Advancing knowledge through interdisciplinarity

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- What are the ’added values’ of ID?
- ID in a few funding schemes
- How to incorporate ID values in science policy?

Background and orientation

Why investigate the added values of ID?

- Need of methodological and science policy *advice*
  - What is good ID research?
  - Why, when and how to support it?
- At the same time, *critical* examination of highly contested, politically important concept

Conceptual and empirical resources

Interdisciplinarity (ID)

- Existing definitions and classifications
- Content analysis of *research proposals*
- Interviews with interdisciplinary *researchers*

Institutions that govern science

- Social and cognitive studies of *disciplines* and *methodology*
- *Peer review* as an institution
- Content analysis of peer *judgments* and *deliberation*

Science in a broader context

- Relationships between science, society and environment
- Science as a complex adaptive system
- Science in the pursuit of human sustainability

What does interdisciplinarity ’add’ to science?

’Functional’ definition of ID

- ID is a means of advancing knowledge *beyond a discipline*
- Must be paired with disciplines: how does it complement disciplinary research?
- Added values can be both epistemic/intellectual and societal/practical
- Values can be defined for any group of beneficiaries (e.g. project partners, disciplines, fundings organizations, political programs, knowledge users…)
- Promoting particular values do have **systemic effects** elsewhere
- What are the **generic** values of ID, and their implications for science?

Three epistemic values (virtues) of ID

1) ***Breadth*** of subject matter, vision, or skills
   - Flow of ideas and intellectual exchange across fields
   - Facilitates both intellectual development and problem solving
2) ***Integration*** of knowledge into a synthetic or coherent whole
   - A means toward greater insight and more comprehensive solutions
3) ***Transformation*** of existing structures of knowledge
   - Regenerative force that challenges the status quo
   - Critical or emancipatory goals of knowledge, and/or a source of radical innovation and breakthrough

Operationalizing and measuring ID

Breadth	Integration	Transformation
Diversity: • Number of disciplines • Balance between disciplines • Cognitive distance between disciplines	**Coherence:** • Number of relations between disciplines • Intensity of relations between disciplines • Disparity of links between disciplines	**Structural change**; no good indicators! • In-betweenness? • Peripheral areas? • Dynamics ?

(Huutoniemi & Rafols, forthcoming 2016)

ID in a few funding schemes

Studied funding schemes

1) The Academy of Finland: *Academy Projects*
2) The Academy of Finland: *Research Program on Computational Science*
3) Helsinki University Centre for Environment (HENVI): *HENVI Research Programs*
4) Lappeenranta University of Technology (LUT): *LUT research platforms*

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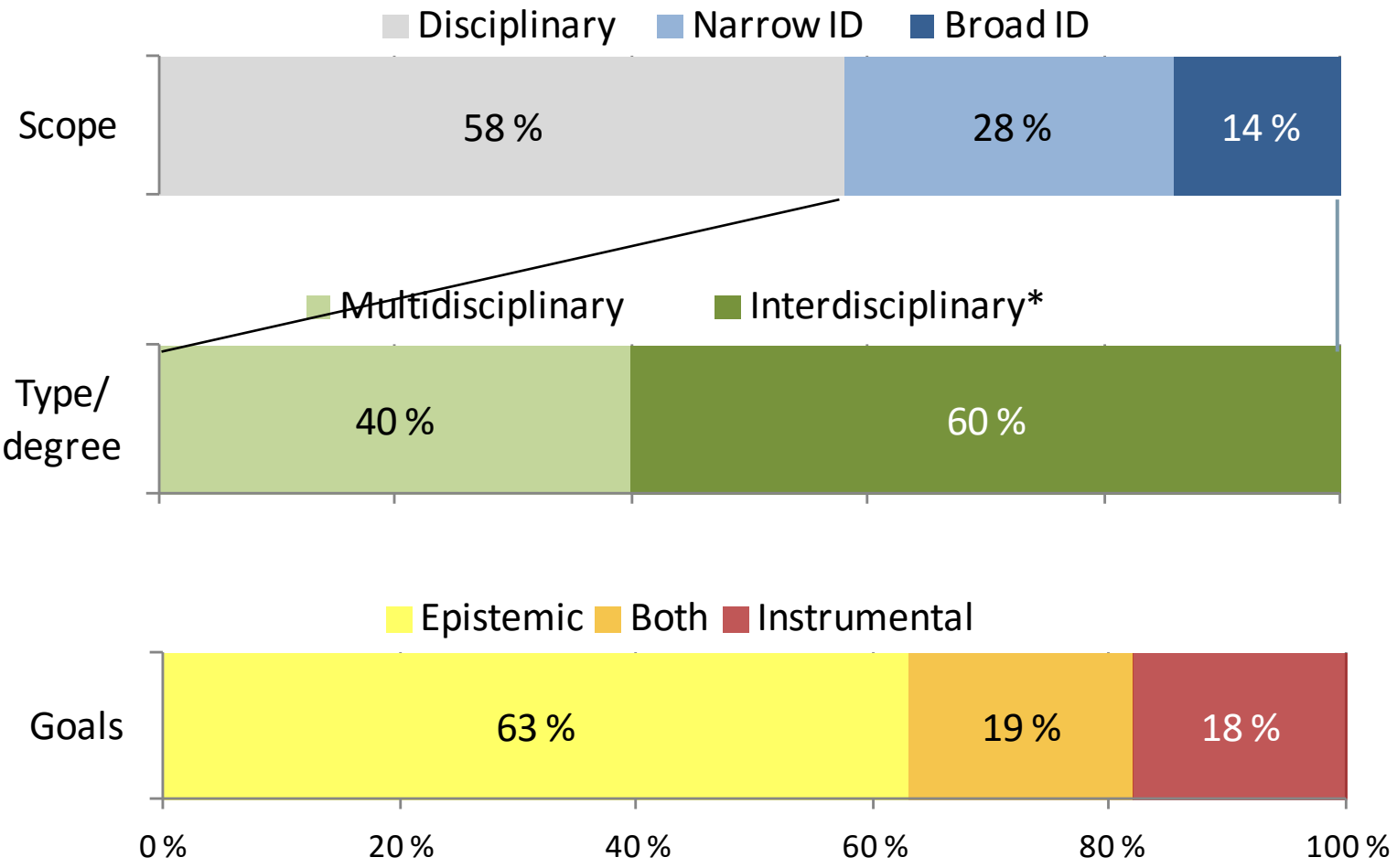
Academy Projects 1997, 2000, 2004 hundreds per year	• 'Bottom up' research initiatives from all fields of research • No particular incentives for ID • *" promotes the quality and diversity of research and its capacity for regeneration by providing funding for **scientifically ambitious** research"*
Research Program on Computational Science 2010-2016 15 research consortiums	• 'Top-down' initiative of the funding organization • ID is one of the program's goals • *" aims to facilitate **interaction and exchange** between research teams and different research disciplines [- - -] between the substance sciences and algorithm and methods development"*
HENVI Research Programs 2011-2014 3 programs	• 'Top-down' initiative of the centre • ID is one of the evaluation criteria • *" the research program will consist of researchers **with different disciplinary backgrounds** (both from natural and social sciences/humaties)"*
LUT Research Platforms 2015-2020 4-6 platforms ?	• 'Top-down' initiative of the university • ID is at the center of the LUT Strategy 2020 • *the research platforms aim to boost interdisciplinary research and provide knowledge base or solve challenges of **societal and economic importance** in fields of clean energy, clean water, circular economy and sustainable business*

(1) Academy Projects



(Bruun et al. 2005; Huutoniemi et al. 2010)

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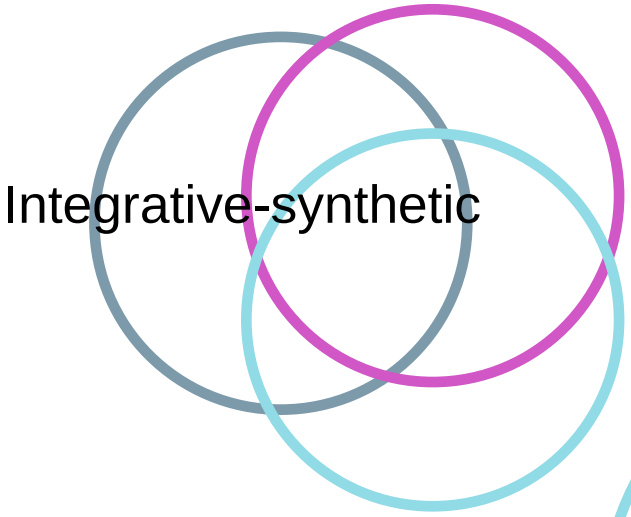
(2) Research Program on Computational Science

Functions of ID interaction and exchange:

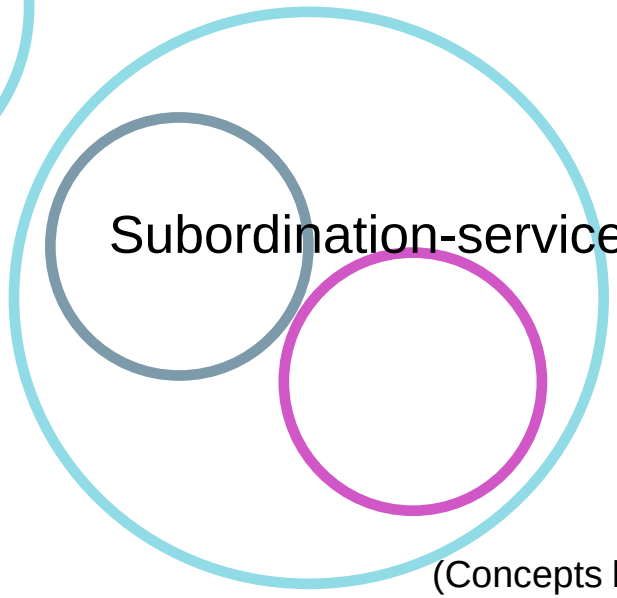
Problem solving	• Provide new solutions to problems in substance fields • Feedback between problem definition and possible solutions • Examples from **Novac** and **CSI Speech**
Conceptual bridging	• Integration at theoretical rather than practical level • Bridge concepts from different domains, scales, etc. • Examples from **ComQuaCC** and **CSI Speech**
Explo-ration	• Exploration of unknown scientific territory • Recognize new patterns / phenomena with improved tools • Example from **BrIAn**

(3) HENVI Research Programs

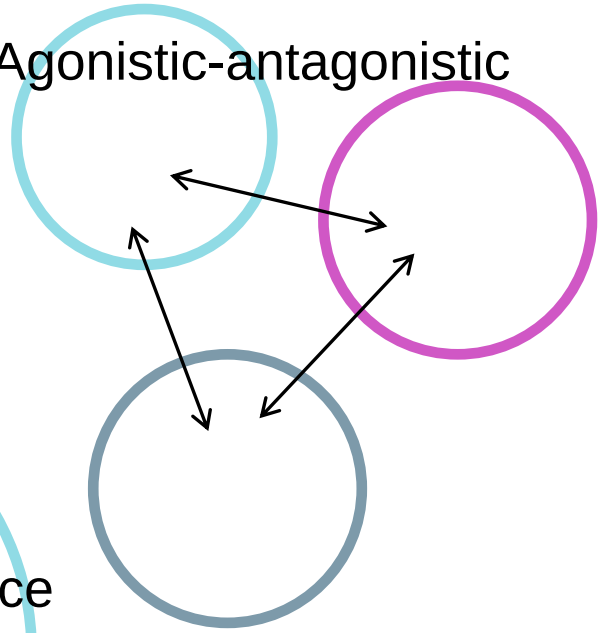
Interrelations between disciplines (Natural & Social sciences/Humanities):



Integrative-synthetic



Subordination-service



Agonistic-antagonistic

(Concepts borrowed from Barry & Born 2013)

Lessons learned from the cases

For researchers:

- Successful ID collaboration does not necessarily require common understanding of problems
- Disciplinary perspectives do not need to be ’equal’
- Interrelations between disciplines are worth designing

For research funders:

- Requirement for ID collaboration may force researchers to profile their expertise even more in disciplinary terms
- Solution-oriented research may rush to incremental problem solving instead of expanding or challenging the current understanding of problems
- Strongly top-down managed ID collaboration is not likely to work

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Incorporating ID in science policy

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Three major epistemic values of interdisciplinarity and their implications for research evaluation

	Breadth	Integration	Transformation
Value added	Expanded repertoire of specialized expertise	Synthesis of perspectives	Transformation of specialized worldviews
Accountability	Multiple disciplines	Integrative research context	Hybrid communities; future generations
Evaluative focus	Management of diversity	Integrative process	Creativity; renewal of knowledge structures
Epistemic standards	Combination of disciplinary standards	Specific standards for integration	Proactive, emergent standards
Policy implications	Structural flexibility in the evaluation process	An evalution system of its own	New governance of knowledge production
Proponents	Academic organizations; sociologists of knowledge	Problem-oriented organizations, practitioners, and theorists	University reformers; antidisciplinary movements
Pathologies	Increase of bureucracy; lack of community	Institutional isomorphism with disciplines, inlcluding their limitations	Epistemic anarchy; no cumulative advancement

(Huutoniemi & Rafols, forthcoming 2016)

Questions raised about ID

- ID values resonate with the overall goals of science
- ID provides remedies for many undesired developments in science – fragmentation, self-sufficiency, unresponsiveness to broader concerns, narrow-mindedness…

- Is IDR more valuable than disciplinary research?
- How much IDR is needed in relation to disciplinary research?
- To what extent should ID be institutionalized?
- How to strike a right balance between the self-organization and top-down management of science?
- What are the unintended consequences of the growing demand of ID?

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