

# Transdisciplinary Innovation: Finding a participatory, longitudinal, action-oriented research methodology

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## Problem

We face enormous societal challenges: the need to transition to sustainable energy; the need to promote conviviality and civility in politically and culturally polarized societies; the need to combat economic inequalities and injustices. These are all *wicked problems* (Rittel and Webber 1984), which need to be addressed via *transdisciplinary* approaches (Brown et al. 2010; van der Bijl-Brouwer et al. 2021). People, however, often *underestimate* the challenges of organizing transdisciplinary innovation. As if putting people in one project does the trick and requires no efforts.

We lack effective ways to manage transdisciplinary innovation projects. This is a problem because transdisciplinary innovation is at the heart of Responsible Innovation (Stilgoe et al. 2013); notably regarding *diversity and inclusion*, and *reflexivity* (being aware of one's own assumptions and limitations; the lack of which can hamper curiosity, creativity, and collaboration).

## Current understanding

There is some knowledge on transdisciplinary *research* (Wickson et al. 2006; Hirsch Hadorn et al. 2008; Bergmann et al. 2012; Brandt et al. 2013; Nicolescu and Ertas 2013; Bernstein 2015). Rather less knowledge, however, is available on transdisciplinary *innovation*, which deals with creating and implementing new systems, products or services. McPhee et al. (2018) define transdisciplinary *innovation* as follows: '[It] differs from multidisciplinary and interdisciplinary approaches in that it is not just about working towards a shared goal or having disciplines interact with and enrich each other. Instead, transdisciplinary innovation is about placing these interactions in an integrated system with a social purpose, resulting in a continuously evolving and adapting practice'. We can add to this the need for an *iterative* approach (Dorst 2018; Steen 2013), which is necessary to address wicked problems: to better understand the problem (problem-setting), and to develop better solutions (solution-finding). We thus have three key elements of *transdisciplinary innovation*:

- Starts with *engagement with societal problems* and aims to contribute to solving these
- Involves *people with diverse disciplines*, and goes beyond multi- and inter-disciplinary work
- Requires *organizing an iterative process*, notably of problem-setting and solution-finding

In two earlier ISPIM papers we used *systems thinking* (Meadows 2008) to look at transdisciplinary innovation. In our [2020 paper](#), we studied one transdisciplinary project team as a *social system*, and discussed: goal orientation ('functional' and 'personal' behaviour); differences (between project team members); openness (to differences between project team members); context (e.g., enabling and restraining forces); the role of curiosity, creativity, presence, and reflexivity; and growth and learning over time. In our [2021 paper](#), we did a case study of four transdisciplinary projects; using a systems view, we looked at: the macro-level of a project's *context*; the meso-level of *content*; and the micro-level of dynamics in the *team*. Looking ahead, we will participate in several multi-year, multi-party, transdisciplinary innovation projects, in which we would like to conduct participatory, longitudinal, action-oriented research, to both study and promote transdisciplinary innovation:

- SPRONG (regional scope), which deals with collaboration between different types of organizations, with a focus on innovation eco-systems and quadruple helix innovation.
- AI-MAPS (national scope), which deals with collaboration between people with ethical, legal, social, and technology expertise, in creating AI systems in justice and security.
- TRANSCEND (international scope), which deals with promoting and organizing societal engagement and citizen involvement in the development of security technologies.
- TNO (institutional scope), in which we plan to study Transdisciplinary Innovation in one organization (TNO), with a focus on enablers and barriers, in both agency and structure.

In order to conduct such research (and to produce, possibly, eventually, an edited book), we are looking for an appropriate methodology. The rest of the paper is about this (not about content).

### **Research question**

The management of transdisciplinary innovation projects is a relatively new topic and justifies an exploratory research approach. Our current question is concerned with research methodology: *What would be an appropriate methodology for conducting participatory, longitudinal, action-oriented research in a series of case studies into transdisciplinary innovation?* (Later, we will also need content-oriented research questions about managing transdisciplinary innovation.)

### **Research methodology**

First, we borrow from *philosophical pragmatism* (Dewey 1938; Steen 2013); we need an action-oriented method that starts from people's practices, then turns to theory and concepts, and then returns to people's practices, with interventions that can be tried out and evaluated, iteratively.

Furthermore, we propose to use a *systems perspective* to look at transdisciplinary innovation as happening on three interrelated levels (our ISPIIM 2020 paper): the macro-level of a project's *context* (society, stakeholders, problem-setting); the meso-level of *content* (consortium, solution-finding); and the micro-level of the team (dynamics, curiosity, creativity, and reflexivity). We may want to draw from Mitchell et al. (2015), who distinguish outcomes on situation, knowledge, and learning.

Moreover, we will use insights in action-oriented research (McPhee et al. 2019; Elsahn et al. 2020; Guertler et al. 2020; Ollila and Yström 2020; Ritala et al. 2020); a *process* view (Ellwood and Horner 2020), *learning histories* (Zafeirakopoulos and Van der Bijl-Brouwer 2018), *narrative interviews*, a *relational* view, e.g., team dynamics (<https://i2s.anu.edu.au/>), and tools to help participants to engage in *reflexivity* (Steen 2021; Van Mierlo and al. 2010).

### **Findings**

In May, we plan to have an outline for a research methodology, and an interview protocol. We also plan to do several try-out observations and interviews, so we can report on that at the conference.

### **Contribution**

A critical discussion of such a methodology can benefit also other people in the innovation management community, from both an academic (rigour) and an industry (practical) perspective.

### **Practical implications**

Our findings, which we expect to deliver during these case studies (over the course of 3-4 years), will be interesting and relevant for people who want to promote Transdisciplinary Innovation.

### **Feedback**

We would be interested in feedback from people who did similar participatory, longitudinal, action-oriented research and who can share practical experiences with these methods.

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