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Engaging or not engaging with transdisciplinary research: on methodological choices in philosophical case studies

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Abstract. Conducting empirical case studies in philosophy of science entails methodological decisions—decisions that can limit the ways in which philosophers can engage with and have an impact on the science they are studying. In this paper I approach such limitations through two examples: case studies in which philosophers of science used qualitative methods in the study of inter- and transdisciplinarity.

1 Introduction

Conducting an empirical case study is a singular way for a philosopher of science to engage with scientists. Here I am naturally talking about the kind of case studies that can include actual engagement: participant observation, interviews, perhaps even co-research in collaboration with scientists. In short, philosophical work that adopts methods from the social sciences, but uses them for the purposes and interests of philosophy of science. Such case studies have become fairly common in philosophy of science, as approaches such as philosophy of science in practice (Ankeny et al. 2011; Boumans & Leonelli 2013; Chao & Reiss 2017) or empirical philosophy of science (Wagenknecht, Nersessian & Andersen 2015) have become popular in the field. When a philosopher spends months or perhaps even years getting familiar with the work of a research group, a project, or for instance the work conducted at some research institute, they get a rare opportunity to build connections with the scientists they are studying. And as cultivating interpersonal interactions with scientists appears to be a particularly efficient way for philosophers to have an impact on science (Plaisance et al. 2021), one would think that conducting empirical case studies would be a straightforward way to take the role of the "voice of reflection" within the group or community they are studying—as noted in the description of the AIPS 2018 conference—raising questions about the "motivation, norms, values, methods, and limitations of the scientific enterprise".

However, the issue is not as simple as that. The aims of philosophy of science are typically normative, and taking the role of the voice of reflection should, if successful, result in changes in the science that is being studied. Such an outcome may be hard to reconcile with the epistemic aims of a case

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study. If a philosopher wants to learn something that can be studied by conducting a case study, having a significant impact on the science one is studying can sometimes be counterproductive. Adopting methods from the social sciences entails the need to make make methodological choices, and these choices can involve both epistemic and research ethical considerations that lead to the conclusion that one should not attempt to influence the science one is studying.

Methodological choices and decisions can thus restrict the ability of a philosopher of science to have an impact on the science they are studying. But what kind of restrictions are we talking about here? In this paper I approach this question through two examples: case studies in which philosophers of science used qualitative methods in the study of inter- and transdisciplinarity. One of these case studies I conducted on my own, and in the other I was a member of an interdisciplinary research team that included philosophers and STS scholars. I will argue that the normative aims of philosophy of science should very much influence the methodological decisions made when conducting case studies. We cannot simply adopt empirical methods from the social sciences; we must critically examine them in order to understand how they will restrict our work as philosophers of science, and decide whether the limitations are worth it, and continue developing the methods we decide to use.

I will begin by briefly examining the use of empirical case study methods in contemporary philosophy of science. I then introduce the broad topic of the two case studies I will be discussing: transdisciplinarity. After describing the case studies, I will conclude by considering the advantages and limitations of the methodological choices made in these two cases.

2 Engaging with science while studying it

In a recent paper based on interviews with 35 philosophers of science, Kathryn S. Plaisance, Jay Michaud and John McLevey (2021) come to the conclusion that face-to-face or interpersonal interactions are the most important pathway through which philosophy of science has an impact on science, science policy, or science education. This emphasis on the importance of active engagement is further reinforced, for instance, in the recent book on "field philosophy" edited by Evelyn Brister and Robert Frodeman. Direct involvement and interventions are effective. Doing philosophical work "that is directly engaged in problem-solving and that explicitly demonstrates its real-world effects" (Brister & Frodeman 2020, 2; see also Plaisance & Elliott 2021) is an efficient way for philosophers to bring about change. In philosophy of science, this means engagement with the scientific endeavour.

Such engagement can take many forms. Philosophers can, for instance, collaborate with scientists (see, e.g., Keven et al. 2018; Bursten 2020; Beck

et al. 2021) or take part in the development of science policy initiatives (see, e.g., Vermier et al. 2018; Parker & Lusk 2019)—or they can study the ways in which scientists work, often using and further developing methods adopted from other fields (e.g., Wagenknecht, Nersessian & Andersen 2015; Robinson, Gonnerman & O'Rourke 2019). The multiplicity of forms of engagement reflects the multiple ways in which philosophers wish to impact science. Plaisance, Michaud and McLevey (2021) identify six central types of impact philosophy of science can have: analyzing concepts or issues in a scientific field; identifying problems with scientific methods, inferences, and explanations, and offering alternatives for scientists to consider; highlighting the role of values in science; contributing to the development of new scientific knowledge; enhancing science policy and legislation; and improving science education. These types of impact reflect the thorough normativity of our field. We try to influence science so that it would better reflect the epistemic, ethical, and social ideals we believe it should manifest. As Angela Potochnik (2018) sums up, even when doing strongly engaged, practice-based philosophy of science, and even when taking seriously "what scientists actually do, using these practices as the starting points for our philosophical accounts of the aims, processes, and products of science", we must not be shy of arguing against scientists: "philosophers of science not only can but indeed *must* bring to bear considerations that go beyond existing scientific practices". This kind of normativity is crucial if philosophy of science is to actually influence science.

The emphasis on taking seriously what scientists do, and paying attention to scientific practices, results from the naturalistic and social turns in the philosophy of science. Many philosophers of science today argue that it is necessary to analyse real scientific practices before presenting philosophical claims or theories, or normative considerations about science. With the growing importance of the social epistemology of scientific knowledge, and more recently, the realisation that not only social practices, but also institutional configurations shape science and scientific knowledge, naturalistically oriented philosophers of science have started paying attention not only to the work of individual scientists, but also to the social and institutional aspects of the scientific endeavour. Doing philosophical work on them requires not only engagement, but also research—"conscious, detailed, and systematic study of scientific practice that nevertheless does not dispense with concerns about truth and rationality" (Ankeny et al. 2011, 304). Often such "detailed and systematic study" means introducing qualitative methods, adopted from various social sciences, into philosophy of science (Kosolosky 2021; Boumans & Leonelli 2013; Wagenknecht, Nersessian & Andersen 2015). Collaborations with people trained in the use of such methods—for instance, sociologists of science or STS scholars—are also relatively common by now.

The use of qualitative methods does not preclude active engagement that attempts to influence the science that is being studied. Some qualitative methods—even case study methods—used in the social sciences allow engagement and participation. A philosopher could, for instance, end up doing some kind of co-research with scientists, or participate in a transdisciplinary project, thus taking part in the scientific endeavour they want to understand (for more on such methods, see, e.g., Hartley & Benington 2000; Hirsch Hadorn & al. 2008; Schrögel & Kolleck 2019). Such engagement can offer valuable opportunities for influencing the development of scientific practices, or for instance science policy. However, some questions are best studied through case studies where researchers do not attempt to influence the processes they are studying, but actively avoid doing so. When conducting a case study, a philosopher of science does not necessarily wish to have a significant impact on its results.

Adopting qualitative methods from the social sciences means that philosophers of science have to make new kinds of methodological choices and decisions. As yet, the methodological work in practice-oriented, "empirical" philosophy of science is in its early stages. Here I attempt to contribute to the development of these methods by examining the relationship and possible tensions between the normative aims of philosophy of science, and some methodological and research-ethical considerations that suggest caution with regard to influencing one's object of study. While case study methods offer useful tools when philosophers of science wish to influence science and science policy, they also impose limitations. I will now explore such limitations by discussing two case studies where philosophers of science had a clear opportunity to influence evolving practices or institutional changes, but to different extents refrained from doing so.

3 Transdisciplinary research

In both of the cases I will be discussing in the remainder of this paper, my focus was on research that could be called transdisciplinary. The term "transdisciplinarity" has many partially overlapping meanings. Moreover, transdisciplinary research shares many characteristics with other approaches that stress societal impact and stakeholder engagement, and quite often a project that is called citizen science or co-research could also be called transdisciplinary. However, one of the central developers of transdisciplinarity, Christian Pohl (2011), identifies four features that are central to the approach: the search for a unity of knowledge, a focus on socially relevant issues, transcending and integrating disciplinary paradigms, and the inclusion of extra-academic partners in the research process. Building on systems theory and the "Mode-2" concept of knowledge production, transdisciplinary research emphasises the "integration, assimilation, incorporation, unifica-

tion and harmony of disciplines, views and approaches" (Choi & Pak 2006, 356).

Uskali Mäki and I have drawn together these and some other available definitions (see, e.g., Pohl & Hirsch Hadorn 2007; Leavy 2011), and compiled a list of attributes that are often mentioned when characterising transdisciplinary research. Transdisciplinary research, then, is research that transcends scientific disciplines and/or approaches within academia, integrates academic disciplines and/or approaches with one another, addresses and attempts to solve socially and practically relevant issues, involves extra-academic agents in various roles, involves and integrates academic and extra-academic knowledges, values, and interests, and serves "the common good" or some similar goal (Koskinen & Mäki 2016, 424). According to its advocates, transdisciplinarity is needed because the adequate understanding and solving of many pressing, complex problems—often simultaneously environmental and social ones—requires the integration of diverse perspectives, knowledges, and skills. (Zierhofer & Burger 2007; Hirsch Hadorn et al. 2008; Brown et al. 2010; Carew & Wickson 2010; Hirsch Hadorn, Pohl & Bammer, G. 2010; Adler et al. 2018; Koskinen & Rolin 2022.)

Both inter- and transdisciplinarity are methodologically ambitious, as their aim is often stated to be the integration of different approaches, methods and perspectives. In transdisciplinary research, this involves not only scientific perspectives, but the viewpoints of the extra-academic participants are also "included in the first stage of problem framing, ensuring that the questions addressed by research will be relevant, i.e. salient, and results credible, i.e. evidence appropriate for the particular policy problem" (Adler et al. 2018, 184).

To summarise, transdisciplinarity is solution-oriented research where the problems are framed in cross-disciplinary and even extra-academic terms, and researchers from many fields are involved in the search for solutions, often also with extra-academic partners. In contemporary science policy, inter- and transdisciplinarity are often taken to be efficient and sorely needed ways to approach and solve pressing societal and environmental problems (Maassen & Weingart 2005; Maassen & Lieven 2006; Jacobs & Frickel 2009; Huutoniemi et al. 2009; Pohl, Truffer & Hirsch Hadorn 2017). This belief has, in many countries worldwide, led to institutional and organisational changes that are ment to encourage and incentivise scientists towards inter- and transdisciplinary collaborations.

If a philosopher of science is to study transdisciplinarity, and wishes to discuss some actual examples, historians or even sociologists of science have relatively little to offer. The approach is so new that the existing studies describing and analysing it do not well lend themselves to the use of a philosopher of science. Therefore, conducting a philosophical case study is

tempting. And that is what I ended up doing. I conducted one on my own, and took part in a larger one. I followed, from the beginning to the end, a two-year project that involved social scientists from several fields, journalists and artists. And as a member of an interdisciplinary team involving philosophers and STS scholars, I participated in a study of a technical university where research was being reorganised into strategically designed inter- and transdisciplinary research platforms. In the first case study—let us call it SocJournArt—the project I studied focused on social inequality in Finland. As I will describe in more detail below, the social scientists collaborated closely with the journalists and the artists, particularly in data collection. My initial aim was to get, through this one example, a better understanding of how questions of demarcation and decisions about the epistemically relevant criteria used in knowledge production can be negotiated in a research team that has extra-academic experts in important roles.

In the second and much larger case study—which we named BizTech—philosophers and STS scholars joined forces in order to study the structural reorganisation of research at a small technical university in a Nordic country. We were particularly interested in diverse tensions that arise from such an institutional change, and from the shift from discipline-driven to more demand-driven university research.

In both projects it was soon clear that we had to decide what kind of input philosophers could and should offer to the researchers and organisations being studied. In BizTech we studied several research platforms, and in addition to tensions arising in inter-and transdisciplinary collaborations, we were interested in the changing institutional context where the inter- and transdisciplinary knowledge production happened. Our work was seen as potentially relevant to science policy, and both some members of the university's upper management and major sources of research funding were interested in our results, even preliminary ones. In SocJournArt I concentrated on just one project, and as I was allowed to participate in project meetings and online discussions, the participants would not only be interested in what I was doing in their project, but at times they also wanted to tap into my expertise—after all, in transdisciplinary research, all participants are generally supposed to take part in the development of a shared understanding of the problem at hand. It soon became clear to me that I was expected to participate—remaining silent would not do.

In both cases there were methodological and/or research-ethical reasons to refrain from offering any comments. In both cases there were also good reasons for disregarding some of these reasons, and for offering views and informed opinions. The decisions we made in BizTech were different from the ones I made in SocJournArt. I will now describe the cases and our choices in more detail.

4 BizTech: keeping the distance

In the project *Interdisciplining the university—Prospects for sustainable knowledge production* (2016–2021), led by Mikko Salmela, our research team conducted a large case study at a small technical university ("BizTech") which was undergoing a significant structural reorganisation. During the study period, BizTech implemented a university-wide policy that was meant to incentivise inter- and transdisciplinary collaboration, and to make the university more competitive in the pursuit of EU research funding. All internal research funds were reallocated to temporary research platforms that had to incorporate researchers from at least two of the university's three schools. Collaboration with diverse stakeholders was also encouraged.

Our team included philosophers—mostly philosophers of science—and STS scholars, and our aim was to explore how the reorganization of research into strategically designed inter- and transdisciplinary research platforms would influence the dynamics of knowledge production. In our project we were particularly interested in the diverse tensions—including epistemic, structural and emotional ones—that arise when such a change is implemented (see Mansilla et al. 2016; Parker & Crona 2012; Turner et al. 2015; Salmela & Mäki 2018), and their epistemically significant repercussions. The overarching aim was to evaluate the consequences of such a structural reorganisation for the epistemic sustainability of university research. Is it possible to push for demand-driven, solution-oriented inter- and transdisciplinarity through internal funding in an epistemically sustainable way? The question is relevant for science policy, because many European universities are currently redirecting their internal research funding in similar ways, as university administrators hope that this will increase their chances in getting Horizon Europe funding (Salmela, MacLeod & Munck af Rosenschöld 2021; see also Lindvig & Hillersdal 2019).

Our group followed the development of the platforms from 2015 onward, conducting semi-structured interviews ($n \approx 50$) with platform principal investigators, professors, coordinators, and researchers from three platforms, and the university management. The last interviews were finished in the spring 2021. The analysis of this data, and of the other data our team collected (e.g., documents such as research plans and evaluation reports) is still ongoing.

Already when we started planning the project, it was clear that we had to make some important decisions: how much and to whom would we talk about our work during the project? In BizTech, some members of the university management were naturally interested in our findings. And on the level of national science policy, the reorganisation in BizTech was seen as an organisational experiment, the results of which we were studying. In other words, we had a chance of influencing both the organisational restructuring

we were studying, and possibly also science policy. On the other hand, there were very clear methodological and research ethical reasons for being careful about the information we would disclose.

Firstly, we collected legally confidential material, such as research plans and evaluation reports, access to which required an official permission from the BizTech administration. Our research team therefore signed an agreement concerning our access to and use of this material.

Secondly, during the interviews, we wanted to ask our informants about the platforms in which they were involved, and wanted to learn about their experiences and even their feelings regarding the work at the platforms. We would hardly have received the kind of answers we were after if it would have seemed that we were reporting to the university management. We therefore made it very clear right from the start that the BizTech management had no control over our problem setting or the selection and analysis of our data, and they had no special access to or control over our findings or possible recommendations.

Thirdly, the anonymity of our interviewees and other participants had to be protected, and any material that was privileged by nature, such as unpublished results or personal discussions, had to be kept private. Such anonymity was particularly important because we were studying an environment where we were already expecting tensions to arise, and any carelessness on our side could have intensified suspicions or envy within the research community. For these reasons we were throughout the project quite cautious when talking about it in public, and did not seize all the available opportunities for attempting to influence science policy. Now that the project has ended and we have begun publishing our results, we have also started presenting our findings in science policy arenas. Among our most important results is the observation that the kind of 'strategically incentivised organisational interdisciplinarity' (as we have ended up calling it) we studied does not always have particularly much in common with interdisciplinarity as it is described in handbooks and science policy briefs (see Salmela, MacLeod & Munck af Rosenschöld 2021).

5 Social scientists, journalists, and artists: participating, cautiously

The other case study I conducted on my own. I followed a two-year (2015–2017) research project, SocJournArt, where social scientists collaborated with journalists and artists. I started following it already during the application process, which begun when a foundation called for research projects that would study social justice and inequality in Finland. Collaboration with journalists was demanded in the call, and the foundation in question also favours collaborations between scientists and artists. The team de-

signed a project that would continue and expand on already established collaborations between some of the social scientists and journalists, and would also include photographic artists. When I learned about the plan, I asked if I could follow the project, as I was very interested particularly in seeing how the collaboration between the social scientists and the artists would work out, as it was something quite new to everyone involved. How would the team members come up with the shared principles and criteria they would need in order to collaborate? How would they reach a shared understanding of their research topic, social inequality in Finland? Would they?

Once the project got funding, I participated in research meetings, followed the group's lively online discussions, read the project publications—both academic and journalistic—and participated in the closing workshop, where I interviewed everyone who was present. Later, once the final art exhibition had opened, I conducted some complementary interviews. I focused on the two sub-projects that included collaboration with journalists and artists, and conducted a total of eight semi-structured interviews with everyone who had taken part in one or both of these sub-projects, as well as with some of the other members of the research team.

In both of the two sub-projects I followed, social scientists collaborated with the extra-academic participants in data collection. The journalists and the social scientists conducted a large survey in a major newspaper. They jointly designed the survey, building on their previous experiences of collaboration, and the journalists wrote several articles about the results. The artists led a one-year artistic workshop with both lay participants and professional photographers. In addition to the artistic work, this group was supposed to produce data for visual sociology. The artists who led the workshop collaborated with the social scientists in designing and organising the data collection.

Quite early on I realised that I could not remain a passive observer. Particularly the collaboration between the social scientists and the artists had to start from scratch: the participants had little to no previous experience of such collaborations, and they welcomed and even demanded the contributions of a philosopher of science familiar with the multifaceted literature on research collaborations across the boundaries of science. I was there because I wanted to observe how social scientists of the quantitative ilk manage to collaborate with artists. But soon the emphasis in my participant observation started to be more on the side of "participant" than I had originally envisioned. On the one hand, I was somewhat worried about distorting the data I wished to gather. On the other, the participants wanted me to contribute, and I felt that as a philosopher of science, I should respond to such a demand, and offer ideas and arguments. Whereas in BizTech our team

was in a position where we might have been able to influence organisational practices at the university we studied, in SocJournArt I could influence study design, and facilitate the collaboration I wanted to study.

In the end I decided to participate, but cautiously. When I was asked for feedback and suggestions, I would point out ideas and options that were readily available in the literature on transdisciplinarity, co-research, participatory research, and other forms of research collaborations between scientists and extra-academic experts. I felt this to be useful, as many of the participants were not well versed in that literature, and I thus saved them some time, but did not affect the outcome in too significant ways. Following the project also gave me some interactional expertise—I was in a position where I could sometimes offer useful comments. And because of the transdisciplinary nature of the collaboration, the non-existence of extablished collaborative practices between the participants, and the need to build a shared framework for the project, the participants were willing to hear me.

In the end I was lucky. I formed my most significant critical arguments regarding the project only after it had already ended. It was during the interviews I conducted at the closing workshop of the project that I finally started to understand the most important bone of contention and source of confusion between the social scientists and the artists. To describe it briefly: for the social scientists, a photograph was evidence of the thing pictured. For the artists, a photograph was evidence of the choices made by the person who took the picture. This disagreement, which for some time remained unclear for everyone involved, resulted in disagreements about how to plan the data collection. This in turn delayed the data collection so much that the project ended before the gathered data could be analysed. But in the end, for the participants of SocJournArt this mattered much less than I would have anticipated. While the collaborative data collection stagnated, the artistic workshop did impressive work on its own, and the project greatly benefited from the public attention that the final art exhibition received. (Koskinen 2018a; Koskinen 2018b; Koskinen under review.)

6 Coordinating methodological decisions with normative aims

Conducting empirical research in philosophy of science entails methodological decisions. And these decisions limit the ways in which philosophers can engage with and have an impact on the science they are studying. In SocJournArt I could have adopted collaborative methods and participated in the project fully (for an ambitious example, see Ginsberg et al. 2014). But had I concentrated more on facilitating the collaboration between the artists and the social scientists, I most likely would not have realised that the

members of the research team cared much more about the societal impact they were creating—regardless of how it was created—than about success in their attempt to organise a small data collection task together. After I had realised this, my attention eventually moved from my original research questions to questions and observations about the various ways in which collaborative projects that involve extra-academic experts can create societal impact (Koskinen under review). In BizTech we could have designed a project that would have informed the university management on a regular basis and possibly had an impact on the development of the ongoing structural reorganisation at the university. But that would have deeply affected the nature of the interview data we would have been able to gather. It might also have hampered our ability to reflect on the case now, and to compare it to similar organisational developments in other universities.

Collaboration between philosophers and scientists, or even the role of a consultant, or participation in science policy initiatives, can offer a philosopher of science highly effective ways to influence science or science policy (see, e.g., Keven et al. 2018; Vermier et al. 2018; Parker & Lusk 2019; Beck et al. 2021). If the aim is to have a relatively fast, straightforward impact, such approaches can be preferable to case study methods that require non-participation.

But the latter methods too can be well aligned with the normative aims of philosophy of science, and the wish to have an impact on science or on science policy. In the long run, they too can be quite effective. Of the two case studies I have just described, particularly in BizTech our results seem to be relevant to science policy. It could even be argued that our normative aims required that we keep a certain distance and do not offer comments or recommendations during the data collection. Our ability to produce results that are relevant in science policy more generally, not just at the university we were studying, depended partly on our methodological choices. As we did not attempt to influence the developments we studied, our results are more likely to be of interest when considering similar developments elsewhere.

Much of the literature on inter- and transdisciplinary research concentrates on examples where the researchers' own research interests have lead them to inter- and transdisciplinary collaborations (e.g., Hirsch Hadorn et al. 2008; Frodeman 2017). In BizTech, the inter- and transdisciplinary collaborations that emerged as a result of the structural reorganisation differed in several ways from the kind of inter- and transdisciplinarity that is typically described in the literature. Similar institutional and organisational changes than the one we studied are being implemented in many countries, and they are meant to encourage and incentivise scientists towards inter- and transdisciplinary collaborations. Our findings suggest that they may

be producing something else than originally intended. (See Salmela, MacLeod & Munck af Rosenschöld 2021; see also MacLeod & Nagatsu 2018; Salmela & Mäki 2018; Lindvig & Hillersdal 2019.)

The methodological decisions philosophers of science make when planning case studies limit the ways in which they can influence the science they are studying. Therefore, such decisions must be made in light of the normative aims of the study. In philosophy of science, the decisions will differ from similar decisions in other fields, such as sociology of science or STS. Even when the methodological ponderings and pros and cons might be similar, the normative aims of philosophy of science can and should influence the decisions, and this may lead to different decisions than would be warranted in some other field. This is something I believe must be taken into account when planning collaborative projects with STS scholars or sociologists or science—our partially dissimilar aims can lead to dissimilar methodological choices. Moreover, this means that philosophers of science cannot simply adopt methods from the social sciences—we must also adapt them to our needs, and continue developing them.

7 Conclusions

In principle a philosopher of science who is conducting a case study on ongoing research is in an excellent position to have an impact on the science they are studying. As Plaisance, Michaud and McLevey (2021) emphasise, the most effective pathways to impact in philosophy of science are interpersonal interactions—it is through conversations and even collaborations with scientists and policymakers, rather than through publications in philosophy journals, that our work has an impact outside our own field. Spending months or years with a group of scientists gives ample opportunities for such interactions.

There are situations, however, where a philosopher of science conducting a case study will not want to seize such opportunities, or will hesitate when they emerge. I have described two examples where this was the case. In SocJournArt I might have been able to have a stronger impact on the research conducted and the results of the project than I eventually did, as the participants had little experience of collaborations between social scientists and artists, and were therefore willing to listen a philosopher of science. But I was cautious, because I had not planned to conduct an experiment on whether I would able to facilitate such collaborations. In BizTech our team might have been able to influence the development of the structural reorganisation we were studying. The reorganisation was seen as an organisational experiment, and both some members of the university management and people involved in research funding were interested in our findings. But we decided not to attempt anything of the sort, as both research ethical con-

siderations and our epistemic and normative interests led to the conclusion that we should not try to influence the processes we were studying.

Using qualitative case study methods in philosophy of science can offer ways to have an impact on science, but the impact is not necessarily a direct one. As I have noted, there are methods and approaches—particularly common in fields like development studies—that allow engaging with and having an active impact on the processes and developments one is studying. But often it makes sense to conduct a case study where such impacts are avoided. For a philosopher of science this is a loss: the chosen methods limit our ability to take the role of the "voice of reflection" within the research group or organisation we are studying. Such limitations can, however, be worthwhile, if the knowledge and understanding gained in the case study is valuable enough from the point of view of the epistemic and normative aims of the philosophers of science involved.

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