

## Inter- and Transdisciplinary Collaboration: Practical and theoretical perspectives

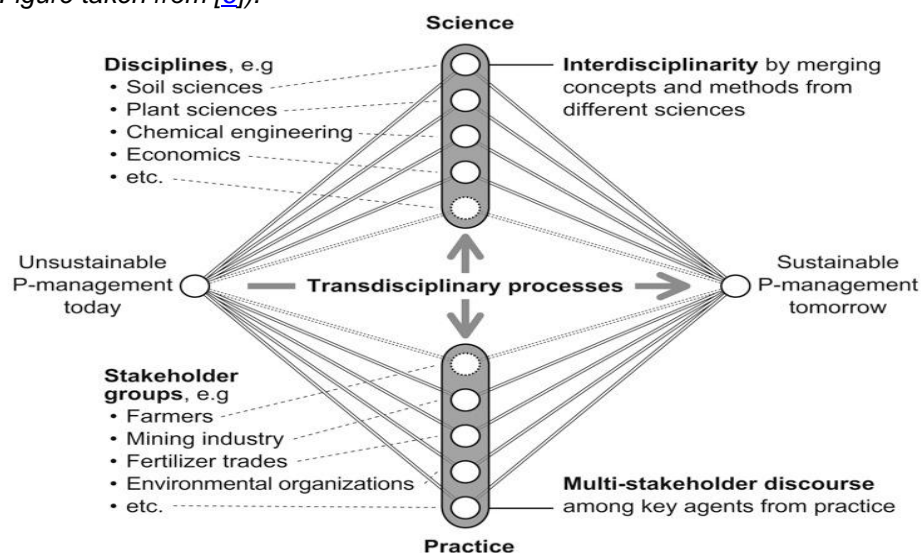
Roland W. Scholz

Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB Stuttgart) and  
University of Zürich

**Summary:** This presentation introduces a prototypical *interdisciplinary* study (the “Bielefeld-Hagenkamp Study” on environmental risk assessment) and a typical *transdisciplinary* case study on sustainable transitioning of a regional system (the “Appenzell case”).

The Hagenkamp case has been a pioneering project in brown-field related environmental risk assessment [1]. The *interdisciplinary task* was to assess the risk to residents resulting from the residents exposure to cadmium and benz-a-pyren contaminations of their house gardens [2]. The Hagenkamp area formerly served as sewage fields [3]. The two main contaminants were mainly emitted from metal industry and the coal power station. One interdisciplinary scientific task was to provide a quantitative assessment of the cadmium uptake when following the path from soil contamination, plant uptake of cadmium, cadmium uptake from garden vegetables and other sources, toxicokinetics and toxicodynamics. This could be accomplished by an integrated model using stochastic differential equations based on subjective and objective probability distributions about loads and transfer coefficients [4]. The scientific challenge was integrated modelling when collaboration with soil scientists, plant scientists, nutrition scientists, and toxicologists. The outcome of the project was a one-element risk assessment [5]. The interdisciplinary project did not answer the question how the exposure of the residents factually looked like over the 35 years or residence (though a biomonitoring study was launched), how the critical contaminants may have interacted, what risk level is considered to be socially acceptable, and what type of scenarios should be taken for risk assessment. Is the self-sufficient household, which produces all food from the garden an accepted safeguard subject. The latter question is of special interests, as the residents of the Hagenkamp were resettled farmers from former East-German after WWII, which received half a hectare of land for their self-supply.

Figure: A transdisciplinary processes links interdisciplinary research and multi-stakeholder discourse (Figure taken from [6]).



The Appenzell study dealt with the sustainable transitioning of a small Swiss pre-alpine state (canton) of about 52,000 inhabitants [7, 8]. The 'Landammann' (president) of the state asked what strategy of land-use and support for traditional industries the cantonal government should take. Based on this, a transdisciplinary process, including about 20 scientists, 70 students and 250 people and representatives of different stakeholder groups took place. The case study may be taken as a typical example of an ill-defined problem. Science and practice went through the stages of joint problem-definition, joint problem-representation (what are the most important facets/subsystems that we have to look at) and joint problem transformation (based on the mutual learning among science and practice which took place in the project, what direction of development should we support). Different forms of knowledge integration took place to generate socially robust orientations. The latter is considered to be the main outcome of a transdisciplinary processes which serves for (a) capacity building among the participants, (b) consensus building on what is the problem and where to move to, (c) mediation which includes how to mitigate the losses of those who do not benefit from a sustainable transition and (d) legitimization [9]. Transdisciplinary projects may be successfully structured and organized when utilizing quantitative and qualitative methods of knowledge integration [10]. These methods may integrate knowledge from different disciplines, systems, modes of thought, perspectives/interests and of different cultures.

The cases reveal that interdisciplinarity is part of transdisciplinarity. Transdisciplinary processes relate a functional, use-inspired [11] interdisciplinarity process with a multi-stakeholder process [6] (see Figure).

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