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## Philosophy of (and as) Interdisciplinarity. Workshop Report (Atlanta, September 28–29, 2009)

Michael H. G. Hoffmann · Jan C. Schmidt

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Since the 1970s, “interdisciplinarity” has become a popular label ascribed to innumerable research programs. Interdisciplinarity is driven by expected benefits of solving problems collaboratively across the boundaries of traditional disciplines and, from a different perspective, by ethical and societal problems at the intersection of science, technology and society. These problems led to the establishment of technology assessment, global change studies, sustainability research, and an abundance of interdisciplinary collaborations across many fields and all over the globe. Interdisciplinary projects are now funded by national and international research agencies, and these agencies came to perceive it as their vital interest to develop the knowledge and methodological tools necessary to evaluate the results of their investments.

However, it is remarkable that after more than 30 years of public and scientific debate there is still no consensus about the exact meaning of popular catchwords like “interdisciplinarity” and “transdisciplinarity.” Although challenging and interesting questions have been posed, there are not many answers. A clear and convincing result cannot be identified. Although many brilliant people have contributed to the debate and social scientists already try to measure interdisciplinarity, we are still far away from a sufficient understanding of “interdisciplinarity.”

Starting from the assumption that interdisciplinary research poses genuine conceptual problems—problems for which philosophical traditions and approaches would be best prepared to deal with—a small group of philosophers and science and technology policy scholars from the Georgia Institute of Technology and the Darmstadt University of Applied Sciences organized in the fall of 2009 an international—and interdisciplinary—workshop to discuss this assumption. The main outcome of the workshop, however, was that this starting point—that is, the assumption that interdisciplinary research should be studied more or less in the style of traditional philosophy of science—is too limited when it comes

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to the question of how philosophy itself has to change when it not only *observes* what is going on in the world of science, but is itself *involved* in interdisciplinary collaboration. The workshop developed the idea of philosophy not as a metadiscipline, but as an engaged participant and partner in interdisciplinary discourses. There was a shared sense that the most interesting questions are those that refer to the possibilities and limits of a new philosophical practice that is shaped by interdisciplinary collaboration.

A second outcome of the workshop was the establishment of a new network of philosophers and others interested in interdisciplinarity: PIN-net, that is the “Philosophy of/as Interdisciplinarity Network.” A new website at <http://pin-net.gatech.edu> informs now about PIN-net and its activities, offers the possibility to sign up for an e-mail list, and presents titles and abstracts of past and future international PIN workshops and conferences. The mission of the PIN-net has been defined—based on an agreement formulated at the workshop in Atlanta—as follows:

The mission of the Philosophy of/as Interdisciplinarity Network is to find a niche within the broad field of interdisciplinarity studies by combining two directions of activities: on the one hand philosophical inquiry into problems regarding the practices and theories of interdisciplinary research in the style of traditional philosophy of science and, on the other, initiating a new philosophical practice of reflective and reflexive engagement in the world—one that questions and overcomes the boundaries that have constituted philosophy as a discipline in the 20th century. In this second direction philosophers leave the study and enter the field, integrating their work with scientists, engineers, and policy makers.

The first International Workshop on the Philosophy of Interdisciplinarity on which we are reporting here comprised sixteen contributions offering a spectrum of reflections on conceptual and methodological questions, as well as discussions of concrete examples and problems of interdisciplinary research. We start our discussion with the philosophical talks, turn then to the two social scientists who presented, on the one hand, research on the long tradition of “interdisciplinarity research” (IDR) and, on the other, its newest attempts to map the structure of interdisciplinary collaboration, and will finally give an overview of the papers that reported on experiences, problems, and perspectives of interdisciplinarity in a series of different fields.

The workshop was opened by Robert Frodeman’s provocative talk about “Interdisciplinarity and the Limits of Knowledge.” Frodeman started with questioning “our fundamental assumption—that we can never get enough knowledge.” Instead of the “simple stockpiling of more and more types of knowledge” that we are facing in modern science, he argued for focusing on the relevance of knowledge: “What is needed today is a better understanding of the relationship between fields of knowledge, and a better grasp of the ways knowledge produced in the academy can more effectively move into society at large.” Referring to the recently published *Oxford Handbook of Interdisciplinarity* that he edited together with Julie Thompson Klein and Carl Mitcham, Frodeman reported that this handbook does not only provide a comprehensive overview of current interdisciplinary efforts of knowledge production, but that it also documents the “transdisciplinary” effort “to make knowledge products more pertinent to non-academic actors.” Most important for the project of a philosophy *of* and *as* interdisciplinarity, however, is the fact that the handbook “constitutes a reassertion of the centrality of philosophy within the academy and within culture generally.”

The centrality of philosophy among the sciences and between the sciences and our broader culture, Frodeman argued, is not a matter of course; it has to be fought for. Over

the past century philosophy itself developed into “just another regional ontology” with specializations the kind of which we find in fields such as geology or chemistry; excessive specialization, accompanied by growing societal irrelevance and a “loss of the sense of the larger purpose of things.” Against this tendency Frodeman emphasized: “Our century desperately needs a field of study devoted to the examination of knowledge in the largest possible compass, without being hamstrung by disciplinary standards.”

The picture that Frodeman developed of a new kind of philosophy that focuses on this field of study is no longer a picture of philosophy as a discipline that draws its pride from the “rigor” it idolizes as its paramount value; instead, what it represents can better be described as what Frodeman called “field philosophy—on analogy with field rather than lab science. Field philosophers would operate on specific projects with scientists, engineers, and policy makers, community groups and NGOs. Philosophy as interdisciplinarity would not eschew theoretical questions; quite the opposite. But its theory would be rooted in and always return to extra-philosophic practice.”

Frodeman showed that one of the most pressing problems such a field philosophy faces is that of the “limits of knowledge.” As a theoretical problem it can be described as resulting from the dilemma that we “are able to go deeper into a given subject only by passing over examination of the lateral connections between that subject and the rest of the universe of thought and action.” We know that studying phenomena in isolation leads to distorted pictures of reality since “everything is implicated with everything else.” But that means: The deeper disciplinary knowledge production goes, the more it loses what motivated its development in the first place. The central message of Frodeman’s talk was that this theoretical dilemma can only be resolved by a new practice of trying to cope with it. For philosophers this could be the practice of “field philosophy”: doing philosophy not like an analysis in the lab, but like an interdisciplinary and collaborative exploration of an ecosystem.

The contributions of Britt Holbrook and Michael Hoffmann focused on one crucial problem faced by everyone who engages in interdisciplinary projects and collaborative explorations: the problem of communication across the boundaries of languages that are primarily determined by disciplinary background knowledge and traditions. While Holbrook tackled the question of “Interdisciplinary Communication” by looking for answers with three groups of philosophers (Lamont-Habermas; Kuhn-MacIntyre; and Bataille-Lyotard), Hoffmann developed a semiotic approach to the problem of interdisciplinary collaboration based on Charles Peirce’s concept of “sign.” While Peirce conceptualized signs as mediators between an “object” and an “interpretant” in a triadic structure, Hoffmann argued for the necessity of a fourth element—“collateral knowledge”—as a crucial precondition for understanding a sign’s meaning and thus for communication. In order to cope with the problem of considerable differences regarding tacit assumptions in interdisciplinary collaboration, it should be helpful to improve communication by employing methods that are designed to visualize collateral knowledge.

A broader spectrum of “Epistemological Challenges” for which a “philosophy of interdisciplinarity” should be prepared was described by Jan C. Schmidt. Referring to the rich tradition of philosophy of science, Schmidt identified a plurality of four different dimensions of interdisciplinarity: Interdisciplinarity with regard to (1) objects (“ontology”), (2) knowledge/theories (epistemology), (3) methods/practices (methodology), and (4) problem perceptions/problem solving. Schmidt argued that different philosophical traditions can be related to the following dimensions: (1) *Realists* and *real-constructivists* refer to given or constructed objects of reality (they prefer the ontological dimension of ID). (2) *Rationalists* focus on knowledge, theories, and concepts; *positivists* share the same

orientation toward theories (epistemological dimension). (3) *Methodological constructivists* and many *pragmatists* reflect on methods, actions, or cognitive rules (methodological dimension). (4) *Critical theorists*, together with *instrumentalists*, *utilitarians*, and some *pragmatists*, refer to problems and how to handle and solve problems pragmatically. The impact, effect, and consequence of interdisciplinarity are of utmost relevance (problem-oriented dimension). Schmidt illustrated this philosophical framework of the four different dimensions by some of the most popular examples of research programs that come with the label “interdisciplinary”: nanoresearch/nanoscience/nanotechnology; complex systems theory/chaos theory, biomimicry/bionics; and technology assessment/sustainability research. Schmidt concluded that we cannot eliminate this plurality. “Interdisciplinarity” is, and will always be, a multi-faceted term. This, he argued, leads to a critical impetus against any kind of unification.

Focusing on “biomedical engineering” (BME) as a new “interdiscipline,” Nancy Nersessian provided a conceptual analysis of interdisciplinary collaboration “on the bench top” that combined discussions on the role of models in philosophy of science and on model-based reasoning in cognitive science. Going beyond the well-known concepts of “boundary objects” (Susan L. Star and James R. Griesemer) and “trading zones” (Peter Galison), she argued for the need of “adaptive spaces” that are “driven by complex interdisciplinary problems,” and which “require that the individuals themselves achieve a measure of interdisciplinary synthesis in methods, concepts, models, materials—in how they think and how they act.” Based on an analysis of “adaptive spaces” in two exemplary BME labs, Nersessian concluded that a philosophy of interdisciplinarity cannot be developed a priori; it requires investigations of different kinds of interdisciplinary practices and a better understanding of the differences between “interdisciplines, multidisciplines, transdisciplines, and so on.”

Nersessian’s approach was supported—from a different angle—by Kenneth Fuchsman. He addressed “Epistemological Dilemmas in Interdisciplinary Studies,” in particular one dilemma that can play the role of a “litmus test for interdisciplinarity”: integration. Most advocates of interdisciplinarity argue, as Fuchsman showed, for unification, integration and synthesis. However, these advocates often do not take into account disciplinary obstacles and boundaries. In fact, they hardly reflect on disciplinary knowledge, concepts and action. Disciplines, as Fuchsman emphasized, are not as coherent as usually presupposed. They themselves show the emergence of substantial pluralities. Fuchsman argues that “integration, in the sense of unifying diverse elements, can no longer be a defining element of interdisciplinarity.” Thus, interdisciplinary studies should be redefined to incorporate “epistemological pluralism.” Philosophy of interdisciplinarity has to be based on epistemological pluralism. Fuchsman concluded that “by starting with the recognition of plural epistemologies, and rigorous comparative methods, interdisciplinarity can be in the forefront of confronting some of the glaring gaps and conflicts within our knowledge apparatus.”

Although Robert Rosenberger does not explicitly claim to provide such an *epistemological pluralism*, his paper on “Reflections on Disciplinary Overlap and Scientific Methodology” turned out to be an excellent example of a pluralist approach. Not unity, synthesis, integration, or unification was on Rosenberger’s agenda, but the scientific practice of “borrowing, incorporating, and transplanting” theoretical structures or claims from one discipline into another. Rosenberger takes the pluralist claim seriously: philosophy is just one discipline among a broad spectrum of other disciplines; philosophy is not a meta-, trans-, or structure-discipline but serves as an equal partner and participant in an interdisciplinary dialog.

From this general vantage point, Rosenberger reviewed some exemplary interactions between developmental psychology and the philosophy of science. He showed, on the one hand, how Jean Piaget inspired Thomas Kuhn and, in reverse disciplinary direction, Kuhn's philosophical framework influenced again the developmental psychology of Susan Carey. Rosenberger concluded that the notion of "interactional expertise," introduced by Harry Collins and Robert Evans, might be useful to conceptualize this kind of interdisciplinary cross-breeding.

While Rosenberger looked at interdisciplinarity with a focus on disciplines that pick up ideas from other disciplines, Bryan Norton was interested in the "convergence" of research that is driven by "real-problems." In "Interdisciplinarity in Action: Looking at Interdisciplinarity from the Other End of the Knowledge Pipeline," Norton focused on the failures and possibilities in the search for improved environmental policies. He blamed the neo-positivist insistence on a clear distinction between facts and values for the simplistic, if not outright false idea prevalent in public policy that gathering science and placing values on effects of decision-making could be separated. Using the application of cost-benefit analysis and other methods to evaluate anthropogenic changes to ecosystems as an example, Norton dismantled the idea that in "good science" descriptive and theoretical work should be isolated from normative discourse. He sketched the outline of a "post-positivist ecology" that can be based on Steward Pickett's work on the limitations of ecological models and the role of metaphors in choosing among models, and he showed how Herbert Simon's distinction between "substantive" and "procedural rationality" can be used to support the idea of "adaptive management." Adaptive Management, as introduced and developed by Norton over the past decades, can be conceived as a participatory and deliberative approach that integrates science and values in management. This can lead to a science and policy model "that assumes feedbacks and iteration, that struggles over time to integrate scientific knowledge about ecological systems with social scientific knowledge about what people value."

After this discussion of papers that measured the scope of a philosophy of and as interdisciplinarity, let us turn now to the contributions of Alan Porter and Ismael Rafols who opened up the workshop's horizon to the rich tradition of quantitative analysis of "interdisciplinarity research" (IDR) as performed in social science.<sup>1</sup> Summarizing selected perspectives from the "Interstudy Era" in the 1970s and 1980s, Porter showed how these perspectives changed over time via the ongoing National Academies Keck Foundation Initiative to foster IDR and in more recent workshops on tracking and evaluating IDR. He examined several sets of criteria that are currently used for evaluating interdisciplinary research, such as variety, balance, and disparity. Rafols then picked up this thread and reported on his most recent efforts to visualize the structure and relationships among bodies of research by means of sophisticated graphic software. Based on a variety of data that are available in Thomson Reuters's Web of Science, Rafols develops methods or measures for tracking and/or evaluating "interdisciplinarity."

The third group of talks we want to summarize here informed the community about problems and perspectives of interdisciplinary collaboration in the fields of environmental policies, law, educational sciences, and in research on information technologies and globalization in political science. In his talk on "Climate Change: The Interdisciplinary Problem from Hell," Paul Baer focused in particular on two problems within the vast array of difficult questions in climate related sciences that require interdisciplinary

<sup>1</sup> See also the project homepage "idr: Measuring & Mapping Interdisciplinary Research" at <http://www.idr.gatech.edu/>.



communication and research: the need to combine analysis of coupled socio-economic and biophysical systems in the projection of future radiative forcing, and the problem of understanding across disciplines the disagreement within the discipline of economics about how to estimate the costs and benefits of reducing GHG emissions.

Paul Hirsch continued this discussion on interdisciplinary experiences in the field of environmental policies by reporting on his experiences (in Frodeman's terms) as a "field philosopher" in an international, interdisciplinary, research initiative called "Advancing Conservation in a Social Context: Working in a World of Trade-offs." Drawing on his previous work with Bryan Norton on "the problem of problem bounding," Hirsch first diagnosed as a major challenge to interdisciplinary research the fact that each participant focuses on a different subset of a hypothetical "universe" of problem elements. Furthermore, and compounding the problem, people coming from different intellectual traditions tend not only to parse the complexity of phenomena in specific ways, they also tend to have a simplified understanding of the way *others*—coming from different intellectual traditions—make choices about what to focus on and what to leave to the periphery. In Hirsch's view, interdisciplinarity as a practice would be greatly facilitated if, first, each participant had a more full appreciation of the problem dimensions their colleagues choose to focus on, as well as why they make those choices; and second, if interdisciplinary collaborations were structured according to a better understanding of the plurality of ways in which the relationship between research and reality is understood.

Following this analysis, Hirsch presented the basic outline of a heuristic that he co-developed with his colleagues in the Advancing Conservation in a Social Context: Working in a World of Trade-offs Initiative, designed for the purpose of effectively structuring collaborative interdisciplinary efforts in the field of conservation and sustainability. The heuristic consists of three "lenses," which are distinguished not by disciplinary divides but according to differing "philosophies" regarding the nature of the relationship between abstract models and the complex socio-ecological systems they presume to represent.

Thomas Wilmer addressed in his talk issues and misunderstandings of interdisciplinary cooperation between legal and technical disciplines. Especially IT and internet businesses require solution-orientated communication styles which do not match legal experts' habits of expression. Willmer raised objections against the widely shared view that a joint- or meta-language should be developed to facilitate interdisciplinary projects. In contrast, he argued that interdisciplinary projects should develop common targets, goals, and problems. For this, however, our everyday language seems to be rich enough.

Herbert Gerstberger focused on mathematics and science education. He stressed that these well-established fields have always been interdisciplinary insofar as research and teaching has to focus on how to bridge the gap between individual sciences and the educational sciences, developmental psychology, and a variety of general philosophical approaches. In his talk, Gerstberger showed in particular that the teacher in the classroom embodies different forms of interdisciplinarity, and how this embodiment can be analyzed based both on work about signs and representations in semiotics and on a discussion in aesthetics which stresses that any presentation—and therefore also any presentation in the classroom—includes an element of theatrical performance. Gerstberger argued for a deeper reflection on the "performance value" of teaching, and on the problem of how to reconcile its epistemic and aesthetic dimension.

Hans Klein showed how the problems and approaches discussed in interdisciplinarity research can help in particular to better understand the relationships among problem characterization, theoretical background knowledge, and processes in the field of global

internet governance. James White, in the workshop's final talk, reported on a interdisciplinary project in the area of globalization studies: The "Globalization Atlas and Portal Project" (GAPP). Although this project could never be realized, its preparation included a software development that allows the organization and visualization of enormous amounts of data and information necessary for cross-disciplinary research on an authoritative globalization research resource.

The Atlanta workshop in 2009 was the first in a series which has been continued with another Workshop on *Philosophy of/as Interdisciplinarity* in Hamburg/Germany in 2010, and a first conference on *A New Practice of Philosophy: Taking Philosophy Beyond Disciplinary Boundaries* at the University of North Texas in 2011. The next conference will take place in Tübingen/Germany in 2012. The workshop in Hamburg has been, and the conference in Tübingen will be, funded by the Udo Keller Stiftung (Neversdorf/Germany). Further details about all these events are available at <http://pin-net.gatech.edu>.