# Introduction

This book is born from the awareness of the urgent need of a large and systematic analysis of current interdisciplinary theory and practice. The first idea arose in the context of the transversal research line "Unity of Science and Interdisciplinarity" of the Center for Philosophy of Science of the University of Lisbon (CFCUL). A group deeply committed to a comprehensive analysis of interdisciplinary procedures, strategies and practices of contemporary science. In this direction, a critical and systematic analysis of the epistemic features, heuristic devices and metaphysical assumptions common to all scientific disciplines has been developed. In parallel, a series of case studies about some concepts and practices indicative of the interdisciplinary nature of contemporary science and academic studies were carried out, both in Portugal and in Brazil.

The research done allowed to reinforce the main hypothesis of this book according to which interdisciplinarity (ID) is essentially a cognitive phenomenon, the actual manifestation of the transversal rationality which has always been underlying scientific activity but which started – from the second half of the twentieth century onwards – to gain a great epistemological dimension as well as a strong impact in the traditional disciplinary structure of scientific and educational institutions (Pombo, 2013).

As such, ID expresses the fact that the progress of sciences – especially since the second half of the twentieth century – ceased to result from an increasing specialization, but, on the contrary and continuously more, is relying on integrative heuristic devices such as the transfer of concepts, the convergence of problems, the contamination of hypothesis or the irradiation of methods between different disciplines, to name a few. Until a certain point in history, disciplines lived in a happy isolation regime with their backs turned to each other, each claiming the dignity of an independent science and proclaiming its autonomy from all the other sciences. This resulted in an unprecedented and unsuspected fragmentation of scientific knowledge with profound consequences in terms of practices, languages, institutional structures, but also culture and mentalities. However, in the mid-twentieth century, these same disciplines revealed the most surprising openness and proximities to other disciplines. The emergence of new kinds of sciences at the interface – or at theconfluence – of traditional disciplines is well known. Take, for instance, the case of Wiener's Cybernetics in the 1940s, or the "galaxy" of Cognitive Sciences from the 1970s onwards (Thagard, 2010). In other words, it is the very progress of specialization that demands interdisciplinary articulation. This seems to be the basic structure of ID (Pombo, 2013).

Contrary to the common view according to which ID is seen as a pedagogical claim, this book is based on the idea that ID is above all a scientific determination of contemporary science which, of course, has huge impact in school and university. Because school and university are institutions necessary to the production of scientific knowledge, they have to adapt to the transformations of the knowledge produced, i.e. to the epistemological advancements of their time, namely to the contemporary model (even if is a weak model) of that old scientific trend that is unity of science. Trivium and quadrivium were for centuries models of the unity of science

and correspondingly of the university/school curricula organization. Nowadays, ID constitutes another form of thinking and practicing the unity of science (not hierarchical, not centered, etc.) and so the curricular structure of schools and universities is changing accordingly (Pombo, 2014). This book aims at clarifying these issues by providing the necessary historical information and conceptual analysis.

Even though the idea of ID is not new – it was born as a "mot d'ordre" in May 68 when students demonstrated in Paris – it is still today vague and imprecise. Many definitions, diverse characterizations and various theoretical frameworks have been provided to inhabit the so far many existing pedagogical and sociological ID studies. We believe that philosophy – although not claiming to be at the hierarchical position of some higher normative discipline – may constitute an important analytic locus of ID features which characterize contemporary scientific activity. And we believe that the well-trained research team of colleagues from Portugal, Brazil, Italy and France that is publishing this book has the necessary theoretical and practical experience for providing such a comprehensive and detailed analysis.

As the final achievement of a long work done by the authors, this book has four ambitious, key objectives: (1) to contribute to the stabilization of the meaning of ID; (2) to characterize – and comparatively confront – the main ID theorizations which have been proposed until now; (3) to build an innovative and broad understanding of the several ID determinations as an essentially cognitive phenomenon (a crucial new heuristic strategy, a response to the complexity which science is dealing with today, a way of facing a new kind of urgent and global problems, a methodological procedure required for problem solving and a new model for peer communication) with critical institutional implications, both at the level of disciplinary structures and of curricular organization; and (4) to distinguish and map the diversity of ID procedures and practices that are being used and tested by contemporary scientific and educational institutions (with case studies undertaken both in Portugal and in Brazil).

The book is therefore divided into two parts: (1) Theoretical Approaches to Interdisciplinarity – i.e. a conceptual and theoretical research about ID – and (2) Practices of Interdisciplinarity – i.e. empirical approaches pointing to the analysis of actual ID practices, programs, procedures and forms of ID institutional implementation. The aim is to gather some samples of ID practices, kinds of work andxi procedures able to illustrate the variety of levels, circumstances and institutional structures in which they are developed. This means the editors of this book believe that studying ID does not only imply to investigate theories about ID, but also to describe, exemplify and evaluate what is actually the case in science production and education (Schell, 1992).

The authors hope that the two parts discussed in this book will contribute to better understand the Theory (Part I) and Practice (Part II) of ID in its fundamental epistemological meaning. Any reader caring about philosophy of ID and philosophy of science may consider each chapter of interest individually.