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**WHY AND HOW TO PROMOTE
INTERDISCIPLINARITY IN RESEARCH
AT THE UNIVERSITY?**
from epistemological to practical aspects

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**VIRTUES AND VICES OF
MONODISCIPLINARITY AND
MULTIDISCIPLINARITY**
*some historical, practical and
epistemological considerations*

THE VIRTUES OF DISCIPLINARY STRUCTURING OF SCIENCES

"Natural" evolution with the development of sciences, (since the 19th century)

Accompanied the building of modern universities

Division of Work and Specialization

- Defined "consistent" areas of expertise
- Constructed relevant research objects
- Gave conceptual frameworks of reference
- Set categories
- Established reasoning modes

Methodology

Description tools

Decomposition of the research subject,
distinctions, reconciliations

Modalities to reveal mechanisms

Modalities for data & results presentation

Terms of interpretation

Procedures
For testing

THE VICES OF DISCIPLINARY STRUCTURING OF SCIENCES

- Division of the work vs "speciation" »
- Construction of the research object vs "reification" of the research object

- Masks the continuum of research objects disciplines deal with

**Cosmic, terrestrial, biological, social,
Political, cultural, historical, symbolic**

"Scotomization" of the recovery zones

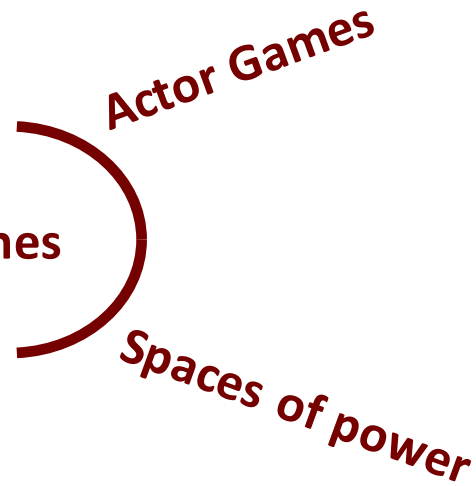
Break in solidarity

Empowerment, isolation

Loss of a common language

THE VICES OF DISCIPLINARY STRUCTURING OF SCIENCES

"Institutionalization" of disciplines

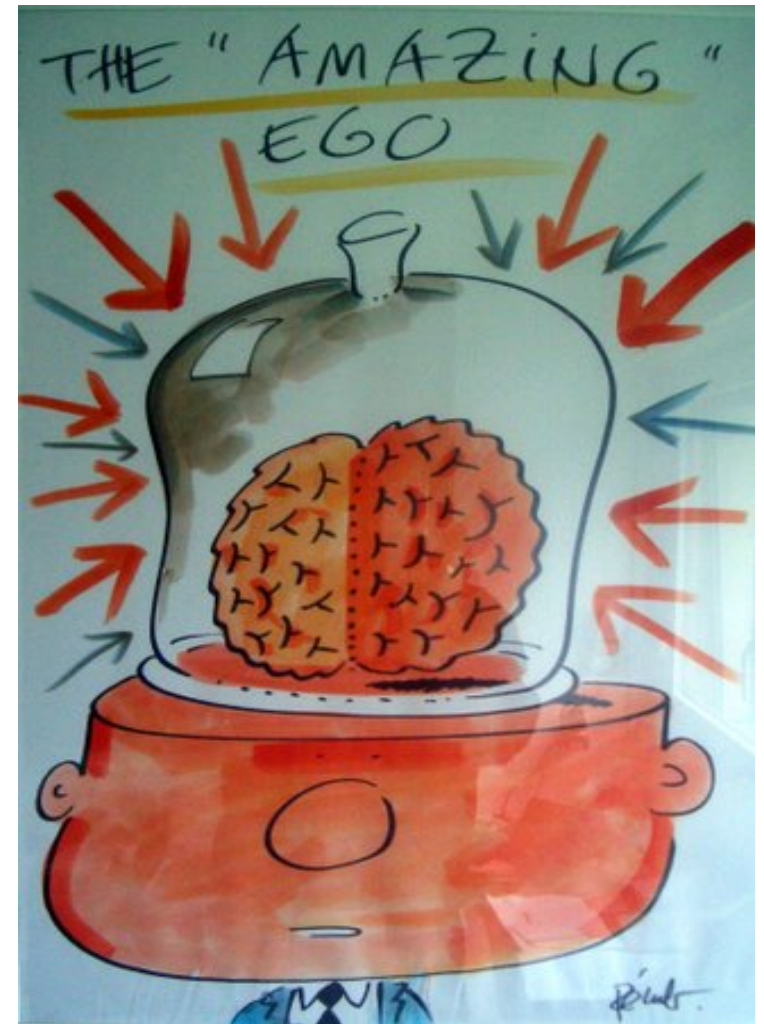


To finish with the disciplinary Egos?

Each discipline is like a jar. Once you are in one of these jars, you need genius to get out or innovate: you think you live in natural boundaries.

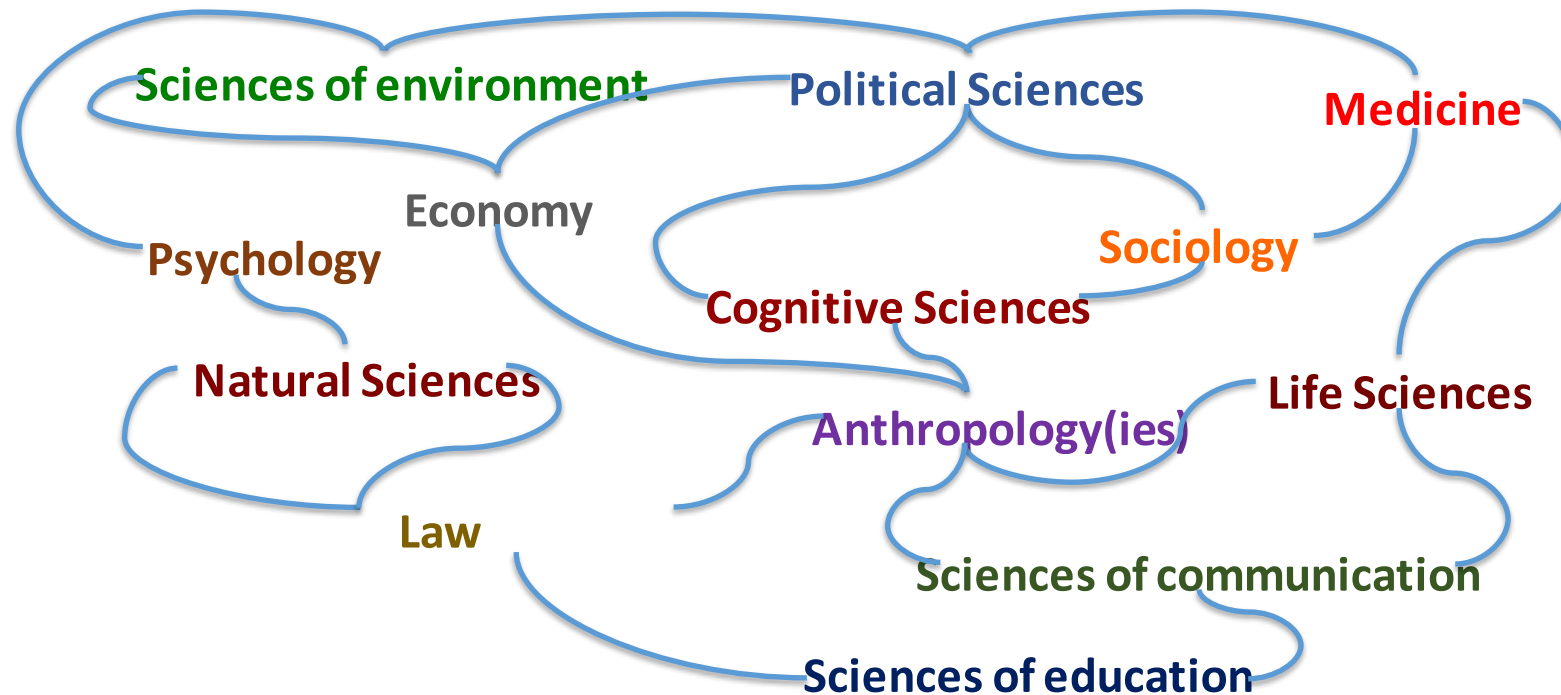
Veyne, P. (1983). *Les Grecs ont-ils cru à leurs mythes ?*

Adapted from pers. communication with F. Darbellay



(Multi) disciplinary configurations

Order or chaos of disciplines



"What a chimaera then is *man*, what a *novelty*, what a *monster*, what *chaos*, what a *subject* of *contradiction*, what a *prodigy*! *Judge of all things*, yet an *imbecile earthworm*; *depository of truth*, yet a *sewer of uncertainty and error*; *pride and refuse of the universe*. Who shall resolve this *tangle*?" — *Blaise Pascal, Pensées*

Operating concepts and concept network

LOW

DEGREE OF COLLABORATION BETWEEN DISCIPLINES

HIGH

DISCIPLINARY

Compartmentation,
Shared background
Disciplinary
Self reliance

MULTIDISCIPLINARY

Shared topic,
Communication,
Juxtaposition of
perspectives, autonomy

INTERDISCIPLINARY

Integration of
disciplinary insights,
cooperation,
interdependence

TRANSDISCIPLINARY

Problem-solving,
Implementation,
Relationship between
science & society

Interdisciplinarity and
the 21st century
research-intensive university

November 2016

Juxtapose
Sequence
Coordinate

Integrate
Interact
Connect
Synthesize
Mix

Transcend
Transgress
Transform

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FROM MONODISCIPLINARITY TO PLURIDISCIPLINARITY AND INTERDISCIPLINARITY :

A turbulent evolution

THE VICES OF INTERDISCIPLINARITY IN SCIENCES

The "violent" polemics of the 1970s (especially in the social sciences)

The multi/interdisciplinarity likely to go against

- “scientificity”
- Rigor
- relevance of conceptual frameworks
- relevance of the statement of postulates and hypotheses
- relevance of the statement of methods and tools of analysis
- ...

THE NEED FOR INTERDISCIPLINARY APPROACHES IN SCIENCES

Address complex issues / problems / challenges

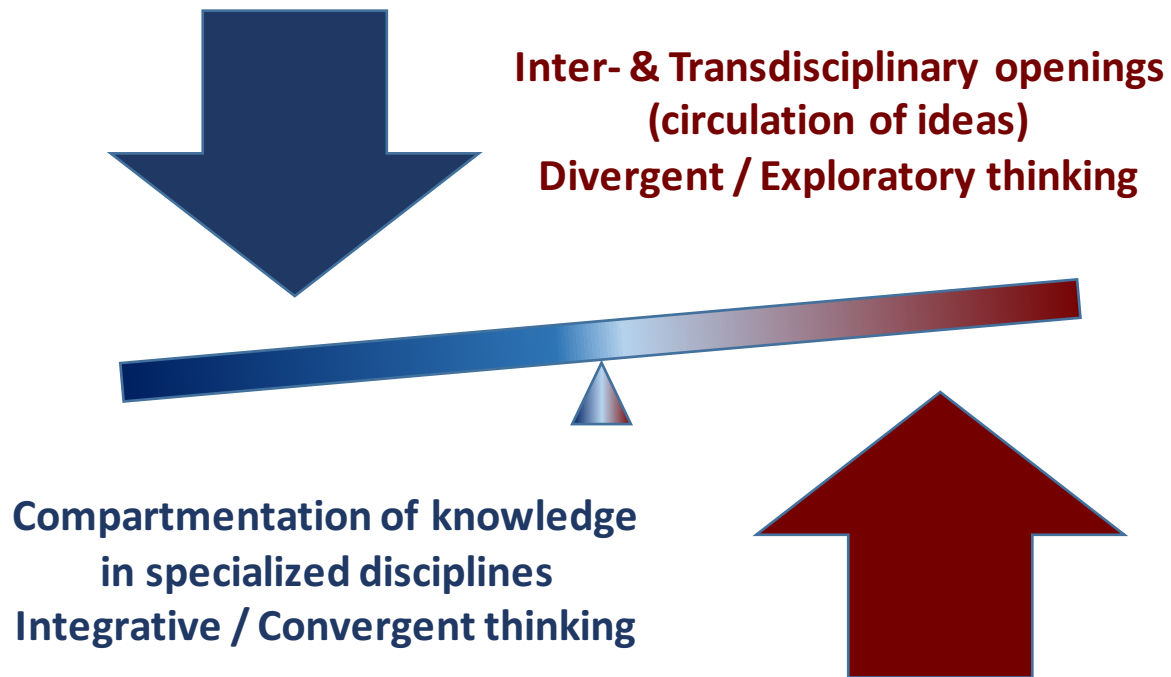
- How can human societies generate enough energy to meet human needs without causing irreparable damage to the planet?
- How do individual DNA sequences interact with environmental factors to influence the incidence of a disease?
- How does the transmission of electrical signals between neurons generate a set of subtle and complex behaviours?
- What will be the impacts of changes in the Earth's atmosphere on the climate, glaciers and oceans?
- What combination of biological, environmental and social factors is causing the increase in obesity rates seen in many parts of the world?
- How can innovations in agriculture feed a growing human population?
- How can human societies act to provide a better framework for integration, fight against inequalities and promote economic development?
- How to understand the diversity of cultures, their historical depth, their languages, their social and institutional structures to better understand the dynamics that cross them?
- How to take into account individual behaviour towards risks and social attitudes towards progress, research and science
- How to promote and support the adaptation of the entire population to the transformations of society? ...

THE VIRTUES OF INTERDISCIPLINARY APPROACHES IN SCIENCES

- The virtues of "embodied" interdisciplinarity, of the « NAIVE LOOK », of the absence of INHIBITION to cross disciplinary boundaries
 - The example of Charles DARWIN
 - The example of Alfred WEGENER
- The virtues of COVERINGS, CONTACTS, TRANSFERS
 - The example of the « biological revolution » in the fifties
- The virtues of NOTIONS migration
 - The example of Shannon's information theory
- The virtues of OBJECTS migration
 - The example of prehistory and study of hominization
- The virtues of CONCEPTS migration
 - The example of the concept of ecosystem
- The virtues of COGNITIVE SHEMES migration
 - The example of the study of cosmos, self-governing machines, artificial intelligence

MONO & MULTI/INTER DISCIPLINARITY IN RESEARCH :

Two complementary approaches



THE KEY TO LIFE IS BALANCE

INTERDISCIPLINARITY: BETWEEN INJUNCTION and OBSTACLES

- **Funding mechanisms most often aligned with disciplinary research**
- **A context of budget reduction favouring activities deemed "essential »**
 - **significant fluctuations in support for interdisciplinary research**
- **Interdisciplinary research "started" with support for pilot projects**
 - **Problem of long term**
- **Funding of research favouring the individual at the expense of the group**
- **Difficulties in funding "at risk" research**
- **The "standard" modalities of peer review processes make it difficult to evaluate projects that go beyond the disciplinary boundaries of experts or programs**



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SOME PREREQUISITE TO CONSIDER IN THE IMPLEMENTATION OF INTERDISCIPLINARITY

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METHOD-METHOD-METHOD & SKILLS-SKILLS-SKILLS
TO RAISE IN OVERCOMING TENSIONS AND CONTRADICTIONS

Originality ↔ Tradition

Selflessness ↔ Passion

Cooperation ↔ Competition

Closing ↔ Opening

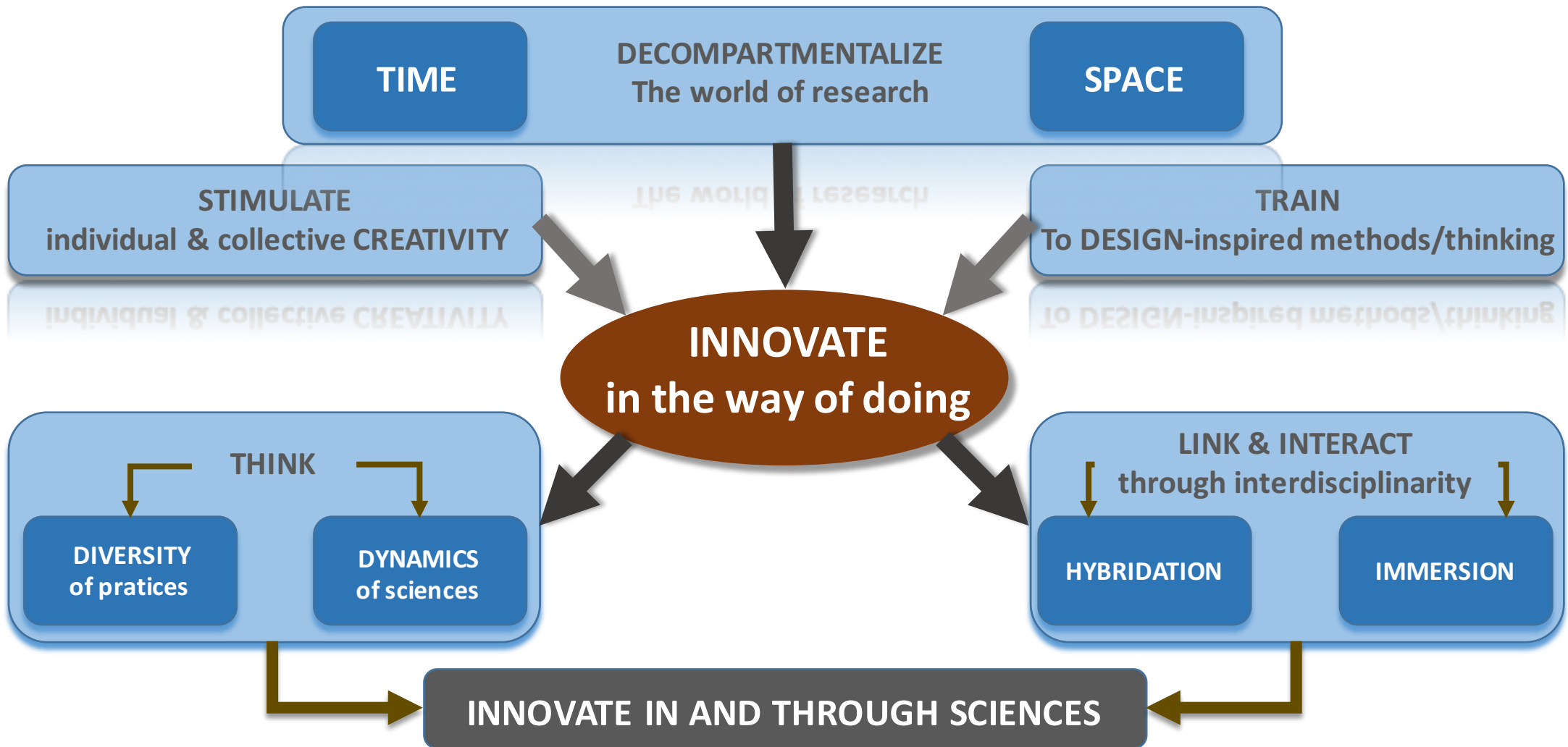
Sharing ↔ Secret

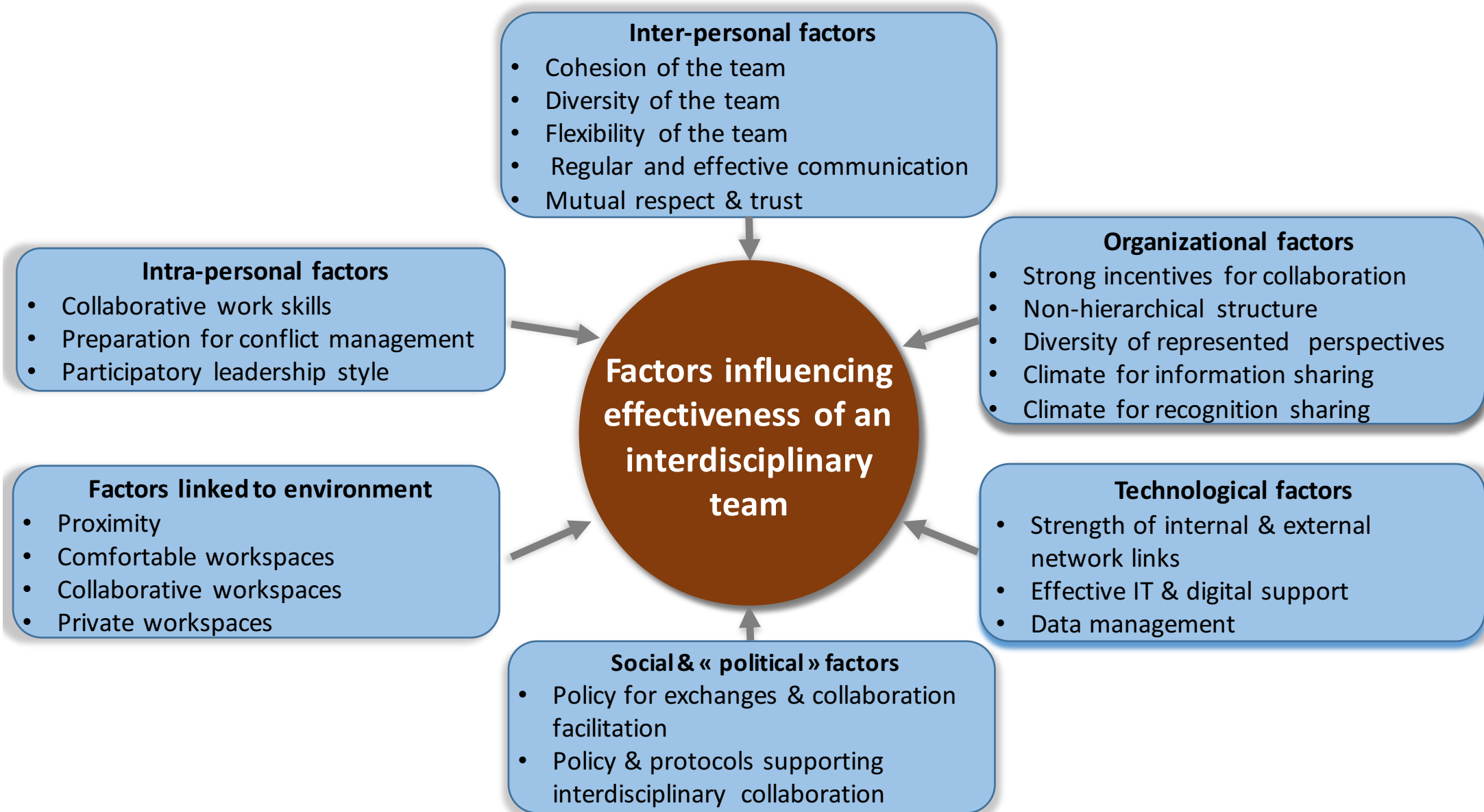
Distinctiveness ↔ Sense of belonging

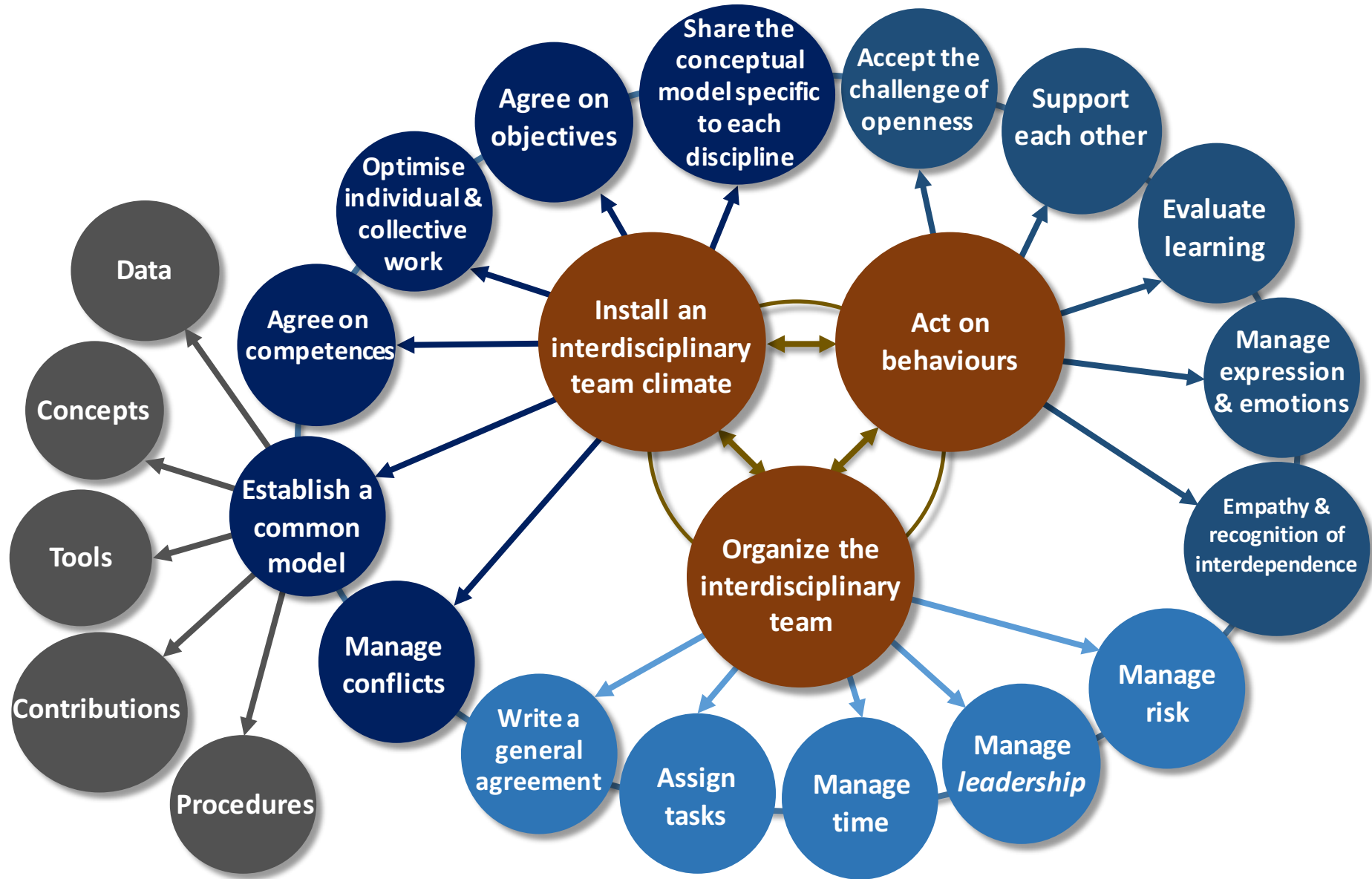
Commitment ↔ Independence

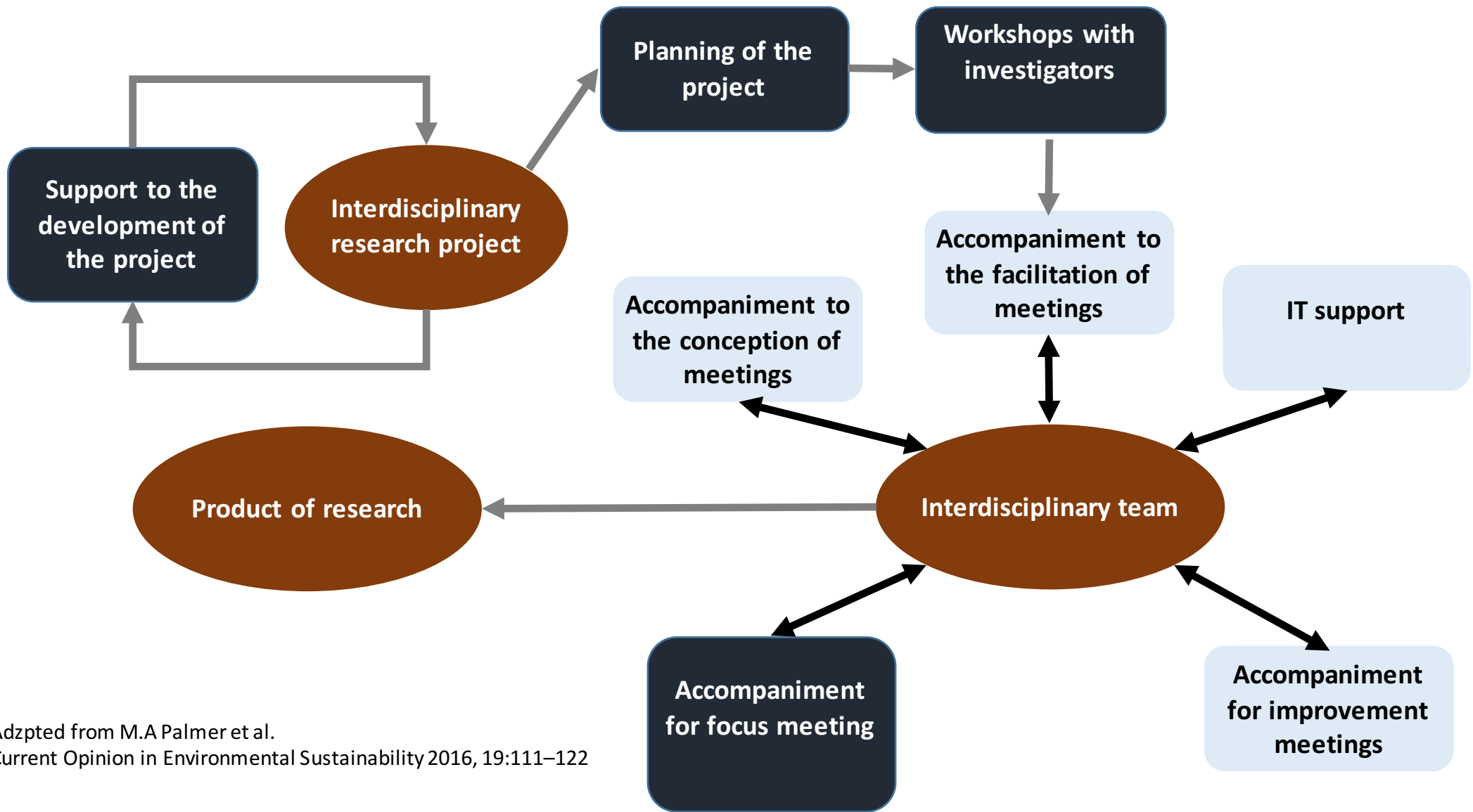
Autonomy ↔ Responsibility

Democracy ↔ Autocracy









Adzpted from M.A Palmer et al.
 Current Opinion in Environmental Sustainability 2016, 19:111–122