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### Planting and nurturing interdisciplinary collaborations: a high-stakes, high-reward endeavour

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Chapter 10

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# **Sustainable transdisciplinary collaborations**

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**CASE 8: TRANSDISCIPLINARY RESEARCH PROGRAMMES**

*Manuela Dahinden*

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**COMMENTARY 10.3: PLANTING AND NURTURING  
INTERDISCIPLINARY COLLABORATIONS: A HIGH-STAKES,  
HIGH-REWARD ENDEAVOUR**

*Machiel Keestra*

**Introduction: Uncertainties about interdisciplinary  
collaboration**

It was almost a century ago that the word ‘interdisciplinary’ was coined, motivated by concerns not dissimilar to those presented to us in the case of the director of a competence centre for plant science. Disciplinary specialisation, but also other obstacles or implicit assumptions about interdisciplinarity may hinder collaboration across disciplines, even if they are not always warranted. Moreover, academics are often not aware of the potential advantages that such collaborations can yield and which might outweigh their perceived risks. This may hold even more for transdisciplinary collaborations, in which extra-academic stakeholders join an interdisciplinary team of researchers ([Keestra et al., 2022](#)).

In the present case, the director of a competence centre for plant science should be commended because they are explicitly promoting interdisciplinary research, education and outreach programmes in various ways. They mention a 10-year-old interdisciplinary PhD fellowship programme, a call for interdisciplinary proposals connecting scientific and societal issues and more. Yet they

also express some frustration about the amount of time these efforts require and the tension between fundamental plant science and connecting this with more applied and societal matters, for example. This frustration is not uncommon, though, raising the question what can be done to mitigate it. Below, I respond to this case by addressing four topics or tensions that struck me the most:

- 1 Should we start with topics or with people? The author describes how their plant science colleagues have already gathered some experience in collaborations with colleagues from the social sciences and humanities (SSH). Yet these collaborations are apparently discontinued, and the director states they are ‘challenged in finding topics and experts’ (Dahinden, this volume, p. 190) in the SSH.
- 2 How can we get the collaboration started and deliver some returns? The director reports that their colleagues needed special tools and workshop formats to get this collaboration off the ground—even though these are time-consuming. In addition, for early-career researchers, such collaborations are also riskier because they still need to establish themselves within a particular discipline.
- 3 Is experience in interdisciplinary research sufficient, or do you need special preparation? The author writes that they ‘did not consider training the principal investigators’ (Dahinden, this volume, p. 190). Nonetheless, the director shares how most plant scientists ask them how to find SSH experts, implying that they do have difficulties in identifying potential collaborators elsewhere.
- 4 Can scientists who are performing fundamental research also engage in interdisciplinary collaborations? Because these collaborations would probably include value-laden contributions, benefit from the expertise of indigenous peoples and are more geared towards applications, according to the current case, they seem to distract from this fundamental science level. Or should this opposition between fundamental and interdisciplinary research be reconsidered?

### ***Topics or people first? A matter of relevance***

The first question I gathered from the case is as follows: ‘Should we start with topics or with people?’ The unsurprising answer must be the following: with both in parallel or even alternating. Typically, any research project starts with a question that requires specific expertise to be answered. Disciplinary questions are usually the result of preceding research and can often be answered by engaging the same expertise that was previously involved. In interdisciplinary research, this is different because these questions often do not emerge from previous projects and are rather new. The current case suggests that social values or indigenous knowledge might be involved, while methods

of arts and anthropology could be employed. When the field of options for topics and methods is widened in such a way, how can we decide where to go and how to start?

The main challenge is deciding what expertise should be included in the team. The key concept that should guide the composition of an interdisciplinary team is *relevance*. Potentially all disciplines might have something to say about any topic, given the complex interdependencies across multiple levels in our reality. So we have to be pragmatic and select the most relevant ones. For example, most plant research need not include subatomic research because the events at that level of description and explanation are not relevant for most mechanisms that determine the life and properties of plants (cf. Machamer et al., 2000). In other words, the research question or topic guides us in composing an interdisciplinary team. Yet it may occur that, after some preliminary research, we have to recompose the team as a result of insights gained regarding what is relevant in this case and what is not, turning interdisciplinary research in an iterative decision-making process (Newell, 2007).

Not all disciplinary experts are equally interested in, or capable of, interdisciplinary collaboration. Bringing multiple perspectives together requires individuals to be more patient, communicative and open-minded than when working only in their disciplinary field of expertise. Involving extra-academic stakeholders in transdisciplinary learning contexts brings additional conditions along. I discussed the implications of this with an international panel of experts in transdisciplinary research and education.<sup>3</sup> Together, we agreed on three major educational requirements distinguishing transdisciplinarity from interdisciplinarity:

- 1 *long-term collaborations* with businesses, as well as nongovernmental, governmental and community organisations;
- 2 teaching particular *dispositions and competencies*; and
- 3 preparing students for *intercultural endeavours* (Keestra, 2018).

These additional requirements address both the persons involved and organisational structure and process of transdisciplinary research.

Clearly, then, extra time and resources are required for creating the necessary conditions for interdisciplinary projects like promoting team members to integrate their insights instead of working separately (Bennett et al., 2018).

<sup>3</sup> The panelists at the International Transdisciplinarity Conference 2017 in Leuphana University, Germany, were Marcel Bursztyn (University of Brasilia), Dena Fam (University of Technology Sydney), Christian Pohl (ETH Zürich), Esther Meyer (Leuphana University of Lüneburg) and Daniel Lang (Leuphana University of Lüneburg). A recording of the entire panel session can be found on YouTube: <https://www.youtube.com/watch?v=tBXh19691YA&list=PLvna7tMNVD9v0yBx8xcVVyd-JXDWvRQc&index=6>

Yet it is good to know that such research is not only high risk but also high reward because the afterlife of published results is longer and more visible in wider circles compared with monodisciplinary ones (Leahey et al., 2017).

### ***Interdisciplinarity and the need for individual and team reflection***

The second question taken from the case presentation asks, ‘How can we get the collaboration started and deliver some returns?’ What special preparations and tools are necessary for the team and its members?

The most difficult element of interdisciplinary collaboration is the integration of perspectives, without which mere multidisciplinary is at stake. Integration can pertain to multiple elements of the scientific process, ranging from theoretical, conceptual and methodological integration to the integrated development of a practical intervention or instrument. It makes sense to separately mention the integration of the research team as a form of integration (Keestra et al., 2022), which might be especially relevant for the director because their ‘idea labs’ are meant to identify community wants and needs and increase trust in end users by way of these collaborations.

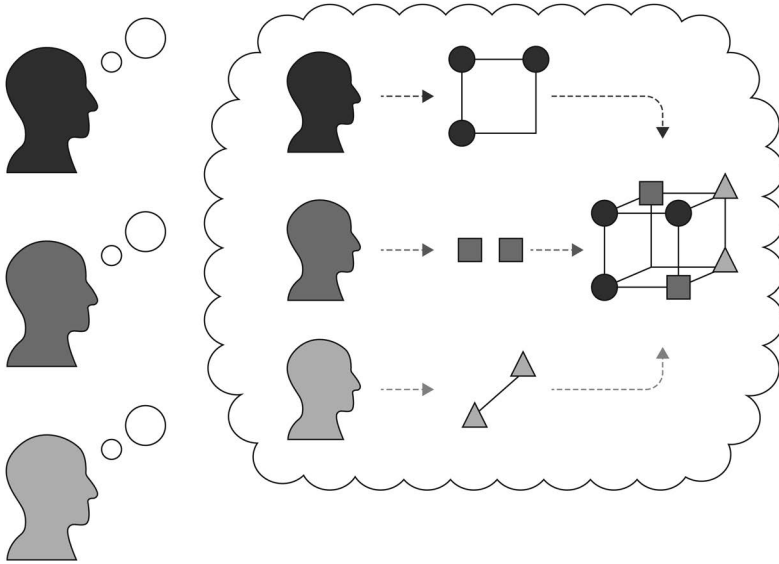
These efforts seem valuable and promising. However, integrating the different perspectives present in such collaborations requires an individual preliminary process of reflecting upon and articulating an individual’s perspective. This should provide insights into how their perspective provides affordances for connections to other perspectives—as represented in Figure 10.1.

There are various tools and methods available for such processes of individual and team reflection. A method that is widely used and that I have found to be helpful for teams of students and for senior researchers is the toolbox dialogue method. This philosophically grounded method consists of both a survey prompting individuals to reflect upon their perspective and a facilitated team dialogue about the collected survey results (Looney et al., 2014).

### ***Interdisciplinarity: A matter of experience or also of special preparation?***

The director mentions that, although they provided PhD students with special interdisciplinary skills training, this was not offered to their supervisors. It is not uncommon to find that academics assume that interdisciplinary research is a matter of just doing it. The complicating factor is the absence of a shared set of interdisciplinary skills and methods among the relevant group of interdisciplinary experts or peers. This is because interdisciplinary research is more often focused on a specific case study or requires the integration of a highly specific set of disciplinary perspectives on a topic compared with monodisciplinary research, which is usually more generalisable (Krohn, 2010).

Bringing together multiple perspectives requires a team to choose from a large number of theories, methods, models, data sets and so forth stemming



**Figure 10.1** An interdisciplinary team of experts together develops a more comprehensive understanding of a phenomenon, as represented by the three-dimensional cube composed of the different elements each of them contributes. Their joint or team metacognition and philosophical reflection upon their interdisciplinary collaboration facilitate the process of their development of an interdisciplinary integration of their distinct mental representations of the phenomenon

Source: From [Keestra \(2017, p. 156\)](#), with permission.

from different disciplines. A useful way to put a limit on this abundance is by employing the constraints that the specific features of a case study present on certain theories and methods.<sup>4</sup> For example, sustainability research in an urban setting focusing on citizens and their consumer behaviour requires a different set of resources than a context in which farmers and their crops are at stake.

Given that interdisciplinary research is often case based, previous case studies may not have provided researchers the insights about their own perspective that were described above as a crucial result of the process of individual and team reflection. As a result, the choice not to involve the senior researchers in the training courses deserves reconsideration because their previous experiences may not always be helpful for new projects.

<sup>4</sup> In his analysis of interdisciplinary cognitive neuroscience, Craver (2007) described how the space of possible mechanisms that explain a cognitive function is constrained by insights in the components known to be involved in it, as well as their spatial, temporal, manipulability and other constraints.

***Either fundamental or interdisciplinary science or both?***

A final topic to be addressed here concerns the alleged opposition between fundamental research and interdisciplinary collaboration. This is one of several assumptions about interdisciplinarity that are often reproduced, suggesting that interdisciplinary research necessarily remains superficial compared with monodisciplinary research. Let me raise a few objections against this accusation of interdisciplinarity's superficiality.

To begin with, this notion fails to acknowledge that, nowadays, research is increasingly interdisciplinary. Theoretical and methodological pluralism have become so common in most fields that we should no longer identify fundamental research with monodisciplinarity. Examples of fundamental research like quantum physics, art history and neurobiology are in fact highly interdisciplinary and represent scientific pluralism of sorts (Keestra, 2022).

However, what may be relevant in the current case is the reported lack of long-term interdisciplinary collaborations. When research projects are carried out by newly formed interdisciplinary teams, they cannot build upon previous projects as a monodisciplinary research team would more easily be able to do. There is no reason, though, why such incremental work could not be done by existing interdisciplinary collaborations. Although interdisciplinary teams often perform case-based research, there is no principal reason why they should. A benefit of interdisciplinary 'triangulation' is the increased robustness of its results: by investigating a particular result from multiple perspectives, it is less fragile than it would be if only a single theory and method had been employed (Wimsatt, 2007). Moreover, if a particular medical therapy has been found to be effective on both the cellular and physiological levels and is also found to be beneficial by patients in their daily life, it will be 'socially robust' and hold up not only under narrow lab conditions but even in the messy real world (Nowotny, 2003).

In other words, I appreciate some of the obstacles that this case presents. I have explained what extra tasks and investments—particularly in extra time and effective communication—have to be made for such collaborations to be successful. 'True interdisciplinary science cannot be rushed, not least because the best course of investigation is rarely clear at the outset' is a conclusion of an editorial comment in nature about interdisciplinary research ('Mind Meld', 2015, p. 290). Yet the same comment reminds us that single disciplines are often not adequate for addressing the 'pressing questions or problems' ('Mind Meld', 2015, p. 290) that motivates much of the work we are doing.

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