



Types of Integration

A Perspective from Philosophy of Science

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1. Task

Wide & broad practice of ID/INT.
But a lack of understanding and
of judgment / critique / assessment.

*More than an umbrella term?
Does a unifying arch exists?*

Requirement for a Concept / Theory of ID / INT

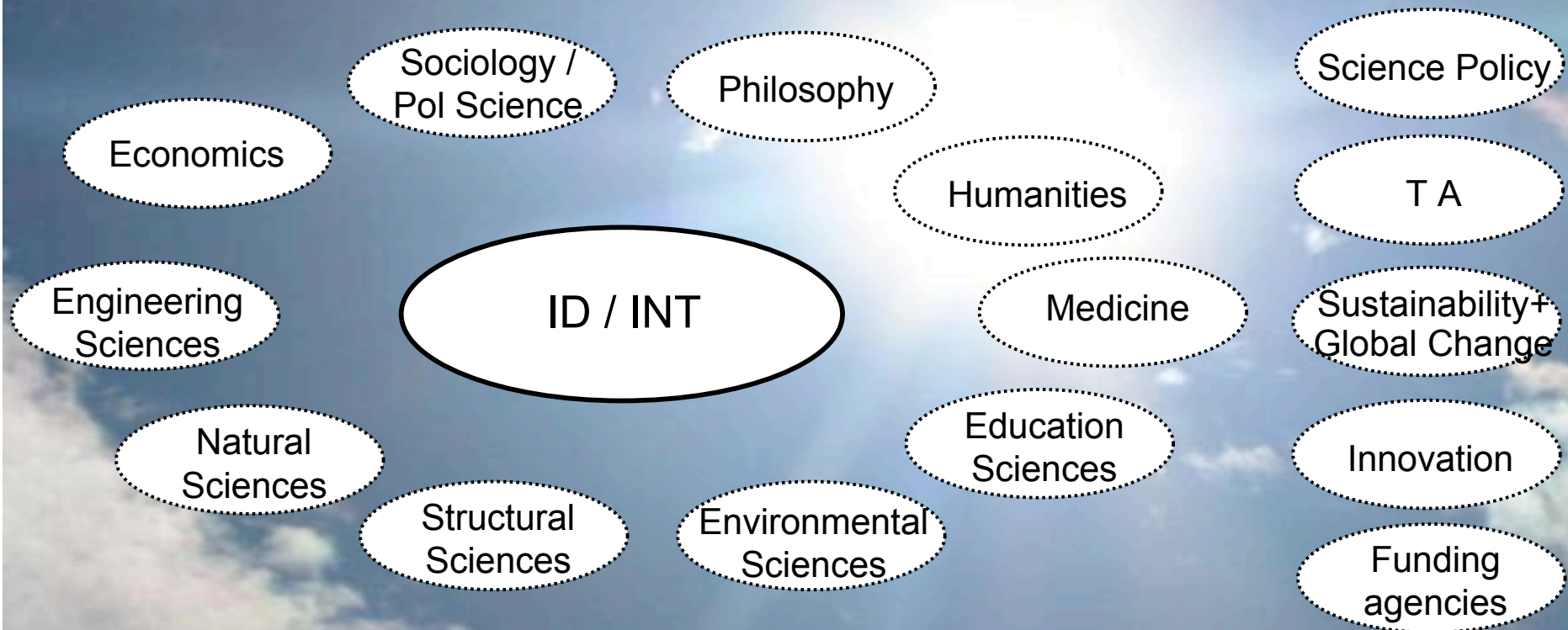
- Description / Explanation
- Orientation / Directions / Management
- Evaluation / Quality criteria

Aim of my talk:

Pose questions! Some elements for a
critique, *not* a method development!

1. Task

Who should answer this hard question? Normative epistemological circle ...



⇒ Big diversity: We are faced with a *circularity dilemma*.
ID / INT is an *interdisciplinary* topic (new kind of reflexivity?).

2. What are the implicit Premises of “ID / INT”?

ID / INT advocates

- 1.start** with a criticism of recent sciences / knowledge production / innovation / science-society interface
- 2.end up** with a belief in better kinds of sciences / knowledge

Modern baconian Motives

- To advance academic knowledge
 - To unify cognitive life-worlds
 - To ensure economic growth
 - To solve pressing problems
- Teleological-instrumentalist view !*

The discourse on ID is a *normative instrumentalist discourse* ... (technoscience)
?

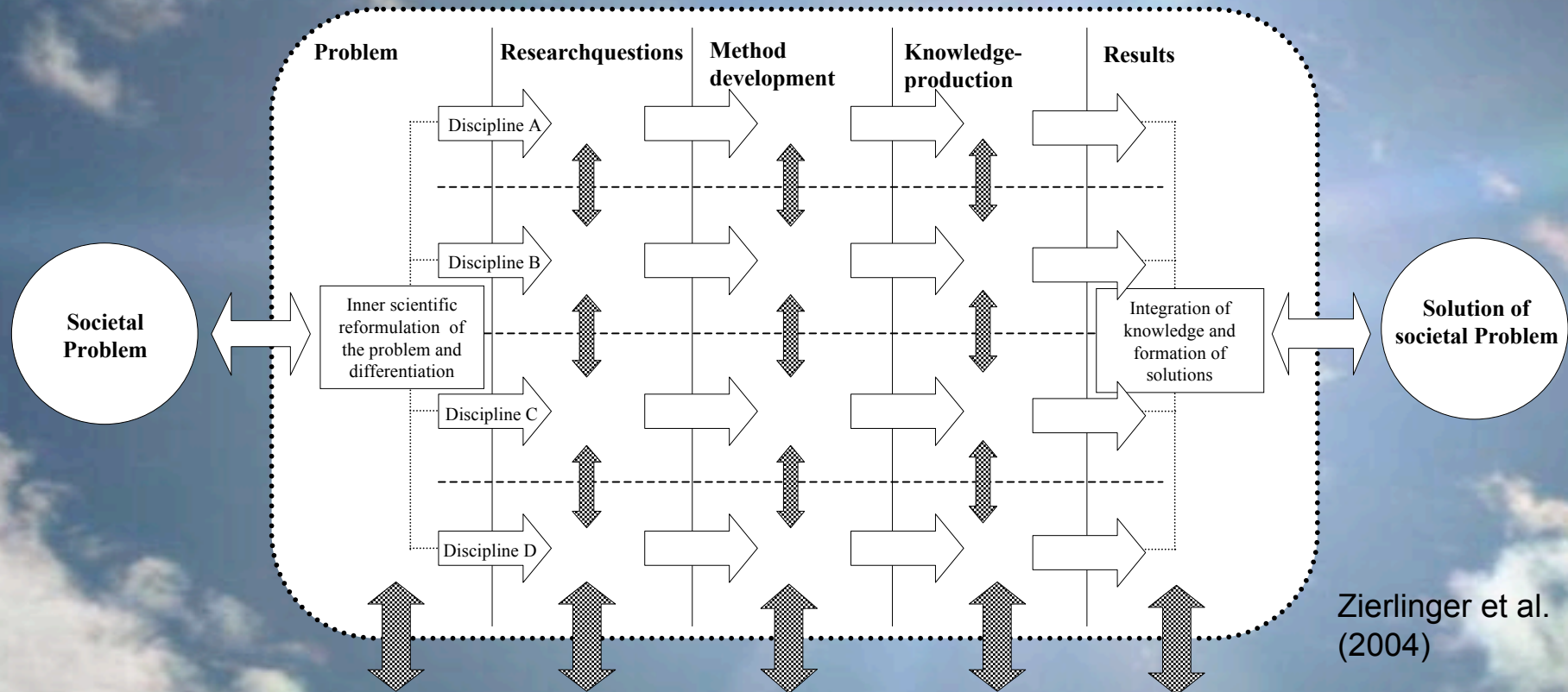
⇒ **Positivation of knowledge and shaping our *knowledge societies* ?**

I. Knowledge premises: Need of knowledge; knowledge is highly valued.

II. Shaping premises: Shaping of knowledge production/science is possible.

We assume: Obstacles *not* only with regard to action/application/implementation

2. What are the implicit Premises of “ID / INT”?



III. Boundary premises: Separation of disciplines and of Science-Society

IV. Transgressing premises: Overcoming boundaries: *integration*, unification

2. What are the implicit Premises of “ID / INT”?

III. Boundary premises

= **dichotomy** between the *internal* and the *external* with regard to discipline-discipline or science-society

Dichotomy might exist on three different levels

1. Boundary: Approach or context of *problem framing*
2. Boundary: Genesis and *context of discovery*
3. Boundary: Validation, evidence, *context of justification*

Objections ...

- Disciplines – how to specify this (concept of dis)?
 - Technoscience – Blurring of boundaries?
 - social-/culture-basis of science
 - language / semantic holism
- ⇒ *Which view of science is leading ?*
- “We have never been modern?” (Latour)

2. What are the implicit Premises of “ID / INT”?

IV. Transgressing premises ...

“The roots of the concepts lie in a number of ideas that resonate throughout the discourse—the ideas of a unified science, general knowledge, synthesis, and the *integration of knowledge*.” (JTK)

Questioning: the one-sided view of integrationists (unificationists, reductionists) ! Boundaries are necessary

Obviously, ID / INT is based on a boundary paradox

- Elimination *and*
- Conservation of boundaries !

⇒ If “elimination” would succeed, ID/INT would dissolve.
Better: **boundary dialectic**, similar to Hegel’s ‘Aufhebung’

2. What are the Implicit Premises of “ID / INT”?

Old and ongoing topics

1. *Non-Reductionism* (“separation / fragmentation”)
2. *Unification* (“integration / synthesis / transgressing”)

Two or more worlds / cultures ?

- Descartes, Kant
- Rickert, Dilthey, Windelband
- Carnap et al.
- Sokal, Bricmont, ... and *Social Constructivism*

2. What are the implicit Premises of “ID / INT”?

Prevalence of boundaries: Recent approaches ...

- *Thompson Klein*: Crossing boundaries. Knowledge, disciplinarity, ID
- *Luhmann/Parsons*: Functional differentiation and systems boundaries.
- *Latour*: Never have been modern and the paradox of boundary setting and dissolution.
- *Bauman*: Ambivalence of modernity is, in fact, ambivalence of boundaries.
- *Foucault*: Deconstruction of boundaries and the illusion of barriers, borders and boundaries.
- *Serres*: Circulation between boundary restricted domains.
- *Beck*: Reflexive modernization, the dissolution of boundaries induced by the technological development and the pressing challenge of boundary policy
- *Star/Griesemer/Lowy*: Boundary objects as means of a symmetrical dialogue.
- *Galison*: Trading zones in between boundary restricted particular domains.
- *Kohler*: Border zones as creative seeds of science

3. How to Approach and to Classify ID/INT?

Object Integration



a. Ontological Level

•What is reality?
⇒ Object systems, reality structures
Question: Do interdisciplinary object(system)s exist? Is there a part of reality which is “INT”?

Theory Integration



b. Epistemological Level

•What is knowledge and truth?
⇒ Knowledge, theory
Question: Do INT theories/concepts exist? Is there a specific context of justification?

3. How to Approach and to Classify ID/INT?

Method Integration



c. Methodological Level

- How can we obtain knowledge?
⇒ Methods, action, language

Question: Do INT methods and actions exist? Is there a specific context of discovery?

Problem Integration



d. Problem Level

- How to perceive and to solve pressing problems?
⇒ Problems, purposes, issues

Question: Do INT problems and purposes exist?

4. Do Underlying Convictions determine the Priority?

a. Realism, Empiricism, New Experimentalism, Real-Constructivism

INT with regard to reality, objects of reality, either given or constructed
⇒ Object INT

b. Rationalism, Idealism

INT with regard to the *theory form*, to knowledge, concepts, structures
⇒ Theory INT

c. Methodolog. Constructivism, Pragmatism

INT with regard to the *research form* and the process of knowledge construction / production
⇒ Method INT

d. Instrumentalism, Pragmatism, Critical Theory

INT with regard to problem-perception and -framing
⇒ Problem INT

Underlying philosophical convictions are predominant in the preference of a specific type of INT. ⇒ The other types are regarded as secondary and part of a deduction chain!

5. What are Operation Options?

5.1. Development of an Evaluation System ...

Object-INT Indicator
New non-disciplinary objects?

Theory-INT Indicator
Theoretical integration / synthesis?

Method-INT Indicator
Transfer method betw. disciplines?

Problem-INT Indicator
Wicked non-disciplinary problems?

Objective: Assessment: Grades of INT \Rightarrow Critique!!!

Does a hierarchy exist? Which indicator is the most important one?

5.2. Example: Nano

“In the early decades of the 21st century, concentrated efforts can **unify science** based on the **unity of nature**, thereby advancing the **synergistic combination** of nanotechnology, biotechnology, information technology, and new technologies based on cognitive sciences (NBIC).”

“The phrase ‘convergent technologies’ refers to the **synergistic combination** of four major ‘NBIC’ (*nano-bio-info-cogno*) provinces of science and technology.”

”Some partisans for **independence** of biology, psychology, and the social sciences have argued **against ‘reductionism’**, asserting that their field is autonomous [...]. But such a **discipline-centric outlook** is self-defeating.”

“A trend towards **unification by combining** natural sciences, social sciences, and humanities using **cause-and-effect** explanation has begun.”

“ ... **material unity at nanoscale.**”

⇒ NBIC-scenario advocates:
Unification / Reductionism /
Interdisciplinarity

Well known from physics?

5.2. Example: Nano

Analysis: What Kind of INT is predominant in the NBIC-scenario?

Lack of Theory INT

Technology is the aim, not theory.
Intervention, not representation.

Hardly Method INT

Methods are mainly based on the
progress in physics and chemistry ...

Marginal Problem INT

Not the problems and purposes
are at the center ...

No Universal “strong” Object INT

Objects are not timelessly located
on boundaries between different
layers of nature

Realconstructivist Object INT

Objects are *constructed* on
boundaries: e.g. between physics,
chemistry, and engineering sciences

5.2. Example: Nano

Contrast NBIC with CTEKS-Report ...

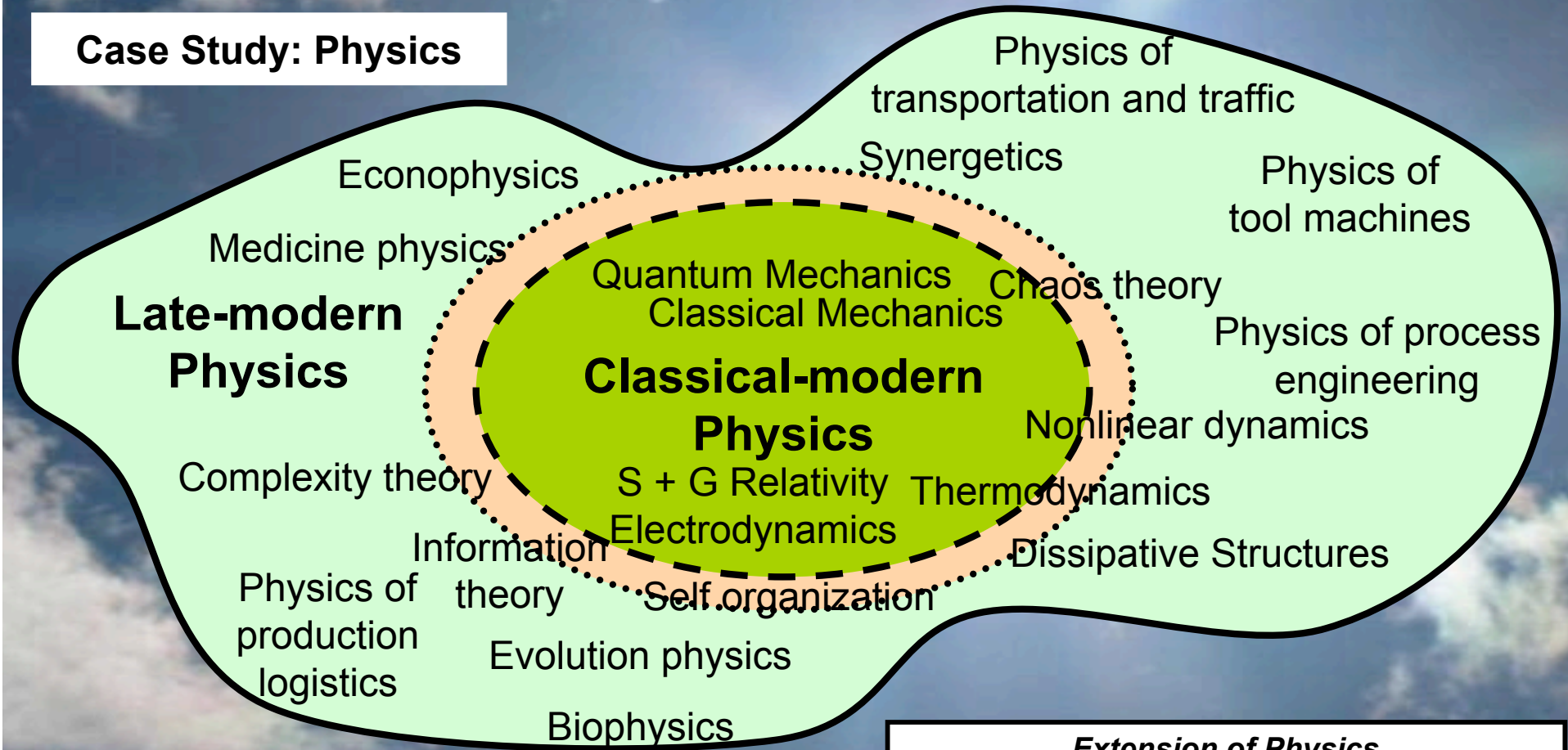
“**Converging technologies converge towards a common goal** or shared visions. CTs [in Europe] always involve an element of **agenda-setting**. Because of this, converging technologies are particularly open to the deliberate inclusion of public and policy concerns.”

“*CTEKS* agenda-setting is **not top-down** but **integrated into the creative technology development process**. [...] It works from the inside out in close collaboration with the social and human sciences and multiple stakeholders through the proposed **Widening-the-Circles-of-Convergence-initiative**.”

⇒ **Example of problem INT?!**

6. Missing Conditions/Feedback: ID Dissolution of Disciplinarity & ID

Case Study: Physics



**Disintegration of disciplines ...
as a condition of the possibility & feedback**

- Extension of Physics***
- Dis INT: Object extension
 - Dis INT: knowledge extension
 - Dis INT: Methodological extension

7. Prospects

Premises of “ID/INT”

- Knowledge prem: positivation
 - Shaping prem: instrumentalism
 - Boundary prem: dis conservation
 - Transgressing prem: elimination
- Boundary Dialectic!

Types of INT

- Object INT
- Theory INT
- Method INT
- Problem INT

Case Studies and Fields

- Brain-Mind, NBIC-Nano
- Complex Systems, Chaos Theory
 - Bionics, Econophysics
- TA , Sustainability, CTEKS

Further Steps ...

- Description, explanation, orientation, evaluation / quality assessment !
- *Non-knowledge, beyond instrumentalism, reflexivity*

⇒ **We should turn to problem INT:** deliberate process of problem-framing and agenda-setting...