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
"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
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
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.


Adapted from pers. communication with F. Darbellay
"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**

**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

**DEGREE OF COLLABORATION BETWEEN DISCIPLINES**

**HIGH**

- Juxtapose
- Sequence
- Coordinate

- Integrate
- Interact
- Connect
- Synthetize
- Mix

- Transcend
- Transgress
- Transform
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 VICIES OF INTERDISCIPLINARITY IN SCIENCES

The "violent" polemics of the 1970s (especially in the social sciences)
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 SCHEMES migration
  - The example of the study of cosmos, self-governing machines, artificial intelligence
MONO & MULTI/INTER DISCIPLINARITY IN RESEARCH: Two complementary approaches

Inter- & Transdisciplinary openings (circulation of ideas)
Divergent / Exploratory thinking

Compartmentation of knowledge in specialized disciplines
Integrative / Convergent thinking

THE KEY TO LIFE IS BALANCE
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
SOME PREREQUISITE TO CONSIDER IN THE IMPLEMENTATION OF INTERDISCIPLINARITY
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
INNOVATE IN AND THROUGH SCIENCES

**THINK**
- DIVERSITY of practices
- DYNAMICS of sciences

**DECOMPARTMENTALIZE**
The world of research

**SPACE**

**STIMULATE**
individual & collective CREATIVITY

**TIME**

**TRAIN**
To DESIGN-inspired methods/thinking

**LINK & INTERACT**
through interdisciplinarity
- HYBRIDATION
- IMMERSION

**INNOVATE in the way of doing**
Factors influencing effectiveness of an interdisciplinary team

Inter-personal factors
- Cohesion of the team
- Diversity of the team
- Flexibility of the team
- Regular and effective communication
- Mutual respect & trust

Organizational factors
- Strong incentives for collaboration
- Non-hierarchical structure
- Diversity of represented perspectives
- Climate for information sharing
- Climate for recognition sharing

Technological factors
- Strength of internal & external network links
- Effective IT & digital support
- Data management

Social & political factors
- Policy for exchanges & collaboration facilitation
- Policy & protocols supporting interdisciplinary collaboration

Intra-personal factors
- Collaborative work skills
- Preparation for conflict management
- Participatory leadership style

Factors linked to environment
- Proximity
- Comfortable workspaces
- Collaborative workspaces
- Private workspaces

Factors influencing effectiveness of an interdisciplinary team
Support to the development of the project

Interdisciplinary research project

Planning of the project

Workshops with investigators

Accompaniment to the facilitation of meetings

IT support

Accompaniment for focus meeting

Accompaniment for improvement meetings

Product of research

Interdisciplinary team

Support to the conception of meetings

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