

BACK TO FUNDAMENTALS OF RESEARCH

Interdisciplinarity



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Position Paper

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On October 9, 2024, the University of Bologna held an international event titled: "Back to fundamentals of research: Interdisciplinarity". The event featured distinguished speakers and experts from national and international institutions who shared their insights on interdisciplinary research and recommendations on how to foster this approach. Through this position paper, the University of Bologna intends to highlight the key messages that emerged from the discussions and point out the challenges and recommendations to create a more supportive environment for interdisciplinary research.

Keynotes

Catherine Lyall, Emerita Professor of Science and Public Policy, University of Edinburgh

Interdisciplinarity: a continuing interplay of perspectives?

Further reading:

Lyall, C. (2019). *Being an Interdisciplinary Academic: How institutions shape university careers*. London: Palgrave Pivot.

Vienni-Baptista, B., Fletcher, I., & Lyall, C. (eds.) (2023). *Foundations of Interdisciplinary and Transdisciplinary Research. A Reader*. Bristol: Bristol University Press.

HIGHLIGHTS FROM THE KEYNOTE PRESENTATIONS

Catherine Lyall, Emerita Professor of Science and Public Policy, University of Edinburgh

Interdisciplinarity represents both an opportunity and a risk for researchers. On the one hand, interdisciplinary (ID) research seems to be quite effective when it comes to addressing increasingly complex scientific and societal issues. On the other hand, there are a significant number of 'mismatches' in the research system for interdisciplinary research. Researchers involved in ID research are often faced with uncertain or troubled career paths and lack of academic recognition compared to their peers who embrace research lines consistent with single disciplines.

This paradox is also reflected in how research policies and institutions regard interdisciplinarity: while present-day research policies encourage ID work, most Research Performing Organizations (RPOs), funding and evaluation bodies are predominantly oriented by uni-disciplinary principles. For example, they assess scholars and their research outcomes based on specific disciplines or provide academic curricula that do not envision an integration between disciplines. Additionally, research funds are mostly dedicated to projects that do not promote an ID approach even if funding bodies often claim to encourage this kind of research.

In the past, a certain confusion among scholars on what "interdisciplinary" means could be perhaps recognized as the root cause of this misalignment between theory and practice. Today, there is significant maturity and agreement on how disciplines can be integrated. From an institutional point of

Miles MacLeod, Associate Professor of Philosophy of Science, University of Twente
Engaging in interdisciplinarity: some lessons from practice

Further reading:
MacLeod, M. (2018). What makes interdisciplinarity difficult? Some consequences of domain specificity in interdisciplinary practice. *Synthese*, 195(2), 697-720.

MacLeod, M., & Nagatsu, M. (2018). What does interdisciplinarity look like in practice: Mapping interdisciplinarity and its limits in the environmental sciences. *Studies in History and Philosophy of Science Part A*, 67, 74-84.

Roundtable - The institutional perspective

Moderator:
Alberto Credi - Vice Rector for Research, University of Bologna

Participants:
Jan D'hooge - Vice-Rector of Research Policy, KU Leuven
Angela Liberatore - Head of the Scientific Management Department at ERC Executive

view, there must be a clarity of purpose when encouraging interdisciplinarity – which should not be promoted at all costs simply because of perceived funding opportunities – and there should be a systematic and holistic approach to tear down its barriers. A possible starting point is to put more emphasis on the researchers' problem-solving abilities and not just their "academic" (discipline-focused) excellence. Another important action is to encourage ID education and training at all levels to ensure more awareness around interdisciplinarity in next generations of researchers which might, additionally, provide more secure teaching contracts for interdisciplinary scholars.

Miles MacLeod, Associate Professor of Philosophy of Science, University of Twente

The challenges stemming from ID research are related not only to external factors such as institutional recognition but also to intrinsic factors that can be defined as cognitive barriers. These barriers can be, e.g., motivational or conceptual/methodological.

Motivational problems can be related to misaligned expectations and interests among researchers working together, for example a lack of clarity on how the ID project is going to positively contribute to all the disciplines at play. Another motivational issue can derive from the fact that researchers tend to leave aside important aspects such as setting an ID common ground, and this might affect the quality of results.

Conceptual and methodological issues that can undermine ID collaboration include a hierarchical conception of disciplines, in which the scientific approach and practices of one field are considered more valid than those of other fields, or the different level at which a given phenomenon is analyzed (macro/societal vs. micro/individual). They can also include more technical differences in the scales models or experiments are run, or the standards used to assess results. Corrective strategies that can be adopted by an ID research group include the development of common methodological approaches prior to the project start and the use of common ID methods such as problem integration, data-integration, and model-coupling. This evidence suggests that the ID approach aligns more closely with the traditional scientific method than is commonly assumed in which ID science like disciplinary science works to develop and deepen a limited number of frameworks or approaches.

Another strategy to foster ID skills among researchers is to move beyond limiting interdisciplinarity to collaborative projects. Historically researchers have for instance moved across fields importing methods as they have moved, or they have taken ideas from other fields integrating them into their own, without explicitly collaborating. Research has also shown that the "cross-pollination" of ideas from different disciplines can create a virtuous cycle, as many significant scientific breakthroughs have emerged from such exchanges. An effective incentive would be to allocate funding directly to researchers, rather than projects, thus avoiding traditional evaluation based solely on single-discipline criteria.

ROUNDTABLE 1: THE INSTITUTIONAL PERSPECTIVE

J. D'hooge - Which are the initiatives promoted by KU Leuven to foster ID research and what are the main challenges? How do you guarantee a virtuous balance between uni-disciplinary and ID research?

KU Leuven has implemented several initiatives to foster ID research while continuing to support uni-disciplinary efforts, recognizing that strong foundations in single disciplines are essential for building effective ID bridges.

Agency - ERCEA

Marco Malgarini - Italian National Agency for the Evaluation of Universities and Research Institutes - ANVUR

Ludovic Thilly - Vice-Rector, University of Poitiers, and Chair of the Executive Board of the Coimbra Group, Brussels

Marino Zerrial - Director of Human Technopole, Milan

Initiatives for students:

- Joint PhD programs offering ID doctorates across faculties and transdisciplinary training targeted to PhD students.

Initiatives for faculty members:

- Dual appointments: Professors can hold appointments across departments, which allows them to contribute to teaching and research in different disciplines.

Initiatives at institutional level:

- Dedicated funding designated to support ID projects, prioritizing interdisciplinary innovation.
- KU Leuven Research Institutes: 22 research institutes aimed at fostering ID collaboration and operating with a model of self-sustainability.

M. Malgarini - Considering the increasing tendency in funding bodies towards the promotion of ID research, do you envision future changes in the evaluation criteria that are currently adopted by the Italian National Agency for the Evaluation of Universities and Research Institutes (ANVUR)? More in general, which actions do you think should be taken by ANVUR to consider the growing importance of interdisciplinarity in research?

Current recognition of ID research:

- Mechanisms for identification: Recognition of ID research has improved; mechanisms now exist to flag and assess ID papers specifically.
- List of journals valid for National Scientific Qualification: Journals may be classified across various disciplines. Additionally, the recent guidelines have expanded opportunities for the inclusion of ID journals.

Future directions for evaluation:

- Incorporating ID in evaluation criteria: Future work with the scientific community to thoughtfully incorporate interdisciplinarity within core evaluation criteria – such as originality, excellence, and impact – while recognizing that interdisciplinarity is not inherently a value on its own.

Career assessment and development:

- Reforming career assessment: Current career assessments are lagging in terms of ID research; the Italian Research Quality Assessment (VQR) has evolved to reflect changes in the scientific ecosystem, but National Scientific Habilitation has remained static.
- Coalition for Advancing Research Assessment (CoARA): The recently published CoARA action plan highlights the need for improved recognition and evaluation of ID research.

A. Liberatore - How is ID research currently considered and evaluated by the European Research Council (ERC) and what could be the added value of an ID approach in achieving groundbreaking results?

- ERC welcomes ID and uses multidisciplinary panels for research evaluation.
- Researchers can express preference for more than one panel, reflecting the ID nature of their work.
- ERC operates on a bottom-up approach, encouraging ID methods if they benefit the research.
- The recognition of the difference between multi-, inter- and transdisciplinarity is important for the ERC. However, often, the greatest disagreements arise within the same discipline, rooted in epistemological and methodological differences. Furthermore, some disciplines and fields of study are inherently ID.
- ERC evaluations can involve expertise from multiple panels; experts outside the main panel provide written comments and ERC briefs all experts on unconscious bias, including possible tendency to value less the expertise of someone who is not present in the discussion.

- An ex post analysis of research funded under the early phase of ERC shows a correlation between ID methodologies and groundbreaking research. (<https://erc.europa.eu/sites/default/files/2024-10/ERC-pioneering-years.pdf>)

L. Thilly - What is the role of university networks in promoting ID research considering the current landscape of European policies and funding instruments? Which are the concrete actions that networks could undertake to support their member universities in enhancing ID research?

The Coimbra Group emphasizes the critical role of ID research in addressing societal challenges and proposes the following key initiatives and recommendations:

- Share ID research insights with the EU Commission to increase recognition in research assessment and career promotion.
- Promote recognition of ID research in career advancement and grant necessary time and resources.
- Enhance meeting opportunities and optimize space for ID interaction.
- Support open science practices.
- Improve ID training of the evaluators.

An example of synergies between education and research to foster interdisciplinarity is provided by the EC2U Alliance, that supports ID efforts through joint articles, virtual institutes, and joint Master programs. Foster joint programs and virtual institutes, creating spillovers from education to research, with occasional impacts on local policy.

M. Zerial - According to your experience, what is the role of research facilities in promoting ID research? Which actions or initiatives is the Human Technopole undertaking to promote interdisciplinarity, in the framework of the national and international research and innovation ecosystem, also with regard to the connection between preclinical and clinical research?

- High-quality infrastructure: laboratory infrastructures are accessible to researchers via an application, enabling cross-disciplinary collaboration.
- Specialized training and technology transfer are key pillars as they foster advanced skills and facilitate technological innovation.
- Problem-oriented approach: research groups with different expertise are encouraged to collaborate to address complex problems such as those relating to human health.

ROUNDTABLE 2: THE RESEARCHERS' PERSPECTIVE

A. C. Mourão Moura; F. X. de La Cruz Montserrat; E. van Emde Boas - How would you define a multidisciplinary, ID or transdisciplinary approach from your experience as a scholar? Which of the three scientific perspectives do you consider most appropriate for the advancement of research in your field of work?

- ID collaboration involves integrating knowledge and methods from different disciplines to solve complex problems.
- Multidisciplinarity is well recognized, interdisciplinarity is necessary to truly integrate knowledge and to find innovative solutions, while transdisciplinarity helps to achieve common goals.
- The transition from multidisciplinary to ID approaches implies mutual understanding and co-design among experts from different fields with shared protocols; shifting to an ID approach deepens collaboration and striking a balance between these approaches optimizes

Roundtable - The researchers' perspective ([see slides](#))

Moderator:

Anna Chiara Fariselli - Former Director of the Institute for Advanced Studies (ISA), University of Bologna

Participants:

ISA Doctoral Prize Winners at the University of Bologna:

Giorgio Franceschelli - Department of Computer Science and Engineering

Adriana Latorre - Department of Cultural Heritage

Yasaman Yousefi - Department of Legal Studies

ISA Visiting Fellows:

Francisco Xavier de la Cruz Montserrat -

Vall d'Hebron Hospital Institute of Research
Ana Clara Mourão Moura - Federal
University of Minas Gerais, Department of
Urban Planning
Evert van Emde Boas - Aarhus University,
School of Culture and Society

research outcomes.

- Interoperability and a common language are essential for successful ID work.
- Artificial Intelligence (AI) plays a crucial role in this process by helping integrate different methodologies and generating innovative solutions.
- Institutional support, including time and funding, is critical for sustaining ID research.

G. Franceschelli; A. Latorre; Y. Yousefi - How did you integrate approaches and methodologies from different disciplines into your research project, and what challenges did you encounter in fostering effective ID dialogue?

- One of the main challenges is communicating with people from diverse backgrounds and managing the varied expectations that arise from their distinct perspectives.
- Convincing the academic community about the value of ID work can be difficult.
- Balancing qualitative and quantitative approaches within a multidisciplinary framework is complex.
- The limited duration of PhD programs hinders the development of a shared language and understanding between disciplines.
- Divergent perspectives and disagreements between thesis tutors from different fields can impede ID work.
- PhD courses in some countries are not designed to promote collaborative research, which limits ID exchange.

Challenges

Over-specialization of science and differences in scientific practices.

- The increasing sectorization in academia makes it difficult for researchers to combine different scientific approaches and consequently to engage in ID work.
- The integration of different disciplines can be hindered by conceptual and methodological differences, which often emerge even within an individual field. These divergences often stem from a hierarchical conception of disciplines.
- The lack of a "common language" and a common ground often complicates the collaboration between experts from different fields.
- Misaligned expectations on how interdisciplinarity can contribute to the advancement of science represent a motivational barrier to engage in ID work.

Lack of proper recognition of interdisciplinarity in research evaluation and researchers' career development.

- Traditional researcher evaluation and promotion systems do not always recognize the value of ID research. This could result in a more difficult career path for researchers who engage in ID work.
- Some prestigious scientific journals tend to publish more uni-disciplinary scientific outputs than ID scientific outputs because the latter is considered less impactful.

Institutional barriers to interdisciplinarity in RPOs.

- The structure and organization of PhD programs do not always facilitate the acquisition of ID skills. This is due for example to their limited duration and to the lack of specific ID training.
- RPOs are usually organized in uni-disciplinary structures.
- There are usually few physical spaces in RPOs in which students and researchers with different backgrounds can come together, exchange ideas and combine their expertise to solve problems.

Uneven support for interdisciplinarity by research funding bodies.

- There is a need for more funding and resources specifically allocated to ID projects.
- Funding allocation for ID projects is unbalanced: most of the funding is dedicated to collaborative ID projects while individual ID initiatives are not usually funded.
- Even if funding bodies promote an ID approach, the evaluation processes of research proposals can sometimes underestimate the impact of ID approaches.

Recommendations

Opening to the contamination of disciplines.

- Researchers should be more conscious of the potential of interdisciplinarity when it comes to addressing a scientific challenge and to producing ground-breaking scientific advancement. At the same time, they should recognize that the knowledge developed by single disciplines is the basis for interdisciplinarity.
- Developing a mindset open to other disciplines or scientific practices is the way to overcome conceptual and methodological barriers when engaging in ID collaborations.

Improving the researchers' assessment and the evaluation of research outputs.

- Researchers' assessment should fully recognize the value of ID research by setting up clear evaluation criteria that also encompass the quality of ID scientific outputs.
- The system of tenure and promotion should fully recognize researchers who engage in ID work (e.g., through the recognition of a wider range of scientific outputs).

Creating an environment conducive to ID research within RPOs.

- Specific ID training and opportunities for ID collaborations should be provided within PhD programs.
- There should be spaces that allow ID dialogue across departments or faculties.
- The role of research infrastructures as a catalyst of ID collaborations should be promoted.

Investing more in ID research and improving its evaluation.

- More resources should be devoted to supporting interdisciplinarity, including funds for individual researchers carrying out ID research.
- Research funding agencies should promote ID training for panelists and evaluators to ensure that ID research proposals are properly assessed