

td-net

network for transdisciplinarity
in sciences and humanities



Akademien der Wissenschaften Schweiz
Académies suisses des sciences
Accademie svizzere delle scienze
Academias svizras da las ciencias
Swiss Academies of Arts and Sciences

NCCR
north
south

Swiss
National Centre
of Competence
in Research
North-South

transdisciplinarity-net

Schwarztorstrasse 9 | 3007 Bern | Schweiz

Fon +41 31 310 40 94 | Fax 41 31 312 16 78

tdnet@scnat.de | www.transdisciplinarity.ch

td-net is a forum of the Swiss Academies of Arts and Sciences.

The present translation was financed by the NCCR North-South,
a research programme co-funded by the Swiss National Science Foundation (SNSF)
and the Swiss Agency for Development and Cooperation (SDC).

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche
Nationalbibliografie; detailed bibliographic data are available on the Internet
at <http://dnb.d-nb.de>.

© 2007 oekom, Munich, Germany

oekom verlag, Gesellschaft für ökologische Kommunikation mbH

Waltherstraße 29, 80337 Munich, Germany

Translation by Anne B. Zimmermann, NCCR North-South

Cover design by Véronique Grassinger

Cover photo by Ines Swoboda

Typesetter: Werner Schneider

Print: Kessler Verlagsdruckerei, Bobingen

Printed on FSC-certified paper

All rights reserved

ISBN 978-3-86581-046-5

Christian Pohl, Gertrude Hirsch Hadorn
Translated by Anne B. Zimmermann

Principles for Designing Transdisciplinary Research

Proposed by the Swiss Academies
of Arts and Sciences

Contents

| | |
|--|-----------|
| Foreword to the English Edition | 9 |
| Translator's Note | 11 |
| Foreword by the td-net Scientific Advisory Board | 13 |
| 1. Introduction | 15 |
| Structure | 17 |
| 2. The Principles in Brief | 19 |
| Transdisciplinary Research (TR) | 20 |
| The transdisciplinary research process | 20 |
| 1st principle: Reduce complexity by specifying the need for knowledge and identifying those involved: | 20 |
| 2nd principle: Achieve effectiveness through contextualisation | 21 |
| 3rd principle: Achieve integration through open encounters | 22 |
| 4th principle: Develop reflexivity through recursiveness | 22 |
| 3. Transdisciplinary Research | 25 |
| 3.1 Starting point, goal and requirements | 26 |
| 3.2 Identifying and structuring research questions | 31 |
| 3.3 Systems, target and transformation knowledge | 36 |
| 4. The Transdisciplinary Research Process | 41 |
| 4.1 Recursiveness | 43 |
| 4.2 Problem identification and structuring | 44 |
| 4.2.1 <i>Identifying actors and specifying the need for knowledge</i> | 44 |
| 4.2.2 <i>Contextualisation: embedding TR in science and the life-world context</i> | 45 |
| 4.2.3 <i>Reformulation of the questions in relation to life-world actors</i> | 47 |

| | | |
|-------|---|----|
| 4.3 | Problem analysis | 51 |
| 4.3.1 | <i>The structure of problem analysis</i> | 51 |
| 4.3.2 | <i>Forms of collaboration</i> | 52 |
| 4.3.3 | <i>Modes of integration</i> | 57 |
| 4.4 | Bringing results to fruition | 60 |
| 4.4.1 | <i>Recursiveness in the phase of bringing results to fruition</i> | 62 |
| 4.4.2 | <i>Explicit and detailed development of impact models</i> | 63 |
| 4.4.3 | <i>Cognizance of the context of life-world problems</i> | 64 |
| 4.4.4 | <i>Tailoring results for the target groups</i> | 64 |
| 4.4.5 | <i>Embedding TR in the scientific environment</i> | 66 |

Annex **69**

| | | |
|----|--|----|
| A1 | Definitions of transdisciplinarity | 70 |
| | <i>ProClim/CASS 1997</i> | 71 |
| | <i>Defila and Di Giulio 1999</i> | 71 |
| | <i>Lawrence 2004</i> | 71 |
| | <i>Häberli and Grossenbacher-Mansuy 1998</i> | 73 |
| | <i>Kötter and Balsiger 1999</i> | 73 |
| | <i>Klein et al. 2001</i> | 74 |
| | <i>Jahn 2005</i> | 74 |
| | <i>Burger and Kamber 2003</i> | 74 |
| | <i>Bruce et al. 2004</i> | 74 |
| | <i>Mittelstrass 1992</i> | 76 |
| | <i>Mittelstrass 1996</i> | 77 |
| | <i>Jaeger and Scheringer 1998</i> | 77 |
| | <i>Jantsch 1972</i> | 78 |
| | <i>Gibbons et al. 1994</i> | 80 |
| | <i>Horlick-Jones and Sime 2004</i> | 80 |
| | <i>Kockelmans 1979</i> | 82 |
| | <i>Nicolescu 1996</i> | 83 |
| | <i>Perrig-Chiello and Darbellay 2002</i> | 85 |
| | <i>Ramadier 2004</i> | 85 |
| | <i>Després et al. 2004</i> | 86 |
| A2 | "Modes of operation" of transdisciplinarity | |
| | known under other designations | 88 |
| | <i>Integration and implementation sciences</i> | 88 |
| | <i>Interdisciplinary problem-solving</i> | 89 |

| | |
|--|------------|
| <i>Mode 2 interdisciplinarity (vs. Mode 1 interdisciplinarity)</i> | 89 |
| <i>La recherche interdisciplinaire finalisée (interdisciplinary research with a purpose)</i> | 90 |
| <i>Trans-scientific</i> | 90 |
| <i>Post-normal science</i> | 91 |
| <i>Sustainability science</i> | 92 |
| <i>Mode 2 knowledge production</i> | 93 |
| <i>Policy sciences</i> | 93 |
| <i>Policy analytic activities</i> | 94 |
| | |
| A3 Participants in the peer review process | 95 |
| | |
| Notes | 97 |
| | |
| List of References | 115 |
| | |
| Figures and Tables | |
| Figure 1 Chart for comparing basic, applied and transdisciplinary research | 31 |
| Figure 2 Identifying and structuring research questions in basic research | 32 |
| Figure 3 Identifying and structuring research questions in applied research | 33 |
| Figure 4 Identifying and structuring research questions in transdisciplinary research | 34 |
| Figure 5 Interdependencies between the three forms of knowledge | 38 |
| Figure 6 The three phases of research | 42 |
| Figure 7 Phases of a transdisciplinary research process (Hurni and Wiesmann 2004, p. 40) | 43 |
| Figure 8 Problem identification and structuring portrayed as a recursive process (Extract from Hickling 1982, p. 284) | 44 |
| Figure 9 Transdisciplinary problem analysis (Jaeger and Scheringer 1998, p. 19; translated) | 52 |
| Figure 10 Forms of collaboration (Rossini and Porter 1979, p. 74) | 53 |
| Figure 11 Problem orientation vs. solution orientation (Loibl 2005, p. 141; translation by A. Zimmermann) | 61 |

| | | |
|-----------|---|----|
| Figure 12 | Recursive application of the phase of bringing results to fruition: the real-world experiment (Gross et al. 2005, p. 275) | 62 |
| Figure 13 | The diversity of impacts (Based on Thissen and Twaalfhoven 2001, p. 629) | 63 |
| Table 1 | The three forms of knowledge | 36 |

Tools

| | | |
|--------|--|----|
| Tool 1 | Identifying the actors involved with regard to TR requirements | 30 |
| Tool 2 | Positioning the need for knowledge with regard to the three forms of knowledge | 40 |
| Tool 3 | Forms of collaboration and modes of integration | 59 |
| Tool 4 | Embedding TR in the life-world | 65 |
| Tool 5 | Embedding TR in the scientific environment | 67 |

Examples

| | | |
|-----------|--------------------------------|----|
| Example 1 | The "Popular Theatre" Approach | 28 |
| Example 2 | The Syndrome Approach | 29 |
| Example 3 | "Collaborative Planning" | 46 |
| Example 4 | The "Menu" | 48 |
| Example 5 | The "Netzstadt" Project | 50 |
| Example 6 | "Collaborative Design" | 55 |
| Example 7 | ETH-NSSI Case Studies | 56 |

2

The Principles in Brief

Transdisciplinary Research (TR)

There is a need for TR when knowledge about a societally relevant problem field is uncertain, when the concrete nature of problems is disputed, and when there is a great deal at stake for those concerned by problems and involved in dealing with them. TR deals with problem fields in such a way that it can:

- a) grasp the complexity of problems,
- b) take into account the diversity of life-world and scientific perceptions of problems,
- c) link abstract and case-specific knowledge, and
- d) develop knowledge and practices that promote what is perceived to be the common good.

The transdisciplinary research process

The transdisciplinary research process consists of three phases:

1. Problem identification and structuring
2. Problem analysis
3. Bringing results to fruition

The importance of each of the three phases must be taken into account when allocating time, finances and personnel. TR does not necessarily progress through the phases in the order mentioned above. For example, identifying and structuring problems can lead to the insight that no further research is necessary because enough knowledge is available to develop suggestions for feasible solutions. In other cases, problem analysis and bringing results to fruition may lead to the conclusion that problem identification or structuring needs to be revised and adapted.

At the stage of analysing a problem field, trying to meet all of the four requirements of TR – which are: (a) to come to terms with complexity, (b) to take into account diversity, (c) to develop case-specific and practice-oriented knowledge that can be transferred and (d) oriented towards what is perceived to be the common good – is risky, as this might overload the project with prerequisites, as if it were supposed to become the proverbial “all things to all people”. To avoid such overburdening of projects, it is important to take into account the following four principles when shaping the research process.

1st principle: Reduce complexity by specifying the need for knowledge and identifying those involved

When trying to come to terms with the complexity of problems, it is crucial to consider only those relations relevant to practice-oriented problem-solving. TR

deals with empirical questions (systems knowledge); it also aims to ascertain and explain better practices (target knowledge) and reflect on the practicability of goals and feasibility of proposed solutions to problems (transformation knowledge) (see Table 1, p. 36). With this in mind, two means of adequately reducing complexity are to specify the particular need for knowledge and identify the people involved. Specifying the need for knowledge implies discerning what research questions need to be addressed by a project and determining the corresponding conditions. To this end, it is necessary to find out what kind of systems perception underlies a project, what normative targets it has set itself, and what potential societal transformations it aims at (see Tool 2, p. 40). Identifying the people involved implies coordinating the tasks of societal actors and disciplines in relation to the four requirements that need to be fulfilled (a–d, see above), e.g. by determining which actors and disciplines need to be involved and in what manner, with a view to taking into account the diversity of relevant perspectives (see Tool 1, p. 30).

The principle of specification is important in all three phases of TR, but it is particularly significant when identifying and structuring problem fields.

2nd principle: Achieve effectiveness through contextualisation

TR aims to develop knowledge that helps solve "life-world" (or everyday-life) problems concretely. Knowledge in this context comprises empirical knowledge, as well as knowledge that enables people to shape practice-oriented opinions and creative skills that open up possibilities for action in specific life-worlds. Research must therefore pay particular attention to the impact-related contextualisation of a project. One way of achieving this is to elaborate an impact model at the stage of problem identification and structuring that shows the social impacts projects may have when bringing results to fruition. Projects must therefore assess the state of knowledge not only in relation to the research questions identified, but also with regard to concrete societal practices and issues in the life-world (existing technologies, regulations, practices, power relations and potential for change). In order to make research results accessible to those concerned, it is essential to reformulate them: Scientific insights must be summarised and assessed for specific target groups; they must be translated creatively into products useful to these groups; and it is necessary to reflect on how these products will fit target groups' current practices and agendas (see Tool 4, p. 65).

But the effectiveness of TR relies just as much on its being embedded in the scientific context. This can be achieved by linking current efforts to the state of the art in the relevant disciplines, by learning from transdisciplinary work on similar problems (even in other thematic realms), and by systematising and publishing experiences garnered in a project (see Tool 5, p. 67).

While the principle of contextualisation is relevant to all three phases of TR, it is particularly significant when problems are identified and structured, and when results are brought to fruition.

3rd principle: Achieve integration through open encounters

The most important principle for successful collaboration between disciplines and with various social groups is to be open to encounters. This implies perceiving one's own perspective as only one among several others, and accepting other views as potentially just as relevant as one's own. Only thus can constructive discussions about the potential of the various perspectives to contribute to the common undertaking take place and be further developed.

Collaboration can take various forms (common learning as a group, negotiations among experts, integration through the project leader), and be based on different modes of integration ("boundary objects", glossary, everyday language, models, transfer of concepts, mutual adaptation of concepts, developing bridge concepts) (see Tool 3, p. 59). Depending on the form of collaboration and mode of integration, the intensity of reflection about one's own and other actors' perspectives can vary. Moreover, every form of integration structures the relation between the perspectives involved in a specific way. This is why it is important to determine the mode and concrete process of integration in a common and open procedure, in order to ensure that it is adapted to problem structuring and questions that have been defined above.

The principle of open encounters is relevant to all three phases of TR.

4th principle: Develop reflexivity through recursiveness

Fulfilment of the requirement that TR must, in the phase of problem analysis, (a) encompass the complexity of a problem field, (b) take into account diversity, (c) develop knowledge that is both relevant to specific cases as well as transferable, and (d) develop practice-oriented solutions for what is perceived to be the common good, often seems to be possible only to a limited degree. This can jeopardise the quality of results and stall TR. One means of preventing this is to shape the research process recursively (or iteratively). Recursiveness (or iteration) implies foreseeing that project steps may be repeated several times in case of

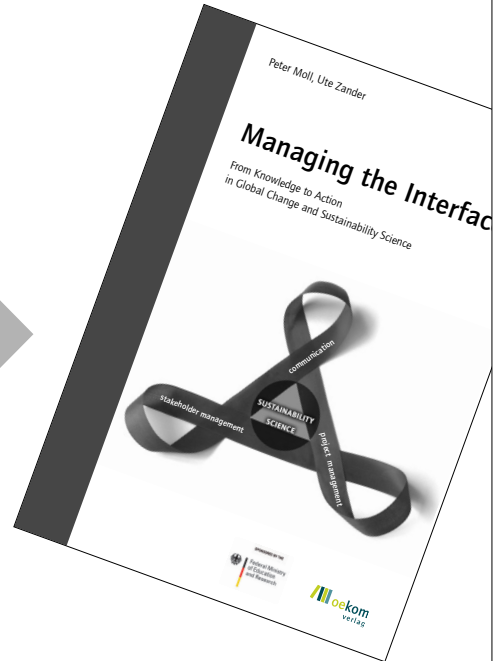
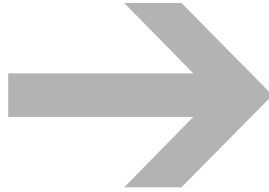
need. The possible limitation or uncertainty of a preliminary result thus becomes a means of targeted learning. Recursiveness is important in all three phases of the research process. With regard to bringing results to fruition, this implies introducing recursiveness not just at the end but already in the course of the research process, so that recursive adaptations are possible. Every effort in the phase of bringing results to fruition becomes a "real-world experiment" that must be observed and from which something may perhaps be learned for problem identification and structuring, for problem analysis, or for the next time results are brought to fruition. Reflexivity thus means to correct assumptions on which the production of knowledge is based, in case the real-world experiment reveals that these assumptions need to be corrected.

The principle of recursiveness is relevant to all three phases of TR.

When planning a project, it is necessary to decide how the four TR principles need to be implemented. Tools 1–5 are designed to help make this choice: they summarise the aspects that need to be taken into account and show very different ways of shaping TR.

Sustainability

A-Z



K for Knowledge and Action

In times of global change and a dramatic loss of sustainability from local to global scales, science has to shoulder ever greater responsibilities. So the question of how to move from knowledge to action becomes more and more crucial. Peter Moll and Ute Zander look at the design of the interface between theory and praxis.

An analysis with examples, action proposals and lists of resources available to actors in science and development.

P. Moll, U. Zander

Managing the Interface

From Knowledge to Action in Global Change and Sustainability Science

oekom verlag, Munich 2006, 157 pages, English, 24,80 EUR

ISBN 978-3-86581-052-6

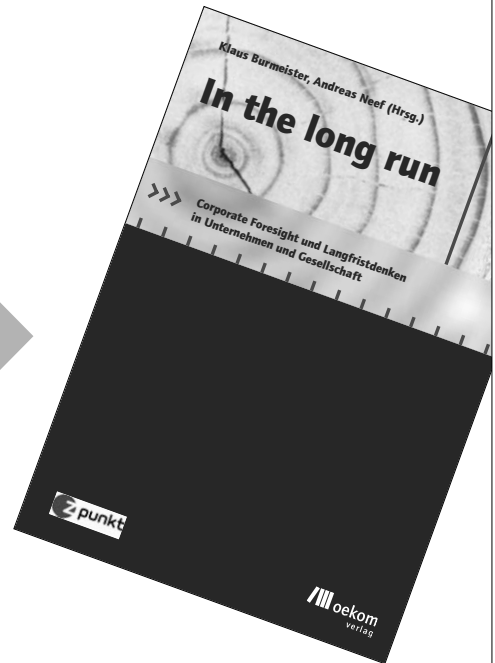
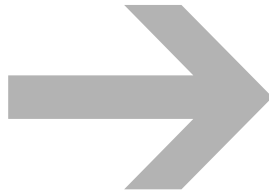
Available at:

www.oekom.de | oekom@rhenus.com | Fax +49/(0)81 91/970 00-405

 **oekom**
verlag

Sustainability

A-Z



I as in Innovation

Markets are changing at break-neck speed, the innovation cycles are becoming ever shorter. Under these conditions, anticipated thinking and corporate foresight are becoming important instruments for the 21st-century business management.

"In the long run" shows the diversity of successful and long-term company policies.

K. Burmeister, A. Neef

In the long run

Corporate Foresight and long-term Thinking in Business and Society
oekom verlag, Munich 2005, 196 pages, English, 35,80 EUR

ISBN 3-936581-89-4

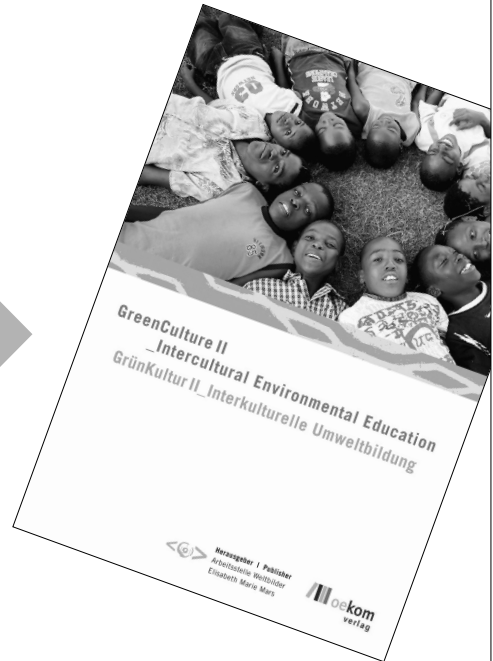
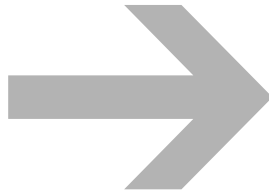
Available at:

www.oekom.de | oekom@rhenus.com | Fax +49/(0)81 91/970 00-405

 **oekom**
verlag

Sustainability

A-Z



I as in Intercultural

Green Culture is an intercultural environmental education project with people from North Rhine-Westphalia and the province Mpumalanga in South Africa.

The recent book "GreenCulture_Intercultural Environmental Education" presents the experiences of South African women and men involved in a project about environmental education and cultural learning. The people talk about the results of their common work, the gardening activities, artistic actions and discussions.

Publisher: Arbeitsstelle Weltbilder
Elisabeth Marie Mars

GreenCulture II_Intercultural Environmental Education

oekom verlag, Munich 2006, 128 pages (completely coloured), English/Deutsch

24,80 EUR

ISBN 3-86581-014-4

Available at:

www.oekom.de | oekom@rhenus.com | Fax +49/(0)81 91/970 00-405

 **oekom**
verlag