

The Structure of Transdisciplinary Research – Six Case Studies

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Why Transdisciplinarity?

- Disciplinary research is not able to cope with many of the increasing "real-world" problems (such as environmental problems or the impacts of technological and social change) because these problems do not fit into the system of scientific disciplines.
- A scientific understanding of these problems is needed, but the increasing specialization and fragmentation of scientific disciplines prevents disciplinary research from working on these problems.
- Transdisciplinary research deals with scientific problems derived from these "real-world" problems.
- In order to distinguish transdisciplinary research projects from inter- and multidisciplinary ones, we define five types of scientific problems (Figure 1).

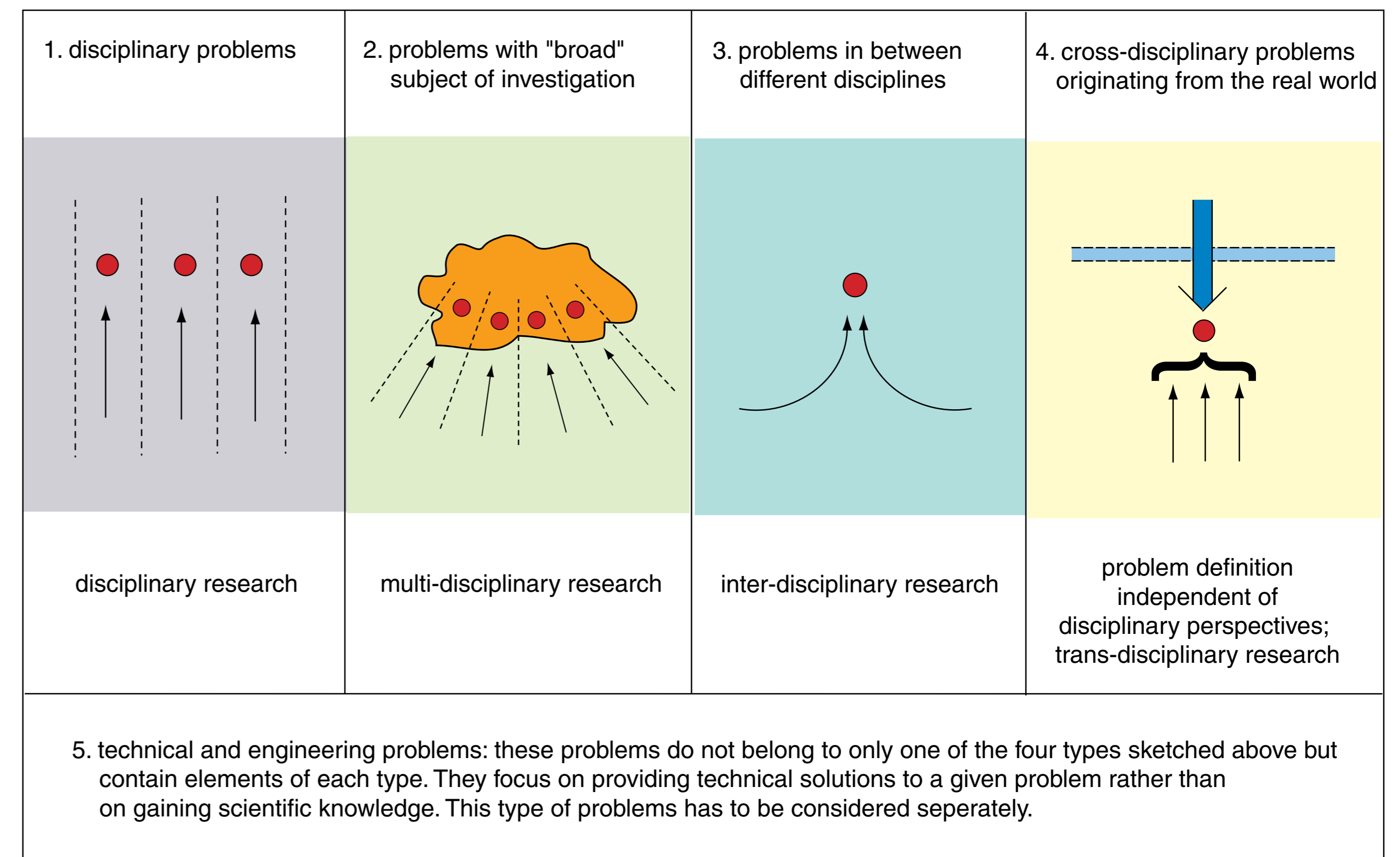


Figure 1: Definition of five types of scientific problems and distinction of transdisciplinary research from inter- and multidisciplinary research. — : discipline, ● : scientific problem, - - - - : boundaries between disciplines, ■■■ : boundary between scientific system and "real world". [1]

What is Transdisciplinarity?

4-stage process of problem solving

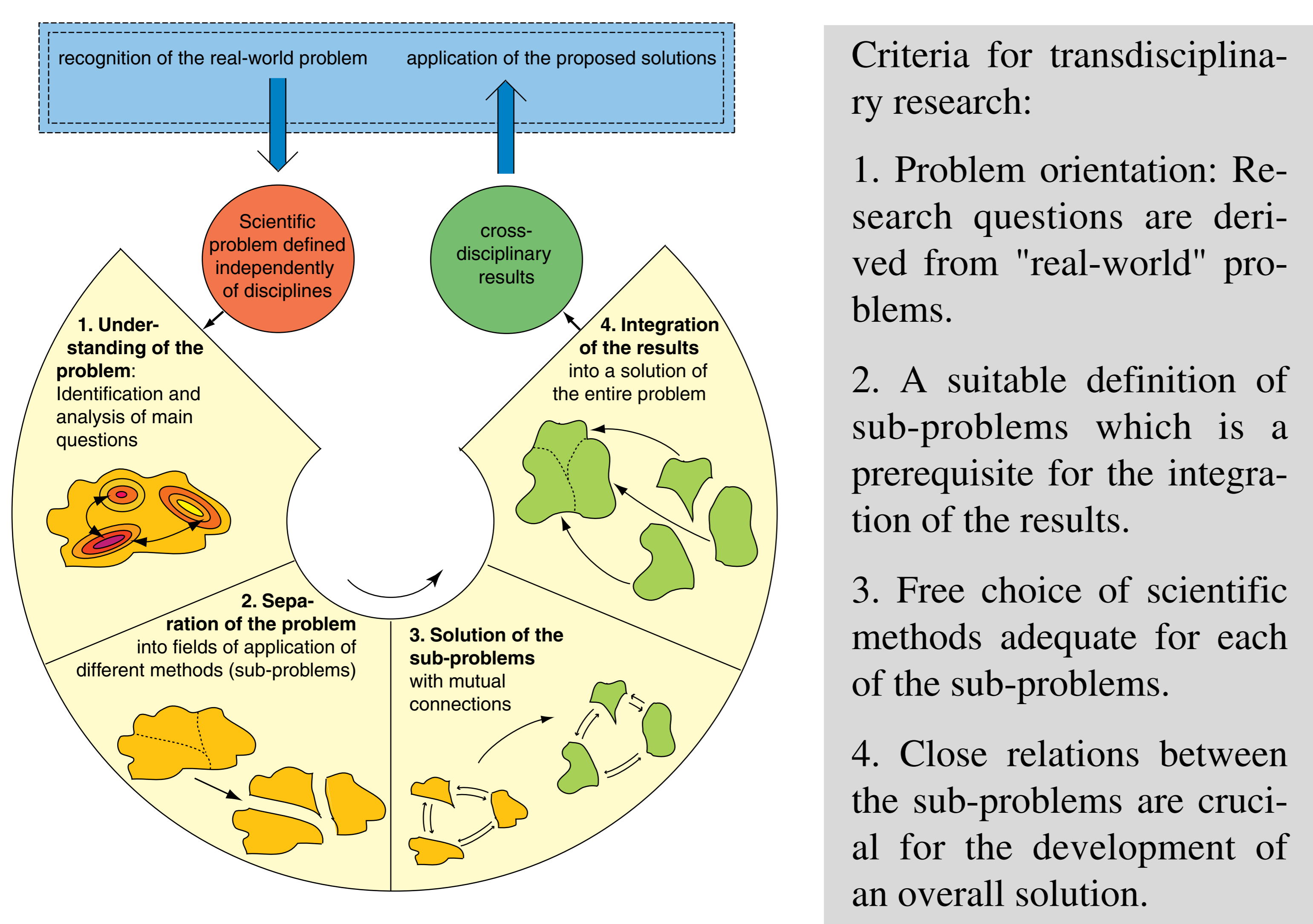


Figure 2: The four stages of the transdisciplinary problem-solving process. ● : cross-disciplinary problem with three main questions. [1]

Results

- The four criteria point to crucial steps of the case studies such as choice of scientific methods and integration of results.
- Teamwork and application-orientated results turn out to be neither specific nor necessary for transdisciplinary research. The four criteria can be applied to both group projects and single person projects.
- Group projects and single person projects have different advantages: Group projects cover broader problems, single person projects are more likely to reach an integration of the results from different sub-problems.

References:

- [1] Jaeger, J., Scheringer, M., Transdisziplinarität: Problemorientierung ohne Methodenzwang, GAIA, 7, 10–25, 1998.
[2] Wissenschaftlicher Beirat für Globale Umweltveränderungen (WBGU), Welt im Wandel – Herausforderung für die deutsche Wissenschaft. Springer, 1996.
[3] Baccini, P., Oswald, F. (Ed.), Netzstadt – Transdisziplinäre Methoden zum Umbau urbaner Systeme. Ergebnisse im Forschungsprojekt Synoikos. vdf Hochschulverlag, 1998.

The Case Studies

Case Study	Methods from ...	Location and Reference
1) Syndromes of Global Change (GP)	various disciplines in a systems analysis framework	Potsdam Institute for Climate Impact Research [2]
2) Regional Sustainability and Urban Design: "Synoikos" (GP)	Substance Flow Analysis and Architecture	ETH Zürich, Departments of Architecture and Civil & Env. Engineering [3]
3) Environmental Assessment of Buildings (GP)	Life-Cycle Assessment and Architecture	ETH Zürich, Department of Chemistry [4]
4) Environmental Assessment of Chemicals (SP)	Environmental Chemistry and Ethics	ETH Zürich, Department of Env. Sciences [5]
5) Perception of Landscapes (SP)	Ecology and Social Sciences	ETH Zürich, Department of Env. Sciences [6]
6) Assessment of Landscape Fragmentation (SP)	Mathematics, Ecology and Social Sciences	Center for Technology Assessment, Stuttgart, and ETH Zürich, Department of Env. Sciences [7]

Table 1: Six case studies exemplifying the four criteria of transdisciplinary research (SP: single person project; GP: group project). [1]

Open Questions

- Further criteria for assessing the quality of transdisciplinary research projects and for deciding about funding are needed.
- How can transdisciplinary research be established in academic institutions? In order to foster transdisciplinary research and to overcome the structural obstacles of the present research system, institutional changes are necessary.
- How can transdisciplinary research be taught? What kind of cases studies is suitable for teaching purposes in the field of transdisciplinarity?

- [4] Lalive d'Épinay, A., Scheringer, M., Hungerbühler, K., An Analysis of Tools for the Assessment of the Environmental Impacts of Buildings, Proceedings of the ECO-INFORMA '97, Ecomed, München, 387–393.
[5] Scheringer, M., Persistenz und Reichweite von Umweltchemikalien. Wiley-VCH, 1999.
[6] Gusewell, S., Landschaftswahrnehmung und Landschaftsbewertung – Instrumente des Naturschutzes? Diploma Thesis, Dept. of Environmental Sciences, ETH Zürich 1993.
[7] Jaeger, J., Gefährdungsanalyse der anthropogenen Landschaftszerschneidung. Dissertation, Dept. of Environmental Sciences, ETH Zürich, in progress.