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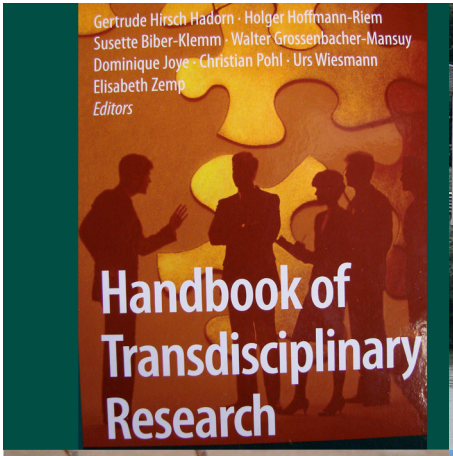
Enhancing Transdisciplinary Research

by Wiesmann et al.



td-net for Transdisciplinary Research
c/o SCNAT
Schwarztorstrasse 9,
CH-3007 Bern

phone: +41 (0)31 310 40 94 or +41 (0)44 632 63 10
fax: +41 (0)31 312 16 78
td-net@scnat.ch, www.transdisciplinarity.ch

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Bilder
Theres Paulsen

Enhancing Transdisciplinary Research: A Synthesis in Fifteen Propositions[1]

Urs Wiesmann, Centre for Development and Environment (CDE), Institute of Geography, University of Berne, Berne, Switzerland
Susette Biber-Klemm, Program Sustainability Research, University of Basel, Basel, Switzerland
Walter Grossenbacher-Mansuy, Centre for Technology Assessment (TA-SWISS) at the Swiss Science and Technology Council, Bern, Switzerland
Gertrude Hirsch Hadorn, Department of Environmental Sciences, ETH Zurich, Zurich, Switzerland
Holger Hoffmann-Riem, td-net, Swiss Academies of Arts and Sciences, Berne, Switzerland
Dominique Joye, Interdisciplinary Institute of Life Trajectories (ITB), University of Lausanne, Lausanne, Switzerland
Christian Pohl, td-net, Swiss Academies of Arts and Sciences, Bern, Switzerland; Department of Environmental Sciences, ETH Zurich, Zurich, Switzerland
Elisabeth Zemp, Institute for Social and Preventive Medicine, University of Basel, Basel, Switzerland

Abstract

The debate on transdisciplinarity is still fairly young and the process of transdisciplinary research is still being developed. This final chapter is an attempt to stimulate the debate on, and the development of, transdisciplinary research. With the 15 propositions, the editors of the Handbook take a position on the definition, scope and process of transdisciplinary research; then we give hints on how to deal with some of the most persistent stumbling blocks in transdisciplinary practice; and finally, we highlight the corner stones needed to face the scientific, the institutional and the societal challenge.

[1] Translations of the article into German and French are published in: Darbellay, F., Paulsen T. (eds.), Le défi de l'Inter- et Transdisciplinarité - Herausforderung Inter- und Transdisziplinarität, Publisher of the EPFL Press, Lausanne 2008.

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1 Introduction

The case studies and discourses presented in this handbook illustrate the broad-ranging relevance and multi-facetted challenges of transdisciplinary research and provide a wealth of concrete hints and recommendations for transdisciplinary research.

In this chapter the Handbook's editorial committee intends to summarise key-features and means for enhancing transdisciplinary research and to point to some of the challenges ahead. We have chosen the format of propositions to emphasise that the views presented are those of the editors. Although based on the contents of the chapters in the Handbook (Hirsch Hadorn et al., 2007), the 15 propositions might not be shared by all authors in all aspects. In order to keep statements and arguments brief, we have abstained from positioning them in the broad range of relevant discourses and therefore references are not included.

At the same time our propositions highlight the fact that the debate on transdisciplinarity is fairly young and that the process of transdisciplinary research is still being developed. Whether it will ever reach the format of an established discipline with sound paradigmatic foundations is questionable, since transdisciplinarity crosses boundaries between forms of knowledge; taking into account the diversity, complexity, uncertainty and values of issues. However, developing means to deal with the resulting challenges in research is what drives a growing community of transdisciplinary researchers. In this sense our contribution aims at further stimulating the debate on, and development of, transdisciplinarity research.

Our 15 propositions are arranged in three sections. First we take a position on the definition, scope, process and outcome of transdisciplinary research; then we give hints on how to deal with some of the most persistent stumbling blocks in transdisciplinary practice; and finally, we highlight some challenges ahead and a possible way forward.

2 Scope, Process and Outcomes of Transdisciplinary Research

In the first section the propositions highlight our understanding of transdisciplinary research. In the following sections, this understanding forms the basis on which we address the question of how to enhance this mode of research.

Scope, Process and Outcomes of Transdisciplinary Research		
Proposition	1	Definition
Proposition	2	Scope and relevance
Proposition	3	Recursive processes
Proposition	4	Knowledge forms
Proposition	5	Contextuality and generality
Proposition	6	Specialisation and innovation
Dealing with Stumbling Blocks in Transdisciplinary Practice		
Proposition	7	Participation and mutual learning
Proposition	8	Integration and collaboration
Proposition	9	Values and uncertainties
Proposition	10	Management and leadership
Proposition	11	Education and career building
Proposition	12	Evaluation and quality control
Corner Stones for Enhancing Transdisciplinary Research		
Proposition	13	Facing the scientific challenge
Proposition	14	Facing the institutional challenge
Proposition	15	Facing the societal challenge

Figure 1 Propositions for enhancing transdisciplinary research

Definition: Transdisciplinarity is, on the one hand, rooted in the rise of the so-called knowledge society, which refers to the growing importance of scientific knowledge in all societal fields. On the other hand, it acknowledges that knowledge also exists and is produced in societal fields other than science. The difference is that systematisation leading to specialisation is more pronounced in science than in other societal fields. Transdisciplinary research focuses on the links between different sciences and between science and other parts of society. This leads to the following general definition.

> **Proposition 1**: Transdisciplinary research is research that includes cooperation within the scientific community and a debate between re-search and the society at large. Transdisciplinary research therefore trans-gresses boundaries between scientific disciplines and between science and other societal fields and includes deliberation about facts, practices and values.

Scope and relevance: Transdisciplinary research has arisen from a growing number of complex problems in the life-world for which knowledge-based solutions are sought but for which knowledge of a single scientific

discipline or societal field is insufficient. This leads to the following proposition on the scope, definition and relevance.

> **Proposition 2**: Transdisciplinary research is an appropriate form of research when searching for science based solutions to problems in the life-world with a high degree of complexity in terms of factual uncertainties, value loads and societal stakes. Through bridging different scientific and social knowledge components it can significantly improve the quality, acceptance and sustainability of such solutions. However, deliberation about facts, practices and values are ongoing when bringing results to fruition in the life-world as well as in scientific communities.

Recursive processes: In a transdisciplinary research process, determining the problems involves making fundamental decisions about what aspects are seen as important and what constitutes disputed ground. Furthermore, decisions must reflect the uncertainties in the knowledge surrounding the problems. These challenges can be addressed by restructuring problems and correcting assumptions in the course of research. Therefore transdisciplinary research requires a research design that is basically recursive. The following proposition deals with this key-characteristic of transdisciplinary research processes.

> **Proposition 3**: Transdisciplinarity implies that the precise nature of a problem to be addressed and solved is not predetermined and needs to be defined cooperatively by actors from science and the life-world. To enable the refining of problem definition as well as the joint commitment in solving or mitigating problems, transdisciplinary research connects problem identification and structuring, searching for solutions, and bringing results to fruition in a recursive research and negotiation process. Transdisciplinarity thus dismantles the traditional sequence leading from scientific insight to action.

Knowledge forms: Transdisciplinary research analyses complex empirical questions (systems knowledge), it aims at determining goals for better dealing with problems (target knowledge) and investigates how existing practices can be changed (transformation knowledge). Transdisciplinary research takes interrelations between knowledge forms into account and includes heterogeneous sources of knowledge by iteratively integrating knowledge components and forms. The following proposition deals with this further key-characteristic of transdisciplinary research processes.

Proposition 4: In relation to the nature of problems that are addressed in transdisciplinary research, the canon of participating disciplines and competences from the natural, technical and social sciences, and the humanities, as well as from the life-world cannot be pre-defined. It is to be determined during the research process which bodies of knowledge have to be integrated to take into account, produce and integrate systems knowledge, target knowledge and transformation knowledge.

Contextuality and generality: Turning to the outcomes of transdisciplinary research, we see that the nature of the problems addressed has far reaching consequences. In terms of concrete results and problem-solving contributions, these must be contextualised and go beyond counselling by developing transmissible knowledge. This tension is addressed in the following proposition.

Proposition 5: Transdisciplinary research is by necessity shaped by concrete problem contexts and related societal settings and its results are basically valid for these contexts. However, taking into account the prerequisite of contextualisation, transdisciplinary research also aims at ge-nerality by providing insights, models and approaches that can be trans-ferred to other contextual settings after careful validation and adaptation.

Specialisation and innovation: Transdisciplinary research is committed to developing state-of-the-art scientific innovation at the interplay between transdisciplinary and disciplinary research. It is driven by the tension between specialisation in transdisciplinary methods and the triggering of transformation of disciplines. Therefore transdisciplinary researchers form a mixed college of peers. This tension leads to the next proposition.

Proposition 6: The quality of transdisciplinary research is bound by sound conceptions of integration and thus requires development of an own form of specialisation. However, transdisciplinary research is not meaningful without sound disciplinary contributions and it has the potential to stimulate innovation in participating disciplines. Bringing this potential to fruition requires an emerging college of peers able to bridge disciplinary and transdisciplinary specialisation.

The six propositions on the definition and scope (1 & 2), the process (3 & 4) and the outcomes (5 & 6) of transdisciplinary research form the basis and reference on which we deal with stumbling blocks and the way forward in the following sections.

3 Dealing with Stumbling Blocks in Transdisciplinary Practice

Given the general characteristics outlined in the above propositions and the experiences presented in the case studies of this handbook, some stumbling blocks of transdisciplinary practice seem to be common and persistent. Therefore, we briefly qualify these stumbling blocks and postulate proposals on how to deal with them.

Participation and mutual learning: Collaboration between science and society in transdisciplinary research implies participatory processes. At the same time participation is one of the major stumbling blocks in transdisciplinary practice. Neglecting the diversity of goals, values, expectations and related power constellations in both society and science exposes the danger of purely symbolic participation, which results in solidifying roles and positions with low innovative potential of transdisciplinarity. This neglect can lead into diffuse 'all-inclusive' processes in which positions, roles and contributions lose credibility to the extent that all major stakeholders in society and science begin to doubt the relevance of participatory processes and lose interest. These considerations lead to the following proposition:

> **Proposition 7**: Participatory processes in transdisciplinary practice require carefully structured, sequenced and selected negotiations and interactions. The different resources, goals and values at stake and their social representation in society and science need to be considered. Building on approaches of mutual learning that bridge roles and positions without dissolving them is a promising entry point to goal oriented participation.

Integration and collaboration: Closely related to participation is another core feature of transdisciplinary research – collaboration to integrate the perspectives and knowledge of various disciplines and stakeholders. The challenge of collaborative integration that ideally starts with problem definition and continues throughout the whole research process is again bound to a wide range of difficulties in transdisciplinary practice. These may turn into stumbling blocks, in particular, when efforts are limited to communicative action only, or when so-called synthesis processes are

postponed to the end of the research process. Major difficulties also arise if integration is delegated to one of the participating disciplines only, or if integrative concepts are too stringently designed and do not leave room for participating disciplines and researchers to manoeuvre. These stumbling blocks can be overcome by considering the following proposition when planning collaboration and conceptualising integration in concrete transdisciplinary endeavours.

> **Proposition 8**: Collaborative efforts of integration have necessarily to take into account the recursive nature of transdisciplinary research. Combining different means of integration, i.e. developing joint theoretical frameworks, applied models, and concrete common outputs – in an iterative or circular process – has proven to be particularly successful. At the same time, transdisciplinary work should be organised in a manner that enables a productive balance between structured collaboration and vested interests by participating partners and disciplines.

Values and uncertainties: Dealing with values and uncertainties is one of the core difficulties in transdisciplinary research, practice and related capacity development. In many cases this turns out to be one of the most important stumbling blocks. The differing and often conflicting values of participating researchers and stakeholders are most decisive in recursive transdisciplinary problem definition. Beyond that, they strongly influence the design and process of transdisciplinary endeavours, i.e. who is included or excluded – as well as the interpretation and application of outputs and outcomes. In addition, ontological and epistemic foundations of participating disciplines are strongly value-loaded. If these value dimensions are hidden or neglected, transdisciplinary collaboration may turn out to be largely superficial or driven by power-constellations representing underlying values. Closely related are the uncertainties that stem from the nature of the problems addressed, the respective limitations of involved system knowledge, as well as the conflicting value-loads influencing all stages of transdisciplinary processes. In this respect it also important to recall that transdisciplinary research is basically bound to socio-political contexts, giving rise to uncertainties concerning the validity of outcomes beyond these contexts. If not actively dealt with, these uncertainties may lead to very diffuse, unnamed and disputed outcomes, or – even worse – to over-interpreted and over-generalised results.

> **Proposition 9**: In order to give sufficient attention to values and stakes at all stages of transdisciplinary processes, collaborations and negotiations should be dominated by a mutual learning attitude, not by positions. This

is best promoted by adequate time allocation, by creating broad ownership of the problems and by building value-consciousness through reflexive processes among researchers. Reflexivity is also the core means for dealing with uncertainties and the outer boundaries of knowledge resulting from transdisciplinary endeavours.

Management and leadership: Project and management structures in transdisciplinary endeavours tend to become complex and overloaded as transdisciplinary research, by default, includes a range of partners and institutions. Due to the recursive nature of problem definition and research, participating institutions and disciplines may vary over time, making management and leadership even more challenging. At the same time, the management and leadership of transdisciplinary processes is often caught in a fix. On the one hand, it is a matter of dealing with the production pressure, which results from the complex and therefore costly projects forced to compete with disciplinary research on the science market. On the other hand, adequate time, space and resources must be provided for mutual learning and recursive research processes to take place. This basic conflict is heightened by the fact that the social reference and control system of participating researchers and stakeholders is anchored within their home institutions and not within the transdisciplinary team. The following proposition indicates some points that may help management of transdisciplinary research to deal with the basic squeeze between high internal and external expectations and the low formal steering powers.

Proposition 10: The leading of transdisciplinary projects primarily implies finding a satisfactory balance between periods of intense collaboration with clearly defined joint outputs and periods where deepened disciplinary and multi-disciplinary contributions can be elaborated. This balance of periods is best supported by management services that simultaneously ease administrative tasks for participants, provide clearly structured and timed means of communication, integration and reflexivity, and support internal and external recognition of all contributors, i.e. through providing access to extended peers.

Education and career building: When considering education, training and career building in and for transdisciplinary research, an initial stumbling block is the misconception of transdisciplinarity as an additional or new discipline. This position neglects the fact that transdisciplinarity is a specific form of research collaboration and of integrative efforts, and therefore is rooted in the participating disciplines. A second problem arises when training and education is designed in a way that reduces transdis-

ciplinarity to communication and social interaction. But – although very important – communication skills and social competence alone do not make transdisciplinarity possible. Competences that relate to reflexivity on disciplinary and interdisciplinary methodologies or to conceptual and theoretical skills are equally important. However, the most common stumbling block in education, and in particular in respective career building, is related to the conflicting reference systems to which researchers are exposed in transdisciplinarity research: that of their own scientific discipline, of the interdisciplinary research context, and of the society concerned. For the individual researchers who aim at building their career, e.g. at the PhD or the post-doc level, this leads to tensions that are difficult to deal with and that may result, either in withdrawal from transdisciplinarity or in amateurish scientific transgression.

> **Proposition 11**: Transdisciplinary training and education is best developed in close connection with the disciplines of origin. Besides building communication and collaboration capacities through practical exposure, emphasis should be put on reflexivity and on methodological, conceptual and theoretical skills that enable the exploration of boundaries and connections between disciplines. Related career building can be supported by careful planning and sequencing of outputs targeting the reference systems of the original discipline and the enhanced peers of transdisciplinarity.

Evaluation and quality control: When all the above points are taken into account it is obvious that external evaluation and internal quality control of transdisciplinary research are great challenges and may turn out to be stumbling blocks. In an increasingly competitive scientific environment and in a science-critical society, independent evaluation is crucial for strengthening high quality transdisciplinary research. If respective assessments only refer to the frontier of knowledge in one or several disciplines and do not respect the integrative and context-specific achievements of such research, trans-disciplinarity will be discredited by default. Transdisciplinarity may also be discredited by poor outputs and outcomes stemming from a lack of internal quality control. It is important to note that discourses and procedures related to quality control are often hindered or even refused consideration so as not to transgress into other partners' fields of competence and assigned roles.

> **Proposition 12**: Evaluation of transdisciplinary research has to go beyond traditional reference systems. It should include qualifying integration and collaboration of disciplines and stakeholders, the recursive design of the

research process, and the way the project is based on, and can provide input to, scientific knowledge and societal problem handling. In order to strengthen internal quality control efforts, researchers should concentrate on finding the delicate balance between respecting specific competence and transgressing them in constructive and critical dialogue within transdisciplinary teams.

4 Corner Stones for Enhancing Transdisciplinary Research

In the previous section we mentioned some important difficulties in transdisciplinary practice and we gave some hints on how to deal with them. We have pointed to the most important corner stone for further enhancing transdisciplinary research, namely impro-ving its practice and thereby enhancing its credibility in science and society. However, this will not be sufficient, as additional challenges have to be faced at a minimum of three more levels, which we will briefly discuss: the scientific, the institutional and the societal challenge.

Facing the scientific challenge: A large part of the scientific community still perceives transdisciplinary research, at worst as a semi-scientific application of several disciplines or, at best as a promising new meta-discipline. These positions overlook the fact that transdisciplinarity is a mode of research that is geared to the science and society interface, aims at knowledge based contributions to life-world problems and is rooted in and builds on the participating disciplines. The effect of the predominant image of transdisciplinarity is at least threefold. Firstly, it hinders conceptual and methodological development and innovation at the scientific and science–society interfaces. Secondly, it prevents the development of acknowledgement and reference systems between disciplines and transdisciplinary endeavours. Thirdly, it promotes fraudulent labelling against the background of the novelty image of transdisciplinarity.

Proposition 13: Good and concrete transdisciplinary practice must be supplemented by efforts at the levels of its scientific foundations and its scientific recognition. Such efforts must go beyond systematising transdisciplinary research procedures and aim at theoretical, methodological and topical development and innovation at the interface with participating disciplines – to the benefit of both sides. Facing these challenges requires development of extended peer networks and other collaborative networks that bridge transdisciplinary and disciplinary reference and quality control systems.

Facing the institutional challenge: Related to its image in the scientific and science po-licy community, transdisciplinary research occupies a peripheral institutional position in academia. It is often associated with institutions of applied research and demand driven consultancy, or it is packaged in temporarily limited projects or programmes. This peri-pheral position has the advantage of having a more immediate connection to the science–society interface. However, it has the great disadvantage that it does not pro-mote theoretical and conceptual development and reflexivity, and even worse, that it is unlikely to stimulate innovative synergies in disciplinary research and curricula. One probable reason is that although many researchers and disciplines participate in trans-disciplinary endeavours, the core of their reference system perceives this participation as a scientific service rather than as a genuine interest of the respective discipline. Thus, the weak institutional position hinders or may even prevent transdisciplinarity from realising its full potential.

> **Proposition 14**: In order to enhance transdisciplinary research, its scientific foundations and its innovative potential for participating disciplines, the institutional position in science and academia has to be strengthened. This means incorporating aspects of transdisciplinarity into research, curricula and career building within established disciplinary institutions, and may include promoting specialist transdisciplinary institutions. The growing network of peers will need to play a key role, allowing transdisciplinary practice to be promoted more pro-actively by the scientific community.

Facing the societal challenge: A key task of transdisciplinarity is to address the science and society interface, implying that the role and image of science in society matter, as does the conception of society in science. However, persisting conventions of these roles, images and conceptions conflict with the goal of transdisciplinary research to address life-world problems characterised by a high degree of complexity in terms of factual uncertainties, value loads and societal stakes. If left undebated, these conventions often lead into dead-locks and false expectations in transdisciplinary practice.

> **Proposition 15**: Efforts to enhance transdisciplinarity should be accompanied by and embedded into a societal debate on the role of science in society, particularly when dealing with factual uncertainties. At the same time, the scientific community is urged to constantly renew the debate on the role of values and stakes in research. Contributing to solving life-world problems through transdisciplinary research requires science to be

conscious and explicit in terms of values and in terms of the boundaries of knowledge and findings – and it requires a corresponding image of science in society.

We, the editors of the handbook, are convinced that transdisciplinary research forms a major avenue for enhancing science based contributions to solve complex problems in the life-world. At the same time we are convinced that transdisciplinarity holds the potential to stimulate innovation in a broad range of disciplines. Enhancing transdisciplinary practice and its scientific foundations is therefore a rewarding challenge. We hope that our 15 propositions, and this handbook as a whole, will encourage many scientists to face this challenge and enter into transdisciplinary practice and debate.

Reference

Hirsch Hadorn, G., Hoffmann-Riem, H., Biber-Klemm, S., Grossenbacher-Mansuy, W., Joye, D., Pohl, C., Wiesmann, U. and Zemp, E. (eds): 2008, *Handbook of Transdisciplinary Research*. Springer, Heidelberg