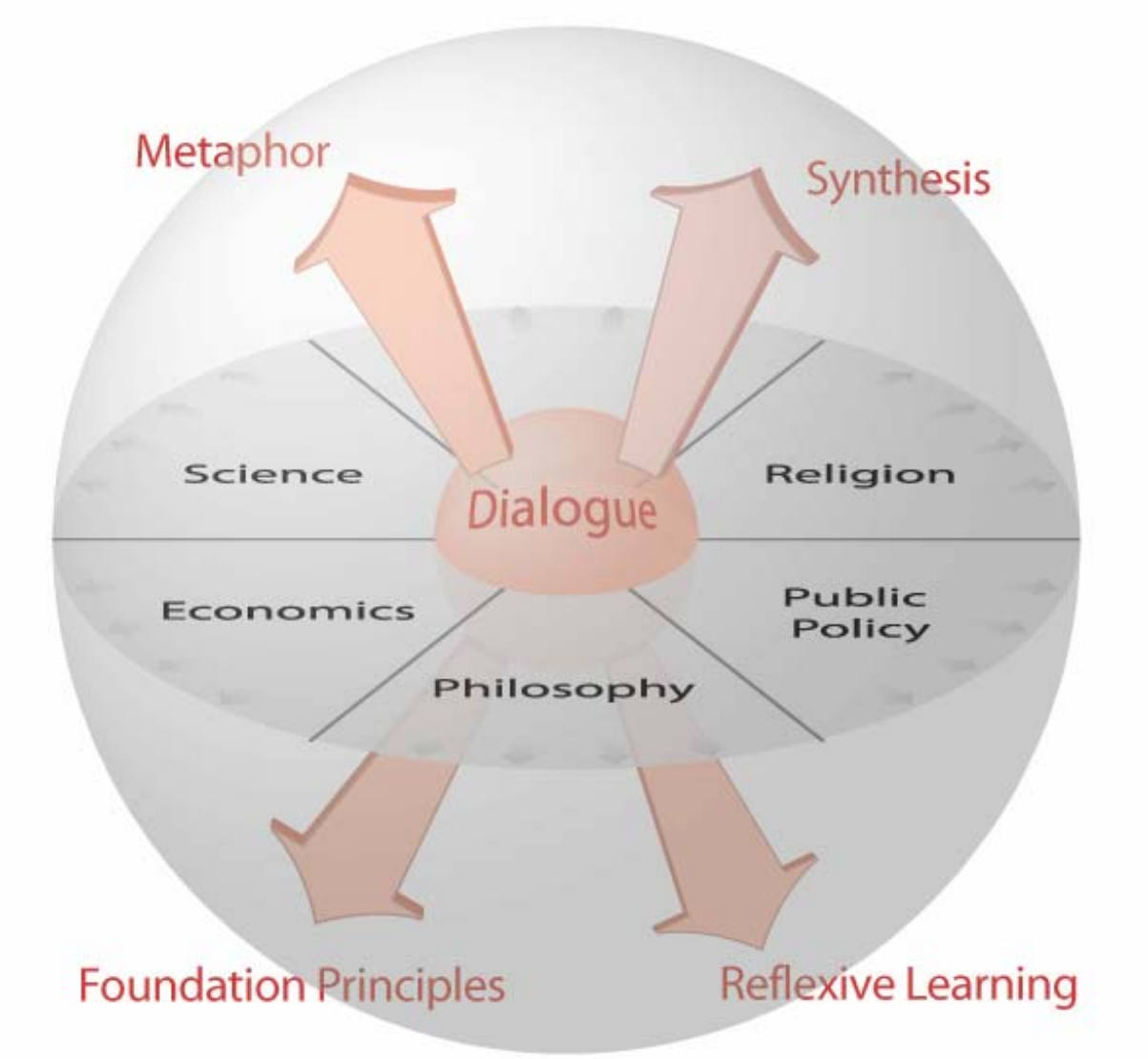

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