

## MANAGEMENT OF TRANSDISCIPLINARY RESEARCH

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### **Summary**

This article elaborates on the relevance of special management skills for transdisciplinary research. It is argued that such research generally is hampered by three main sorts of problems. These are of a social, communicative, and cognitive nature, respectively. On all three accounts, the management of transdisciplinary research is faced with an important challenge. The second part of the article therefore asks what kind of management is feasible. Who and what is to be managed how in transdisciplinary research? The discussion of this question focuses on three main areas of the management of transdisciplinary research: (1) Management of interests, conflicts, and relations; (2) management of communication and information; and (3) management of knowledge and integration.

Methods and instruments of transdisciplinary research management are named and described. In the third part of the article, the results of two comprehensive case studies on current practices are used to illustrate the practical difficulties for the management of transdisciplinary projects. It is shown that the success of research that transgresses traditional disciplinary boundaries largely depends on the way in which managerial support is organized. Such support can be organizational, facilitating, or content based. Finally, the paper discusses future perspectives for transdisciplinary (TD) research management. Remaining problems are identified and it is asked which developments in TD research management seem to be particularly promising.

## **1. Introduction: Relevance of Management Skills in Transdisciplinary Research**

Scientific research that transgresses traditional disciplinary boundaries by its very nature involves cooperation between practitioners from different academic and professional backgrounds. The participants in transdisciplinary (TD) projects, that is, are socialized in various academic traditions and work within different theoretical frameworks, often using research methods typical to particular disciplines or subfields. In the day-to-day practice of TD research, the differences between participating researchers can seriously undermine cooperative research efforts. Potential threats to the efficiency and progress of TD projects are even greater when TD research includes the cooperation of nonacademic participants such as representatives from NGOs and societal interest groups.

Trans- or interdisciplinarity cannot be an end in itself. It is meant to achieve particular aims. The desired goals of common research projects across disciplinary divides generally are much broader than disciplinary defined designs. Because of the necessary integration of various disciplinary perspectives, a more profound scientific understanding of the phenomena under study is often expected from TD research. Moreover, TD projects generally involve the cooperation of nonacademic participants (*see Unity of Knowledge and Transdisciplinarity: Contexts of Definition, Theory and the New Discourse of Problem Solving; see Actor Participation and Knowledge Dissemination in Transdisciplinary Research; see Evaluation of Transdisciplinary Research*). Goals defined within such projects therefore often include an explicit reference to societal value. By consequence, the question of how TD research projects can be organized or managed in such a way that critical problems can be avoided becomes particularly salient. How and under what conditions can TD research projects be managed effectively? What tools can be used to manage research cooperation between practitioners from different disciplines and societal groups?

Although it is yet unclear whether the volume of TD research has increased substantively in recent years, a growing number of publications are drawing attention to this form of research. It has been observed that cooperative research efforts between disciplines have become more important for the knowledge process. Also, it has been observed that the interaction between academic researchers and nonacademic audiences has intensified in many domains. This has led Gibbons and others to argue that an essentially new mode of knowledge production is emerging. Arguably, this new mode of knowledge production distinguishes itself among other things by the TD nature of research practices. The so-called mode 2 thesis has found widespread approval, but has also generated criticism. This particularly concerns its lack of empirical evidence (*see Integrating Knowledge in*

*Technology Development*). Questions of how to organize and manage new and often TD forms of research, that is, have largely remained unanswered.

The success of TD research depends on the effective organization of research cooperation. This means that project management is particularly important to TD research. The management of larger projects, involving representatives from many different academic disciplines and societal interest groups, however, can encounter serious difficulties. There are three main problems that the management of TD research can run in to. These problems are of a (1) social and systemical, (2) communicative, and (3) cognitive nature. Although practical difficulties in these three domains will overlap in the actual practice of cooperative research, they are analytically distinct. It is important to recognize this since special management skills are necessary to prevent these problems from seriously disrupting TD research efforts.

### **1.1. Inter- and Transdisciplinarity as Concept and Practice**

The important question regarding TD research concerns the meaning of concepts such as inter- and transdisciplinarity. How do these concepts bear on the practical organization of cooperative research? How can inter- and transdisciplinary efforts meet the high expectations that often are connected to these forms of research? Empirical analyses can contribute to answering questions of what can be expected of TD programs, where their intellectual and practical boundaries are and what the social and scientific relevance of their results can be. These are very important topics both for future scientific management and for science policy. The importance of these questions is heightened by the fact that not much is known about the actual functioning of inter- and transdisciplinary research groups, let alone about ways to optimize their functioning. A particularly relevant question is how to structure and organize research projects in order to meet the specific requirements for both coordination and management. What these specific requirements are is an open question itself and remains to be determined. In many respects, possible guidelines for interdisciplinary cooperation still are a wish for the future.

There are many definitions of interdisciplinarity and transdisciplinarity (see *Unity of Knowledge and transdisciplinarity: Contexts of Definition, Theory and the New Discourse of Problem Solving*). These often rest on different approaches to cooperative research across traditional disciplinary boundaries. Interdisciplinarity is a form of scientific cooperation concerning contents and methods of research meant to produce the most relevant potential for problem solution and achieving cooperatively established targets. According to this definition, the form of research cooperation differs from case to case, depending on situational factors and their interrelation. Following this definition, situational factors are important determinants of the success or failure of interdisciplinary research projects. This implies that it is not possible to identify general management rules to actually support forms of interdisciplinary research management in practice.

Although there are many, sometimes competing, views on the nature of transdisciplinarity, most authors agree on the fact that specific tasks have to be solved to achieve an interdisciplinary integration that is more than merely an additive compilation of different perspectives. The latter can be labeled multidisciplinary or "patchwork interdisciplinarity." The important conceptual difference between "additive

multidisciplinarity" and interdisciplinarity is the extent to which disciplines are interrelated; may it be in formulating or in studying problems. In multidisciplinary research, a relatively high degree of independence of the disciplines can be assumed. An interdisciplinary perspective aiming at integration, in contrast, requires substantially more cooperation and management. Simple distinctions between trans-, inter-, and multidisciplinarity often are normative or judging in tone and regard multidisciplinarity as scientifically less advanced. Such distinctions, however, are one-sided. For certain types of research tasks, multidisciplinary forms of cooperation may indeed be very suitable.

## **1.2. Empirical Basis**

This article draws its empirical basis especially from the study of innovative research practices in three European Countries. These are Germany, Austria, and Switzerland. One part of the empirical data presented here derives from the D-A-CH questionnaire (D stands for Germany, A for Austria, and CH for Switzerland). In the third section, the empirical details referred to are drawn from two research programs. These are the German Program "Urban Ecology" and the Austrian Program "Cultural Landscape Research." These examples will be used to illustrate the many issues surrounding questions of the management of TD research projects.

In the D-A-CH questionnaire, 285 researchers from four research programs ( $n = 600$ ) completed a questionnaire dealing with their experiences in inter- and transdisciplinary work. The survey took place between the summer and autumn of 1999. The response rate averages around 47%. The written questionnaire contained questions on research management, leadership, and personal skills as well as on communication between research groups and forms of cooperation with experts from outside academia. The questionnaire also included three open questions concerning strengths and weaknesses of TD cooperation and additional suggestions for project organization. The participating programs were (i) "Urban Ecology" funded by the German Federal Ministry of Research in 1992; (ii) "Global Environmental Change—Social and Behavioral Dimensions," a German priority program funded by the Deutsche Forschungsgemeinschaft, the German Research Society, and established in 1995; (iii) the "Cultural Landscape Research," initiated by the Austrian Federal Ministry of Science and Transport in 1995; and (iv) the "Swiss Priority Program Environment," established by the Swiss Federal Parliament in 1991 and funded by the Swiss National Science Foundation.

## **1.3. Why Management?**

Empirical evidence from the D-A-CH questionnaire illustrates the importance and the need for specific forms of research management. Within the questionnaire, three open questions were posed concerning problems in cooperation and recommendations for the future planning of research. The following graphic shows the answers to the open question: which advice would you give for the planning of future TD projects? The participants could name up to six recommendations. In the analyses, all different statements were recorded and then grouped into eight different content areas.

The most important recommendation of the respondents was to formulate and stick to joint questions and goals in a TD project. This was mentioned 90 times. Directly followed by

this recommendation, mentioned 66 times by the respondents, was the advice to establish good management and moderation. Moderation here is to be understood in the sense of mediation, as, for example, mediating different points of view in a conflict situation. As the graphic shows, the importance of “management and moderation” was regarded as very high and ranged directly behind the necessity of “formulation joint questions/goals.” The need for management was among the most important and frequent recommendations derived from the answers of the members of the research teams.

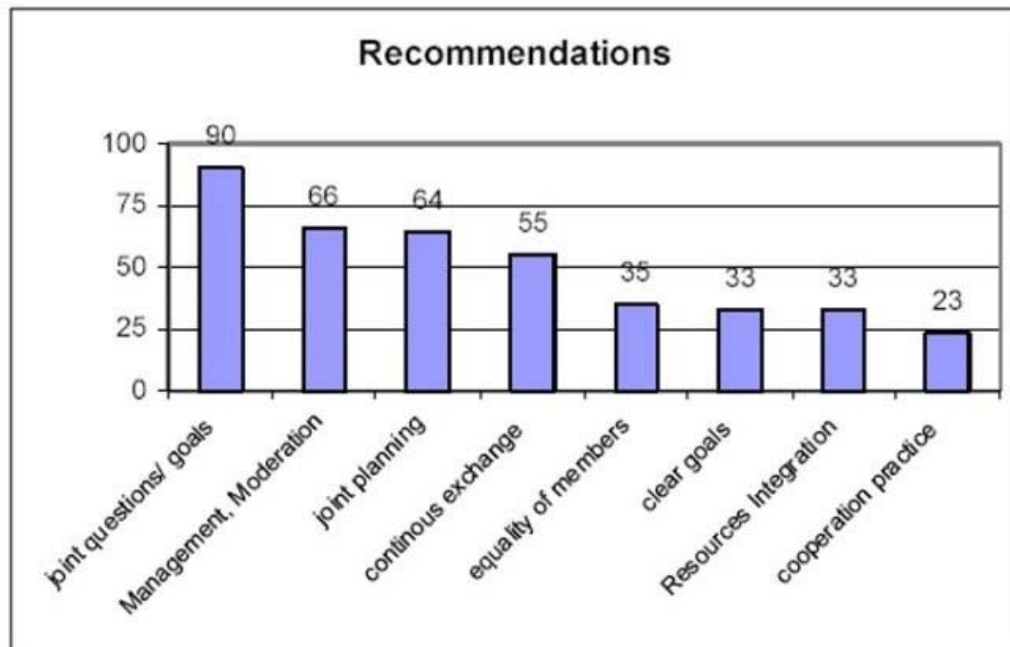


Figure 1. Recommendations for TD projects  
(Source: D-A-CH questionnaire)

“Joint planning” (64) was very important since this is also central to achieve “joint questions and goals” (90) as well as “clear goals” (33). The respondents further pointed out that “continuous exchange” (55) is a prerequisite for success, which again highlights the necessity of an active management of communication. Their recommendation to ensure the “equality of members” (35) shows that democratic forms of task division seem more appropriate than hierarchical settings. However, the latter recommendation was modified in the observation in the cases study on the German program "Urban Ecology." There it was found that groups with a hierarchical leadership style were successful in terms of completing joint research tasks. These recommendations show that careful planning and active management of communication and coordination are vital to the success of TD research. Interestingly, traditional scientific qualifications were not mentioned explicitly in the recommendations.

#### 1.4. Project Management vs. Project Leadership

A distinction between tasks and tools for either project leadership or management is useful when assessing the prospects and problems of successful TD management. Project

leadership and project management constitute two different forms of research guidance, which require various inputs from the side of those actually coordinating joint research efforts.

Project management in TD research implies that management occupies itself with organizing the communication between project partners—including the organization of meetings and the process of integrating research results. This form of research management further includes assuring that all parties involved in the TD project comply with the particular distribution of tasks which is agreed upon. Another important objective of project management consists of identifying reasonable time frames for the completion of specified tasks such as feasible deadlines for the publication of research results.

Being the project leader of a TD research project, in contrast, includes the responsibility to assure that the project is progressing properly. It does not necessarily mean, however, that the project leader is personally performing day-to-day management tasks. Management can be delegated or even be partly distributed among the team members as soon as resources, research aims, deadlines, and decision models have been identified and agreed upon.

There are three aspects of project leadership, however, that cannot be delegated and which remain with the project leader because they are *more* than a management job. These are (1) the overall responsibility of assuring that appropriate working methods, partnerships, and decision rules are applied in order to reach the research aims laid down in appropriate contracts; (2) the requirement of being able to represent and explain the entire project—even if it is very complex and includes many different partners; and (3) the responsibility to overcome periods of team destabilization and blockades due to scientific disagreement or personal frictions.

It is important to note that managerial support for TD research cannot just be provided by any person that may be qualified as a general manager. The management of a research project in many respects is different from that of a profit-oriented company or research laboratory. TD research is public-good research and this is something that research managers have to take into account when supervising cooperative research efforts. Different from a research and development project located within a profit-based firm, such as in the case of the pharmaceutical development of new drug substances, the results of TD research projects are not intended to be marketed exclusively. TD research involves societal stakeholders and its goals, therefore, generally include the publication of results. The outcomes of TD research, that is, normally are being made directly available to the public.

As Robert K. Merton has already observed, the functioning of the science system provides scientists with incentives to share their knowledge with others and to make their research results publicly available. From the point of view of science as a whole, the sharing and free flow of information within the science system is functional and as such prerequisite to producing scientific truths. Research and development in an industrial setting, on the other hand, is driven by other forces (see *Integrating Knowledge in Technology Development*). In the context of industrial research and development, management controls primary resources, notably money, as well as the distribution of research outcomes. This has a number of important consequences for the actual management of research efforts. The main

consequence is that, in public-good research, the management of a research project only partly controls the sort of incentives that researchers are confronted with. In industrial research and development, research eventually is driven by the need to realize profits through technological innovation. The firm can, for instance, seek a competitive advantage by developing a new product or by improving on existing ones. Researchers within such firms may be free in terms of their choice of particular research question and problem-solving strategies, but will have to demonstrate the value of their research efforts. The company's need to establish or maintain a certain market position through research-based innovation can go against the scientific norms of openness and the collective ownership of knowledge. This can, for instance, be the case when market considerations prompt firms to establish intellectual property rights in the form of patents.

Since TD research, on the other hand, is public-good research, money is but one incentive, or control mechanism, among others. Scientists have a double membership. They are members of a research group or a temporarily established project, and at the same time they are members of a (geographically dispersed) scientific community. TD management therefore, only partly can control resources relevant to the members of the research team. For that reason, TD research projects cannot be managed in the same way as research and development efforts within profit-oriented companies.

The next paragraph discusses problems in TD research in more detail. The problems of TD research management are classified along social-systemic, communication, and cognitive dimensions. The distinction between these main problem areas is used further on in the paper, in the third paragraph, to discuss the concrete challenges that research managers encounter in the day-to-day practice of TD research. This is further elaborated on in the fourth paragraph, where empirical evidence from two recent, comprehensive case studies is used to illustrate problems of TD research management. In the fifth paragraph, finally, future perspectives and challenges to the control and guidance of TD projects are discussed.

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### Biographical Sketches

**Kirsten Hollaender**, born 1966, is a sociologist. From 1995 to 2000, she was at the Research Institute for Sociology, University of Cologne. Her studies have included the program of Urban Ecology, funded by the German Ministry of Research (BMBF) and the theoretical bases of interdisciplinarity, interdisciplinary, and transdisciplinary cooperation. She is a member of the D-A-CH working group working on a comparison of the practices of four international transdisciplinary research programs and a member of the conference board for the first international Transdisciplinarity Conference, held February and March 2000 in Zurich. Currently working as freelance Research Consultant for the German Ministry of Research for the newly funded program on social-ecological research and development of the communication concept for internal and external communication. She is living in Amsterdam, the Netherlands.

**Marie Céline Loibl**, born 1959, is a geographer leading the planning department in the Austrian Institute for Applied Ecology, Vienna. Since 1995, she has been coordinator of the program Cultural Landscape Research, municipal strategies for sustainable environmental management, methodological advice for interdisciplinary research projects, and transdisciplinary cooperations.

**Arnold Wilts**, born 1965, is a sociologist. He is a lecturer in strategic management at the Department of Public Administration and Communication Sciences, Free University, Amsterdam. His research interests include the organization of scientific research, management issues in nonprofit organizations, and the role of expertise in public decision making.