

could signify, that evaluations of transdisciplinary research will have to include non-scientific criteria. Do we then have to leave the formulation of extra-scientific criteria to the market, to political representatives or to a public discourse?

Conclusion

Even if we would come to conclude that assessing transdisciplinary research is in the end a transdisciplinary task itself, it will always refer to professional skills and competencies. While there seems to be no easy way to avoid the arbitrariness of determining which is a better transdisciplinary project, there are manifold possibilities to analyse and monitor organizational features and qualities of cooperative research projects. Assessments of that kind, however, will provide at least valuable foundations for the professionalization of the field, which is a precondition for the success of transdisciplinary research in the long run.

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Resources

Coordination office “Mensch-Gesellschaft-Umwelt” (MGU), University of Basel:

www.unibas.ch/mgu/

Further information on transdisciplinarity: www.transdisciplinarity.ch/

Interfakultäre Koordinationsstelle Allgemeine Ökologie (IKAÖ), University of Berne:

www.ikaoe.unibe.ch/

Transdisciplinary case studies at ETH Zurich:

www.fallstudie.ethz.ch/ITdNet/itdnet_home.html

On inter- or transdisciplinarity: inherent handicaps and some solutions?

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Introduction

We live in the aftermath of extreme specialization in scientific branches and witness the revival of integration. Also, our image and credentials in society have sometimes dropped, whether we like it or not. The main reason is that society has to cope with complex problems and does not accept partial, e.g. technocratic, solutions from specialists for problems that require a broader scope, a more balanced decision-making process rooted in the desire to create sustainable solutions. Together with the division of science in disciplines and sub-disciplines the organization of visions on reality (in paradigms), research activities (programs) and researchers (in disciplinary communities) seem to have become conservative in its own. Centripetal forces dominate. Reasons are bureaucratic sluggishness and territorial behaviour, the prestige of specialists among colleagues and in the public opinion, psychological characteristics of researchers and the amount of time, money, energy needed for interdisciplinary ventures. Last but not least: integration is less easy than sometimes thought. It requires more abilities than analytical brightness and relies heavily on other skills and knowledge. New theories, concepts and methods are required. Some elaboration is given below, as well as suggestions to overcome or minimize some of the handicaps.

Handicaps: some underlying factors.

1. The organization of science in universities, research institutes, advisory councils, flows of money and criteria to give it to scientists often form a heritage

from many decades of specialization and branching of sciences. Even recently we sometimes experience a drop back in some universities returning to even more disciplinary boundaries than before (Wageningen University).

- II. The organization, availability and impact factors of scientific journals that are often highly specialized. Interdisciplinary research has less and less highly regarded media. As pointed out by Gary Fry (elsewhere in this publication) this perception is maybe not realistic, as many journals try to promote integrative studies and more and more journals on interdisciplinary studies are available. Maybe the scientists themselves are not yet able to produce good results.
- III. Social and psychological factors play a role unconsciously: how nice (and safe) it is to be among disciplinary fellows; it is easy and socially safe to be amongst members of the same church. Psychologically it feels comfortable being a specialist and experience that you are constantly updated instead of being amongst aliens that don't automatically regard your discipline as relevant or interesting?
- IV. Prestige in the world communities of specialists: you belong to the happy few of real specialists. You might even be asked to present your knowledge on television!
- V. Merit systems and criteria: formal personal, program or institute assessments (reviews, visitation procedures) on quality or output of scientific results and adherent consequences for salary or career. Who recognizes the omnivorous animal as the target species to be protected? Who is paying the ferryman, taking care of connecting scientific results back and forth between scientific domains?
- VI. The practical experiences in interdisciplinary projects: it consumes a lot of time to see what others do and why, to learn their languages, to experience the relative importance of your own profession. It consumes much time and energy to explain what your contribution could be, and quite often you have to be content with the relative anonymity in publications. When your last interdisciplinary projects have ended, it takes a lot to do all this again with new, inexperienced people.

- VII. In interactive processes (in a trans-disciplinary set up) cooperating with target groups, non-scientific people the above problems could be amplified. Some of these groups are not impressed by scientific theories or methods and jargon and not used to our sectarian way of reasoning and arguing.
- VIII. The management of inter- or trans-disciplinary research is by definition teamwork; it requires more social and managerial skills, whereas communication needs are much larger than working alone or in homogeneous groups. Many scientists are not equipped by nature or by training and education, nor inclined to invest time or energy in these non-scientific activities.
- IX. Let's admit that interdisciplinarity, ultimately targeted at dealing with complex problems and a set of conflicting expectations of target groups with strongly varying perspectives and values, is hard work. How can ecologists and economists find a level that they understand and respect each others visions and findings and cook a meal out of very differing ingredients that is digestible for a decision maker. Can we manage different paradigms, theories, concepts, and methods? Maybe we have to design new, overarching concepts. Have we been successful so far?

Can we solve some of our handicaps or at least lessen the pain?

Referring to the above we suggest some recommendations that improve the situation

Problem definition

Articulation of problems and questions: nothing works like an explicit definition of the problem, so that goals, expectations are clear, stimulating and shared by participants.

Organization

- I. Re-organization of the scientific communities: of course this can help; either by a drastic reshuffling or by other means: why not launch a special group or small institute dealing with complexity from an interdisciplinary approach

- II. Reorganization of financing structures and criteria: Insofar research programs, review systems (ante), review criteria promote disciplinary approaches rather than integrated approaches, this system can be re-focused. Also ex – post reviews could be adjusted as well as merit systems for programmes, project, individual researchers, groups or complete institutes
- III. Promote horizontal mobility of researchers: Exchange of researchers, especially aimed at creating synergy between disciplines could help. The crucial condition is that they work on clear problems and that their contribution is felt necessary

Content

- I. Invest in common language, theory, unifying concepts: This is a neglected part of research; for reasons of uncertainty, time or money researchers are inclined to choose for their own, proven methods or concepts and definitions, instead of discussing their meaning and the compatibility in interdisciplinary processes. The role of language cannot be overestimated in communicating among scientist, to communicate with stakeholders, to present results. Experiences show that long-term misunderstandings between scientists can remain for a too long time during research projects, causing inefficiency, loss of time, money and good humour. A deliberate choice or new design of (unifying) concepts is often a sine qua non.
- II. Change scientific evaluation criteria in a sense that added value of integration theories, concepts, methods or applicability of results are recognized.
- III. However, do a better job as well, deliver quality and show it: what failures were avoided by your research, what were the profits?

Teambuilding and team processes

- I. Studying complexity in inter- or trans-disciplinary teams requires knowledge of your own system characteristics: what makes a team a team, what are the favourable stars to be born under ? Do we know the tricks to develop a good and efficient team-process?

- II. Try to build upon experiences and good chemistry: organize continuity
- III. Analyse successes and failures: from both you can learn!
- IV. Recognize the role of leadership which is something else than appointing the smartest or oldest of disciplinarians
- V. Invest in training and raising scientific and societal consciousness (paradigms, languages, cultural differences, basics in communications, the processes within teams, applicability of results) in all stages of academic studies and on-the-job training

Various

- I. Launch a new magazine if necessary, try to convince existing ones that integrative research could be interesting to show the role of disciplinary fields in a broader context
- II. Don't forget: make it fun!
- III. Do not complain, do!

Conclusion

