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SWISS PRIORITY PROGRAMME
ENVIRONMENT
Swiss National Science Foundation
Newsletter



**Evaluation Criteria for
Inter and Trans-
disciplinary Research:**

Project Report

Instrument



Interdisciplinary Center
for General Ecology (IKAÖ),
University of Berne,
Switzerland

Evaluating Transdisciplinary Research

Editorial	Page	3
Introduction	Page	3
Please share your experiences with us!	Page	4
Project Report	Page	5
The Task – Our Approach – The Procedure – The Results – Interesting Ideas and Notes from the Consultation of Experts – Outlook: The Dissemination of the Proposal – Addresses of the Project Team and of the Monitoring Group		
Bibliography, Other Documents	Page	12
Instrument – Evaluation Criteria for Inter and Transdisciplinary Research		
Explanations	Page	13
Evaluation Sequence (Table)	Page	17
Catalogs of Criteria:		
Evaluation of Research Proposal (ex ante) – Overarching Project	Page	18
Evaluation of Research Proposal (ex ante) – Sub-Project	Page	20
Notes on Intermediary Evaluations	Page	22
Final Evaluation (ex post) – Overarching Project	Page	24
Final Evaluation (ex post) – Sub-Project	Page	26

Editorial

Research support by the Swiss National Science Foundation (SNSF) has always been competitive and publicly accountable. Similarly there is an international consensus that competitive and peer-reviewed research support is the most effective available. Appropriate procedures for the evaluation of proposals and the productivity and effectiveness of researchers include the traditional quantitative measures of numbers of peer-reviewed article publications and the citation index.

For the evaluation of project proposals in oriented research, however, an expanded set of criteria, which go beyond narrow disciplinary qualifications, are needed. In the case of the Swiss Priority Programme Environment (SPPE) several additional criteria were required. First, the proposals have to be examined with respect to their coherence with the original goals defined in the request for proposals. A new element is the evaluation of requirements for interdisciplinarity (natural, social, engineering, medical sciences and humanities) and for transdisciplinarity (participation of addressees and users of expected research results).

Experience in our SPPE with external peer-reviews and evaluation procedures within the expert group has shown that such expanded evaluation

criteria, which were not readily available, first had to be developed and implemented. Accordingly, criticism in the initial phase of the SPPE was mainly levelled against recommendations involving such not strictly disciplinary criteria.

The expert group in its deliberations has continuously worked on the development of these additional evaluation criteria. Starting from a wide array of opinions and possible approaches, through intense debate and continuous discussions, a group consensus has gradually developed over several years. The recognition that this occurred in an empirical way and that the catalog of questions to be addressed expanded continuously, led to the proposal of a systematic survey and treatment of the problems and methods of evaluation of transdisciplinary research proposals and projects. Interest in such a project also was expressed by the administrators at the SNSF, who wanted to learn and profit from the experience gained within the SPPE in view of the upcoming evaluations for the planned new initiative for National Centres of Competence in Research.

The authors of the commissioned study, Rico Defila and Antonietta Di Giulio, present their results in the current special issue of «Panorama» to a wider audience. The goal of publicising the study now is to promote a wider discussion of the issues involved.

Towards this goal, the following personal questions and remarks relating to my own experience with the SPPE are added. Why did the authors limit their evaluation catalogues to qualitative criteria? Would it not be useful to have quantitative criteria for comparisons between competing project proposals or for the evaluation of an entire program such as the SPPE in comparison to other oriented research programs or to the traditional basic research funding programs of the SNSF?

Could such a comparison not provide the evidence that the efforts and expenditures incurred within SPPE for planning, coordinating and managing research, and for synthesizing and implementing the results have indeed been worthwhile and have not only led to a lot of «frictional heat» but to quantifiable surplus value results not obtained and obtainable with the traditional research programs? The results of the study presented in this special issue of «Panorama» are a first and important step towards that goal. ♦



Hans R. Thiele

Introduction

The SPP Environment Group of Experts asked us to elaborate a proposal on how, and according to what criteria, interdisciplinary and transdisciplinary research projects may be suitably evaluated. We were happy to accept, and carried out the task in close cooperation with the SPP Environment Program Management and the SNSF secretariat responsible for the Swiss Priority Programs.

In our view it is impossible to lay down once and for all how interdisciplinary and transdisciplinary research should be evaluated; as with research

in general, any such evaluation must be adapted to basic conditions, objectives and needs relevant in particular cases. We therefore decided to assign a modular conception to our proposal, with various units designed for adaptation to the specific situation and features of, for instance, a research program. The modular structure is also intended to serve as the basis for discussing and establishing the methods and criteria to be applied in practice.

The result of our work is printed in this special issue of Panorama, in which we present a work report describing procedures and our approach, and the

instrument for evaluating interdisciplinary and transdisciplinary research itself, in the form of various complementary documents. Certain parts of the report and proposal are redundant: the instrument is intended for use on its own, without further reference to the report. Thus the proposal itself repeats a certain amount already contained within the report.

We hope that this instrument proves to be a useful «evaluative tool», and would welcome any feedback on your experience of working with it. ♦

Rico Defila and Antonietta Di Giulio



Send this coupon to
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Fax ++41 (0)31 631 87 33

IKAÖ / Project Evaluation Criteria
Falkenplatz 16
3012 Bern, Switzerland

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... the «Evaluation Sequence (Table)»:

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... the Catalogs of Criteria, «Evaluation of Research Proposal»:

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... the «Notes on Intermediary Evaluation»:

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... the Catalogs of Criteria, «Final Evaluation»:

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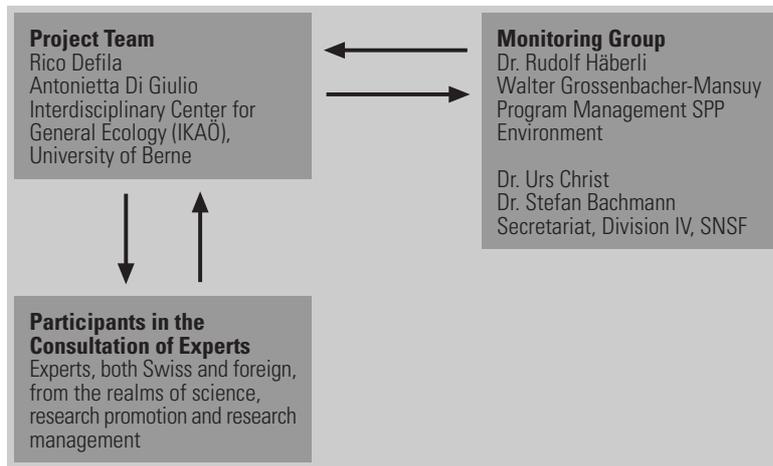
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The Task

The issue of adequate evaluation of inter and transdisciplinary research has gained in significance in recent years, in Switzerland particularly as regards the Swiss Priority Programs (SPP) and the National Centers of Competence in Research (NCCR). Since the earliest days of activity, the Expert Group of the Swiss Priority Programme Environment (SPP Environment) of the Swiss National Science Foundation (SNSF) has been concerned with this issue. In June 1998, the Group asked Rico Defila and Antonietta Di Giulio from the Interdisciplinary Center for General Ecology (IKAÖ) of the University of Berne, to draw up a Catalog of Criteria for the Evaluation of Inter and Transdisciplinary Projects – in close cooperation with the Secretariat of the SPP at the SNSF, and with the Program Management of SPP Environment. While this project is a part of the final work of SPP Environment, it also served as an instrument during the preliminary work of the National Centers of Competence in Research (NCCR) in 1999. Rather than being a theoretical discussion of issues regarding the evaluation of inter and transdisciplinary research, the aim of this project has been to suggest procedures for actual, practical use. The present report will therefore outline the theoretical basis for and development of the Proposal, which is presented in brief, as well as some interesting ideas which resulted from a consultation of experts but were not integrated in the Proposal. Finally, the section Outlook focuses on the dissemination of the Proposal.

Our Approach

Evaluation

In research as elsewhere, evaluation generally means target performance comparison. The evaluation of research encompasses various criteria ranging from quality control (e.g., in deciding which projects to support) to quality enhancement, i.e., by coaching. Any evaluation therefore has a certain aim and there must be consequences, both if the target has or has not been reached. In quality enhancement, any evaluation needs to contain suggestions on how to reach this target.

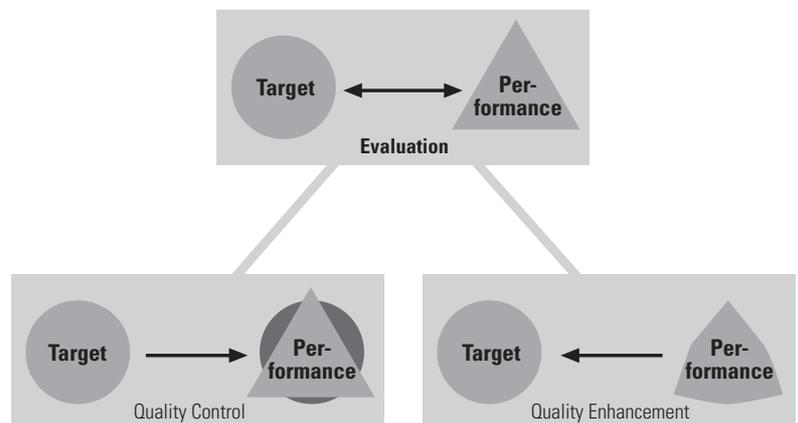
meaningful; there can and should always be an element of self-evaluation by the scientists involved, be that for their own benefit or for a third party. A research project invariably encompasses various aspects whose evaluation can be entrusted to various people.

For ethical reasons it is imperative for the process to be transparent. The evaluatees must be informed from the outset of the criteria and consequences, of the procedure, and of who is in charge of which part of the evaluation.

The following must, therefore, be determined:

- how the evaluation is to proceed;
- the aim of any evaluation;
- the respective target, and the evaluation criteria;
- the consequences if the target has or has not been reached;
- the identity of those who carry out the target performance comparison.

In research, planning down to the least detail is impossible. Any research evaluation therefore needs to have a certain degree of flexibility. Moreover, when defining the target, it makes sense from the outset to ensure adequate participation of those



Evaluation means the comparison of a target with actual performance. While Quality Control compares performance and target, the aim of Quality Enhancement is to minimize the difference between the two states.

Research evaluation can be carried out by various kinds of people, such as experts in various disciplines, secretariats of institutions promoting research (or of research programs), practitioners, or experts in organisational development. However, external evaluations are not always necessary nor

concerned in the course of the evaluation.

Inter and Transdisciplinary Research

The evaluation of inter and transdisciplinary research requires adequate consideration of the characteristics of

this kind of research in the evaluation; these characteristics, therefore, need to be recorded in a requirement profile and to be operationalised for evaluation.

guage. Therefore, consensus is here not intended to mean agreement or authorisation, as in everyday language, but denotes the integration of various disciplinary viewpoints to achieve a common ground. For ex-

held in common. The aim, therefore, is to achieve shared results and products.

- Diffusion: The results require adequate publication, and their reception with the target audience needs to be promoted. Usually, this audience will be neither disciplinary nor purely scientific, just as the channels of dissemination will often be non-disciplinary. The knowledge gained will need to be useful to the target audience and their actions.
- It will be necessary, especially in transdisciplinary research, to ensure from the outset the adequate participation of users in the project and research work.
- In problem-oriented research, both the problem needing to be resolved and the contribution expected from the research work has to be presented.
- Cooperation in such a project group needs to be structured, and the processes of consensus building and integration also need to be stimulated, moderated and monitored. Special management is therefore required.
- There is also the problem of the so-called «surplus value» of inter and transdisciplinary research: this val-

«In any case, care should be taken to avoid the hampering of research activities by any evaluation, especially in the course of the project.» *)

«Interdisciplinary research» here denotes the integration-oriented cooperation of scientists from at least two disciplines with the aim to reach common objectives, thereby merging the sundry disciplinary viewpoints into a greater, more complete view. The disciplines involved are those likely to make a useful contribution to the treatment of a theme. «Transdisciplinary research», in turn, denotes a special form of interdisciplinary research involving practitioners from beyond the realm of science. The premise, moreover, is problem-oriented research, i.e., research intended to make a contribution towards the solution (and prevention) of socially relevant issues.

The following are some of the special characteristics of inter and transdisciplinary research in the sense of a requirement profile:

- Inter and transdisciplinary research is usually carried out in project groups uniting various sub-projects, or research groups in an overarching project. Individual contributions toward the overarching project need to be identified.
- Consensus: The participants need to agree upon common objectives and questions, and upon a shared approach to dealing with them; they need to arrive at both a shared view of the problem, and a common lan-

ample, a description of the research subject that is equally valid for all will have to be found. Appropriate procedures and methods need to be used to achieve consensus.

- Integration: It is necessary from the outset to combine, by adequate



Dissemination of results – not only among scientists, but also among the general public

means and methods, the results of the individual sub-projects (or research groups) to form a whole that goes beyond a simple addition of the individual results, and one that aims at answering the questions

we can actually be assessed only in a direct comparison of disciplinary and inter/transdisciplinary research projects dealing with the same question – which, for obvious reasons, is not feasible. The task,

*) Voices from the Consultation of Experts

therefore, is to ascertain the extent to which an inter or transdisciplinary approach to the research subject is justified or even necessary, by demonstrating, for example, that a disciplinary treatment of the subject has not been successful.

- Of course, inter and transdisciplinary research must be scientific. It should be noted, however, that the sub-projects (or research groups) of such a project group may not always be at the cutting edge of disciplinary and specialised research.

The Procedure

On the basis of the theory outlined above, the Team consulted selected literature on research evaluation, and existing or proposed procedures and criteria for the evaluation of research

- agement, SPP Environment, Swiss National Science Foundation (SNSF);
- Dr. Stefan Bachmann, SPP Environment, and Dr. Urs Christ, SPP De-

experts from the realms of science, research promotion and research management were invited to comment. They were

«How should transdisciplinary «surplus value» be assessed?

This issue remains unresolved.»

– both disciplinary and inter/transdisciplinary (see p. 12), always keeping in mind the pragmatic objective of this project, i.e. the drafting of a proposal for the actual evaluation of inter and transdisciplinary research. The point, then, has not been to present a scientific discussion of issues of research evaluation in general, or inter and transdisciplinary research in particular.

The present Proposal, «Evaluation Criteria for Inter and Transdisciplinary Research», was drawn up by the authors (Project Team) in a continuous dialogue with a Monitoring Group consisting of the following representatives (see also box p. 11):

- Dr. Rudolf Häberli and Walter Grosenbacher-Mansuy, Program Man-

«Usually, the demands placed on leadership in an interdisciplinary research project are completely underestimated.»

main la Suisse/Switzerland: Towards the Future, Secretariat, Division IV, NSF.

The Monitoring Group ensured the inclusion in this Proposal of practical experience from evaluating inter and transdisciplinary research, thereby ensuring that the result would consider the needs of those ultimately intended to use the instrument. They have also been essential in the adoption of our Proposal in NSF procedures. We would like to take this opportunity to express our sincere thanks to the members of the Monitoring Group for their invaluable cooperation on this project.

- scientists whose work will be evaluated, and those acting as reviewers;
- managers of project groups or research programs;
- scientists concerned with the theory of inter and transdisciplinary research, and those doing accompanying research;
- people actively involved in tertiary education and science policy, and those working in interdisciplinary institutions in the tertiary educational sector.

There were 40 responses to our consultation of experts, some of them with extensive comments. The results of this consultation as well as a list of the respondents can be found in the

«The timing and number of evaluations need to be handled with flexibility and regard to each specific project.»

In order to integrate as much experience from inter and transdisciplinary research and its evaluation, the first draft of this Proposal was submitted for criticism to a panel of experts in Switzerland and abroad. Approx. 100

German version of this Special Issue (http://ikaowwww.unibe.ch/dokus/Sondernummer_Pano_1=99.pdf). Some particularly interesting suggestions which, for methodological reasons, could not be integrated into our

Proposal will be presented briefly further on. The consultation had a significant impact on the outcome of our Proposal, and we would like to extend our sincere thanks to everyone who contributed to our project in this way.

The Results

The following is a brief overview of the Proposal, «Evaluation Criteria for Inter and Transdisciplinary Research». It consists of a set of documents which, with a few adaptations, can be used for the evaluation of various types of inter and transdisciplinary research. The set consists of the following documents:

1. Explanations
2. Evaluation Sequence (Table)
3. Catalogs of Criteria

Explanations

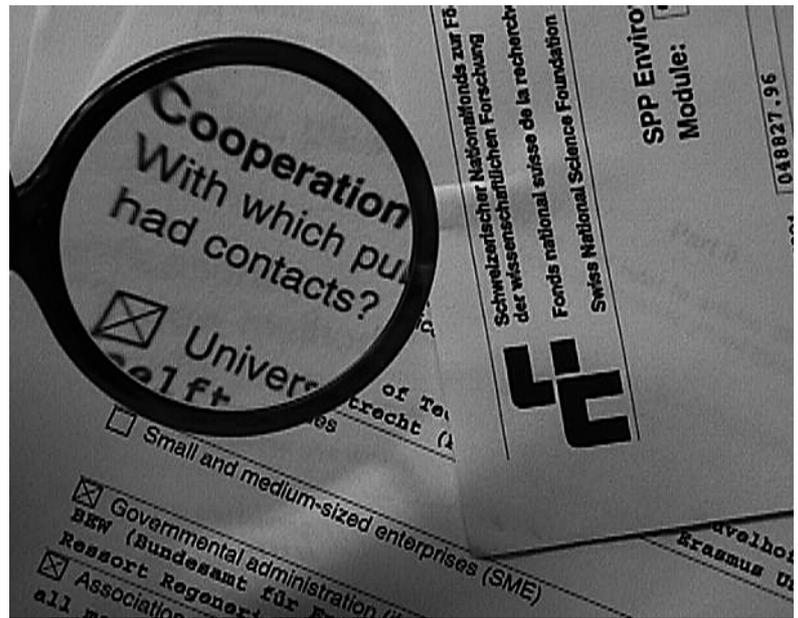
The explanations outline the theoretical basis of the Proposal; moreover, some of the terms used in the catalogs of criteria are defined. In particular, it is explained what will need to be defined in the event of an evaluation (e.g., for a specific research program), and how to adapt and use these catalogs.

Evaluation Sequence (Table)

This table gives an overview of the Evaluation Sequence in its various stages, assuming a research program

as well as an impact evaluation (the impact of research on science and society). Specific objectives set for

Evaluating the impact of a program has been adopted for the sake of completeness without making any further



Intermediary evaluations – assessment should focus upon selected aspects

each evaluation, and possible consequences have been outlined (i.e., sanctions as an example for possible consequences). It is also suggested that not all aspects of a research project should be assessed in each evaluation; the table shows which aspects should be focused upon at which stage.

The number of evaluations to be carried out in any specific research program, and the time at which they should take place will need to be determined for each program, taking into account its particular parameters and requirements. Likewise, possible consequences to the evaluation will need to be stated at the outset of any evaluation. Although peer reviewing has been assumed to be the most likely procedure, the question of who is in charge of which aspect has not been resolved; this, too, will need to be determined for each individual research program.

No suggestions have been made for the basis of the evaluation, i.e., whether it should be based upon reports, interviews, site visits, etc.: this will need to be determined for each specific research program, taking into account its particular parameters.

suggestions as regards the actual procedure or criteria, etc. It should also

«I think training of the evaluators by the research promoting organisation will be required.»

running approximately four years. The process involves an evaluation of the research proposal, followed by three intermediary and one final evaluation,

«In view of the various intermediary evaluations it is important to avoid a mentality of scrambling to fulfill the plan in the projects.»

be pointed out that, for the vast majority of the projects, impact assessment

at three to five years after completion will probably come rather too early since the impact of research work often manifests itself only after ten years or more.

Catalogs of Criteria

The criteria to be used at the different stages of the evaluation have been formulated as questions. An attempt has been made to draw up a comprehensive questionnaire to encompass the characteristics of inter and transdisciplinary research that readily manifest themselves to the outside observer. The questions can be used both in self-evaluation and in external evaluations, in coaching as well as in assessments. The vast majority of these questions are neither quantified

such a project group. These catalogs have been harmonized and are complementary. (For example, it is possi-

mediary evaluations, some suggestions have been made on how to develop catalogs of criteria on the basis

«I don't think there is a general rule as regards «a sufficient number of publications, etc.»

ble to assess whether the objectives of the project group are «shared» or «common» ones, i.e., whether everyone involved is willing and able to

of the evaluation of the research proposal and/or the final evaluation.

In the event of an evaluation, the questions suitable for the evaluation of the respective research program will have to be selected from these catalogs, and suitable catalogs will have to be drawn up for the intermediary evaluations. The flexibility required in evaluating research should become particularly evident in the intermediary evaluations; for example, it should be possible to adapt the research objectives and questions as well as the desired products to changing parameters. The quantifiable criteria have been kept intentionally open in the Proposal («a sufficient number»); they will have to be determined in the actual event. The scientists will also need to participate in the selection and definition of the criteria, one possible result of this activity being an agreement defining the respective obligations of the scientists and the research promoting institution. In the event of an actual evaluation, the criteria also need to be identified for which the evaluators will have to justify their assessments.

Finally, it must be pointed out that this Proposal is based upon the assumption that the individual sub-projects or research groups within a project group may again be inter or transdisciplinary. However, this will not always be the case and the questions have been formulated in such a way that they can also apply to disciplinary sub-projects or research groups.



To be determined for each program: how much is enough?

nor quantifiable; the reviewers' judgment is required.

Catalogs of criteria were developed both for the evaluation of a project group as well as for that of sub-projects, or research groups within

reach them: if so, this should become evident both from the design of the sub-projects and the structure of the overarching project.) Only the catalogs for the evaluation of the proposal and for the final evaluation have been drawn up in detail. As regards inter-

Interesting Ideas and Notes from the Consultation of Experts

The following is a selection of suggestions and notes taken from the consultation of experts, which were not adopted in this Proposal.

On high demands, and their funding: The demands placed on scientists wishing to draw up a research propos-

the scientists themselves. One possibility for the scientists' participation would be the evaluation of the sub-projects by the management of a project group prior to submission of the research proposal. Another possibility would be a joint internal evaluation by the scientists on the sub-projects (or research groups) with the management, which, however, places particularly high demands on the management's social competence. A fur-

On the unpredictability of external participants: It must be remembered that, while external participants can be contracted to make a specific contribution to a research project, ultimately these outsiders cannot be forced to make that contribution. Moreover, while it may be possible to schedule this contribution, it may be impossible to manage it at all times, which may lead to the required contribution not being made.

«Obviously, the energy required for this type of evaluation has increased over the past years – this must be made clear when recruiting experts.»

al for an inter or transdisciplinary project are very high, not only as regards quality, but especially as regards the resources required in the early stages of designing the proposal. Such high demands can only be made if the required time and funding have been budgeted. Sufficient funds also have to be earmarked for the special demands of inter and transdisciplinary research projects (e.g., achieving synthesis).

On the selection of evaluators:

Potential evaluators should be recruited not just from among the traditional actors. Especially in inter and transdisciplinary research it is essential for the evaluation of specific aspects to be entrusted to individuals competent in the relevant field, e.g., issues of project management should be evaluated by experts in organisational development, issues of scientific quality by scientists, issues of social relevance and the description of societal problems by practitioners.

On self-evaluation and valuee participation: Adequate relevance must be accorded to self-evaluation by

ther possibility would be for each sub-project participating in the proposal to identify three criteria on which assessment should be carried out.

On taking risks vs. securing success:

To make predictions of success is highly problematic as this might

On the unpredictability of product orientation: As regards product orientation of research, a certain degree of caution needs to be exercised: while it is possible to conceptually develop and target products, their actual realisation and market acceptance often depends upon parameters beyond the scientists' sphere of influence.

On the problem of overall assessments and of quantitative criteria:

While overall assessments are meaningful and necessary, there is a risk of the assessment of the individual criteria being swept under the carpet in the final analysis. This needs to be avoided. As regards quantitative criteria («a sufficient number», etc.) the fact needs to be remembered that such criteria may result in quantity being given primacy over quality. Moreover, it is usually impossible to determine the desirable number of papers, lectures and seminars, etc., in advance; this is more appropriately

«Depending on the desired product, the researchers may find it to be incomparably less manageable and controllable than publications.»

lead to risky projects being systematically excluded. This would be regrettable since risky projects often have a high innovative potential and should therefore be admitted to research funding.

done in the course of negotiations, once the project is underway. Finally, the fact needs to be borne in mind that the number of publications tends to depend upon parameters beyond the scientists' control.

On the consequences of the final evaluation: While it is usually quite simple to determine the consequences of evaluations of proposals and intermediary evaluations, it is more difficult to do so as regards the final evaluation. One possibility would be to authorise the payment of a final, additional sum, subject to certain condi-

and of those in charge of the National Centers of Competence in Research (NCCR), work on the Report has come to a formal conclusion. Apart from the SNSF, the primary audience of the Proposal, «Evaluation Criteria for Inter and Transdisciplinary Research», are other institutions of research promotion, both public and private, both in

been expressed for the results to be published so as to be available to anyone interested and for this Proposal to be tested, discussed and developed further subsequent to practical implementation.

The Project Team is therefore very happy with the decision taken by the management of SPP Environment to publish the present Report as a Special Issue of Panorama, not only in German, but in English as well. The Team will also ensure the dissemination of the Report on other occasions for discussion by a larger audience from the realms of science and science policy. Among other things, the Report is on the WWW (http://ikaoewww.unibe.ch/top_forsch.html) – also enabling the publication on the Web of feedback on implementation. The Team hopes to have made a small contribution towards the discussion of a meaningful evaluation of inter and transdisciplinary research. ♦

«The criteria read like guidelines for the design of inter and transdisciplinary research projects.»

tions, in order to ensure, for example, the completion of certain implementation work.

On accompanying research vs. evaluation: Research on the program itself is called for if the aim is to observe the functioning of research processes in a research program, and to identify suitable methods of integration, or cooperation with users, etc. Evaluation of research cannot replace accompanying research because an evaluation always considers only a slice of the research process, that is, process results rather than the processes as such.

On program evaluation: It remains unclear, how and by whom an entire research program would best be evaluated. One possibility could be to ask questions during the final evaluation (or even when evaluating impact) that would be aimed at a program evaluation. One such question could be whether the research results might jeopardise the objectives of the research program.

Outlook – the Dissemination of the Proposal

Now that the Project Report has been handed to the Swiss National Science Foundation, for the attention of the Group of Experts of SPP Environment,

Switzerland and abroad. Moreover, especially those who have already been involved in the consultation of experts, as well as the scientists themselves are also interested in the results. The Project Team picked up signals to this effect, both when conducting the consultation and when presenting their project. A desire has

Addresses of the Project Team and of the Monitoring Group

Project Team

Rico Defila / Antonietta Di Giulio
University of Berne
Interdisciplinary Center for General Ecology (IKAÖ)
Falkenplatz 16
3012 Bern, Switzerland
defila@ikaoe.unibe.ch
digiulio@ikaoe.unibe.ch

Monitoring Group

Dr. Rudolf Häberli / Walter Grossenbacher-Mansuy
SPP Environment
Länggassstr. 23
3012 Bern, Switzerland

Dr. Urs Christ / Dr. Stefan Bachmann
Swiss National Science Foundation
SPP Secretariat
Wildhainweg 20
3001 Bern, Switzerland

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Explanations

In the following, the parameters guiding the project will be outlined, as well as the procedure to follow in any evaluation, and explanations are given as to how the catalogs of criteria should be used and adapted. Moreover, some terms, such as «interdisciplinary research», «transdisciplinary research», «external participants», «consensus» or «product», will be defined (see boxes).

What is the philosophy underlying this Proposal?

The philosophy underlying this Proposal on the evaluation of inter and transdisciplinary research is that of classic LEGO: we would like to put at your disposal the greatest possible number of building blocks to «construct» a meaningful evaluation of your research program.

Principles

Evaluation is used here in a very wide sense encompassing assessment and controlling as well as monitoring in the sense of coaching; it comprises both self-evaluation and external evaluation. These various forms of evaluation are not differentiated further; this will have to be done for each specific research program.

Transparency: Both the participants in an evaluation and the evaluatees themselves must from the outset be informed of the evaluation criteria (for example, the evaluation criteria could be integrated into the program call). If criteria were not pre-defined but are to be defined together with the scientists, it must be clear from the start which ones they are and how they will be defined.

The premise in the development of evaluation criteria was that of **oriented inter and transdisciplinary research**, i.e., research informed by pre-existing societal issues, and in-

tended to make a contribution towards their solution. It comprises both fundamental and applied research.

If the evaluation criteria are to be applied to **free interdisciplinary research**, i.e., interdisciplinary research not carried out in the context of oriented research, and therefore not necessarily informed by societal issues, the criteria need to be adapted accordingly. This is especially true for the evaluation of objectives and questions, or results and products, as well as transfer of knowledge and technology (for example, «Presentation of the societal problem» could be reworded as «Presentation of the scientific/technical problem»; also, in this case, the section «Involvement of users and external participants» might be omitted.

The basic premise is for the research under scrutiny to be structured as follows: an **overarching project** uniting various **sub-projects** (or similar, e.g., research groups). Sub-projects may be disciplinary, inter or transdisciplinary. The object of evaluation is always both the overarching project and the individual sub-projects. Catalogs of criteria, which have been harmonized and are complementary, are therefore presented for both categories. In particular, it is possible to assess whether the justification for sub-projects (or research groups) results from the overarching project, and whether they are oriented towards it. In order to examine «minimal disciplinary requirements» in the case of interdisciplinary sub-projects, these projects will have to be divided up and ascribed to their respective disciplines. Whether certain disciplines are missing from an overarching project will be determined by examining whether any sub-projects required to reach the objectives of the overarching project are missing.

The evaluation criteria have been **formulated as questions**. The suggested catalogs of criteria are an attempt at presenting a comprehensive questionnaire to evaluate those characteristics of inter and transdisciplinary research that readily manifest themselves to the outside viewer.

One unresolved issue is that of assessing the so-called **«surplus**

value» of an inter or transdisciplinary project. Strictly speaking, this can only be done in direct comparison with a disciplinary project focused on the same subject. One possible solution could be to assess the justification for an inter or transdisciplinary study at the beginning of the project (ex ante), and to examine at its conclusion (ex post) whether this approach has been a success.

The present proposal is essentially based upon the **peer review** principle, which is considered appropriate also for the evaluation of inter and transdisciplinary research. Most issues to be assessed are unquantifiable and will therefore require the reviewers' judgment. Accordingly, a mechanistic view of evaluation, in the sense that the assessment of each criterion should always be the same, irrespective of the person carrying out the evaluation, has been rejected as being unrealistic.

Inter and Transdisciplinary Research:

Interdisciplinary research here denotes the integration-oriented cooperation of scientists from at least two disciplines with the aim to work on common questions and the achievement of shared results.

Transdisciplinary research, in turn, here denotes interdisciplinary cooperation, involving not only scientists but also practitioners from beyond the realm of science (e.g., the users) in the research work.

Documents:

- Explanations
- Evaluation Sequence (Table)
- Catalogs of criteria

What will be evaluated at what stage?

The following **sequence** is suggested:

The evaluation of the research proposal should soon be followed by the first intermediary evaluation; about half-way through the project, the second intermediary evaluation should take place, and the third intermediary evaluation towards the completion of the project. After completion, the final evaluation should be carried out, and impact should be assessed several years later.

Each one of these evaluations has a specific objective:

Evaluation of research proposal

(ex ante): evaluate the selection of projects to be granted.

First intermediary evaluation: assess whether the projects are operative, i.e., whether work has begun, and whether the planned steps are being taken.

Second intermediary evaluation:

assess whether the projects are productive, i.e., whether the research schedules can be kept, and what changes might result as regards their objectives and questions.

Third intermediary evaluation:

assess whether there will be an output from the projects, i.e., whether their objectives will be reached, and the diffusion of results is well on the way.

Final evaluation (ex post): assess

whether the projects have been successful and their objectives have been reached.

Impact: Assess whether the research work has produced any/the desired effects.

Depending on the actual objective of the evaluation the **focus is on specific aspects** while other aspects are excluded from evaluation. Basically, any specific aspect should only be assessed in depth once in the course of a project. This is especially true for the three intermediary evaluations, which are complementary. The table «Evaluation Sequence» gives an overview of the various evaluation stages and their focal points.

In the course of the evaluation a certain **shift of emphasis** will occur.

The aspect «Scientific quality», for example, will be virtually irrelevant in the final evaluation, because this aspect will now express itself chiefly in results, products, publications, etc., where it can be evaluated. Likewise the aspect of «Integration/Synthesis»: if these processes were successful, joint results and products can be presented, if not, they will be absent. Hence, it is unnecessary to evaluate this aspect specially.

The present study is based upon the assumption that a project will run for a total of four years. If the duration is longer or shorter, the Evaluation Sequence will have to be adapted as regards both the number and the timing of evaluations, especially concerning the suggested intermediary evaluations (e.g., by combining the second and third ones). The **number of evaluations and their timing** will

Results, Products:

The term **results** denotes the outcome of the research process.

The term **product** denotes all those things specially developed and designed for users (such as manuals, apparatuses, courses, programs, itinerary exhibitions, analytical kits, etc.); their foremost characteristic being their practical usability. Papers and the like, intended exclusively for the dissemination of results, are not part of the term «product» but evaluated separately.

generally have to be adapted to the requirements and parameters of a specific research program. To improve the overall quality of proposals, for example, it might be useful to insert an evaluation prior to the actual evaluation of the research proposal (evaluation of project outlines), or to evaluate the research proposal in two stages. For a particular program it may also make sense to stagger the various parts of the final evaluation.

Ideally, the **impact** of research – i.e., whether the work carried out is having any/the desired effect on science and society, and whether the results and products have been accepted and adopted – should be studied approximately no earlier than three to five years after conclusion of the research project. No criteria for impact evaluation were formulated for the present catalog; impact has been added to the table for the sake of completeness. Caution is required in assessing impact both as regards timing, making sure the evaluation does not occur too soon, and the fact that impact rarely depends only on criteria that the scientists can influence.

Any evaluation needs to have **consequences** (e.g., rewards, incentives, recommendations, conditions, sanctions). The primary objective of any evaluation is to ensure or enhance quality, hence the consequences need to be designed accordingly, especially in the intermediary evaluations. Consequences can only be more specifically defined and described in the context of actual research programs, including their requirements and parameters, and they need to be defined and communicated at the outset of every research program and every evaluation. If a given consequence is formulated in terms of conditions, the subsequent evaluation will also need to examine whether they have been met. The table «Evaluation Sequence» only lists possible sanctions.

How Should the Catalogs of Criteria Be Used?

The catalogs of criteria are to be considered as a **«pool»** since not every research program necessarily needs to take all questions into account. Context-related adaptations, deletions and additions will have to be made, thereby creating specific catalogs of criteria for each specific research program. At the outset of such a program, then, the relevant questions to be applied to a research program will have to be **selected** from the «pool», and the required adaptations will have to be made.

No **catalogs of criteria for intermediary evaluations** have been drawn up, since such catalogs (both for over-

arching and sub-projects) to be applied to a specific research program can be derived from the catalogs of criteria of this program. Some notes on intermediary evaluations have been added in lieu of catalogs of criteria.

«If so, in what way?» have only been inserted in the catalogs if they were considered to be absolutely essential. The need for additional questions of this type to be asked of the evaluators will have to be determined for each

and documentation by the scientists (e.g., what the forms for progress reports, contracts with external participants, etc., should look like) so that the evaluators have the required information to answer the relevant questions. Which aspects shall be evaluated based upon written documents, oral presentations, or site visits, etc., will also need to be determined at this point.

Consensus, Integration:

Consensus denotes both the process and the result of arriving at a shared view of the problem, common objectives and questions, and a common approach to dealing with them, as well as the development of a shared language. Therefore, consensus is here not intended to mean agreement or authorisation, as in everyday language, but denotes the development of shared methods, models and theories, as well as of a description of the subject being studied that is equally valid for all, common definitions of technical terms, etc.

The term **integration** denotes the ongoing combination of the results of individual sub-projects to form a whole (a synonym used here is «synthesis»). Methods (a term used in a wide sense encompassing techniques, heuristic solutions, procedures, etc.) for consensus building and for integration therefore serve to guarantee inter and transdisciplinary quality.

It is essential to **define** certain criteria **more precisely** prior to applying them to any specific research program. This is especially true for criteria using elastic quantitative formulations, such as «sufficient», «a sufficient number», etc. It is necessary to define early on the quantity that will be considered «sufficient». Essentially, such a definition can be made in two ways, either in (a) plans of execution, etc., or (b) project-specifically, and involving the participating scientists (to be recorded in corresponding agreements). Which one of these procedures (or which combination) is to be chosen needs to be determined in the context of the respective research program.

The **possible answers** to the questions in the catalogs of criteria are usually a simple «yes» or «no». When applying the catalogs to a specific research program, however, this will often prove to be inadequate since a more refined scale may be required for a more differentiated assessment (e.g., adding the category «partly»). Here, too, the most sensible range of answers will have to be determined for each specific research program. Similarly, additional questions such as

program. Where desirable, it may also be useful to reserve space for «Remarks» so that assessments may be justified, or to enable the free expression of opinion on a project.

Because it wouldn't make much sense to do so in a general manner, the **criteria** have not been **weighted**. Weighting the questions will have to be decided for each specific research program, i.e., which criteria are absolutely essential, and for which ones fulfilment will be rewarded while non-fulfilment will not be sanctioned, etc. Based upon the evaluators' judgement of the weighted criteria, a final assessment (a «mark») will be given in every assessment, both on the overarching project and on all sub-projects.

Questionnaires to be answered by the evaluators will have to be designed once the criteria have been selected, defined more precisely and weighted, and once the types of answers have been determined.

At the outset, the **basis of evaluation** should be defined for each research program. It is therefore necessary to define the type of reporting

Who carries out the evaluation?

Again at the outset of each research program, the question of **who will participate in the evaluation** will need to be settled. Participants may be a group of experts, a steering committee, external scientific reviewers, the management of a research program, the management of the overarching project, experts on issues of organisational development, users, or the scientists involved in the program.

The question of **who is in charge of evaluating which aspects** will also have to be settled for each specific research program. It is neither possible nor necessary for everyone to evaluate everything. Rather, it will be useful to define precisely who should assess which aspects at which stage of evaluation. For example, the «formal requirements» might most usefully be evaluated by the secretariat of the research promoting institution, the first intermediary evaluation by the management of the research program, and «project organisation/project management» by an expert in organisational development. It might also be useful to entrust the management of the overarching project with the evaluation of certain aspects of the sub-projects, while users might more profitably assess the «presentation of the societal problem», or the «practical implementation». Last but not least, it must be pointed out that any evaluation should always contain an element of self-evaluation by the scientists involved. The question of who evaluates what may be decided either in plans of execution, etc. or project-specifically, involving the participating scientists (and recorded in agreements, e.g., between the group of experts and the project management).

This may be particularly useful when assessing the applicability of products, etc. It will only rarely be possible in each individual case to define the evaluator both in advance and at the program level.

Finally, it is essential to ensure the **quality of evaluation**. The demands placed on the assessors should not be underestimated, both as regards their expertise and the input expected of them. When recruiting evaluators, therefore, these aspects will need to be taken into serious consideration. The quality of the evaluation may also be enhanced by discussing with the evaluators, for example, the criteria that should be brought to bear on a specific program, or by an ongoing exchange on the evaluators' experiences, or even by offering special training to evaluators.

On the various groups of people involved:

Management of the overarching project: This is the team in charge of managing the overarching project. It may consist of scientists as well as practitioners – especially in transdisciplinary research.

Sub-project team: This is the team doing research on a sub-project (project-internal group). It may consist of scientists as well as practitioners – especially in transdisciplinary research.

External participants: This term denotes all the people who are neither members of the management of the overarching project nor of a team on a sub-project, but who are nevertheless substantially involved in a project, e.g., in a monitoring group (project-external group). They may be scientists as well as practitioners (e.g., citizens or neighbourhood residents, or representatives of organisations, associations, institutions or companies). The term does not apply to individuals subject to studies (in the context of surveys, observations, etc.).

Users: These are the groups of people towards whom the products and research results are targeted, or who shall use products and results in their professional or everyday lives. While the users may be part of the management of the overarching project, or of a sub-project team, they may also participate as external participants.

Results and products at the level of the overarching project:

If the catalogs of criteria for the overarching project contain the question of whether a sufficient number of dissertations or theses has been written (transfer of knowledge and technology), this does not refer to the sum total of writings at the level of the individual sub-projects. What it always does refer to is academic qualifications, events, publications, etc., which were not done within individual sub-projects but resulted from the cooperation of the sub-projects or from the activities of the management of the overarching project. For example, this might be a dissertation written in the context of managing the overarching project, or resulting from a «Graduierkolleg» (Graduate Program) on the subject of the overarching project, a paper by the management of the overarching project, or a joint paper by some or all sub-projects. The same is true for the results and products at the level of the overarching project: far from being simply the sum total of the results and products of the sub-projects, they have been developed in processes of consensus building and integration.

Evaluation Sequence

					
	Evaluation of research proposal (ex ante)	Intermediary evaluations (estimated duration: 4 years)			Final evaluation (ex post)
<i>What is the objective of the evaluation?</i>	<i>Selection of the projects to be granted</i>	<i>Assess whether projects are operative</i>	<i>Assess whether projects are productive</i>	<i>Assess whether there will be an output from projects</i>	<i>Assess whether research work has produced any/the desired effects</i>
<i>What are the focal points?</i>	Formal requirements Contents/Objectives Integration/Synthesis Scientific quality Transfer of knowledge and technology Projectorganisation/ Project management Competence		Contents/Objectives Scientific quality Transfer of knowledge and technology	Results/Products Transfer of knowledge and technology	Impact on science and society (e.g., population, economy, politics)
<i>Examples for sanctions</i>	<i>Refusal or return for revision</i>	<i>Continuation with conditions</i>	<i>Abortion or continuation with conditions</i>	<i>Conditions for completion and/or proviso for future projects</i>	<i>Consequences for design of research promotion</i>
<i>When does evaluation take place?</i>	<i>upon submission of the research proposal</i>	<i>after six months</i>	<i>approx. half-way through the project</i>	<i>at least six months prior to completion</i>	<i>approx. three to five years after completion of the project</i>

Evaluation of Research Proposal (ex ante) – Overarching Project

A. Formal requirements		
1. Requirements according to program call	achieved	not achieved
B. Contents/Objectives		
Presentation of the societal problem		
1. Has the problem been sufficiently described?	yes	no
2. Has the relevance of the problem been convincingly presented?	yes	no
3. Has a convincing case been made for the fact that only inter or transdisciplinary research can make the promised contribution towards resolving the problem?	yes	no
Objectives and questions		
4. Does it become sufficiently clear what the contribution towards resolving the problem is to be?	yes	no
5. Do the objectives of the overarching project correspond with the objectives of the research program?	yes	no
6. Do the scientific objectives follow from the problem-related objectives?	yes	no
7. Do the questions serve the purpose of reaching the objectives and do they follow from those?	yes	no
8. Are any essential sub-projects missing to reach the objective, and/or to answer the questions? If so, which ones?	yes	no
9. Do all the intended sub-projects follow from the objectives and questions of the overarching project? If not, which ones do not?	yes	no
10. Do the objectives of the overarching project appear to be attainable?	yes	no
Originality		
11. Is the overarching project original? If so, in what way? If no, why not?	yes	no
Involvement of users and external participants		
12. Were the users sufficiently involved in the wording of the objectives and questions?	yes	no
13. Do the objectives and questions justify the participation of external participants?	yes	no
14. Has the contribution to be made by external participants been presented with sufficient clarity?	yes	no
Results/Products		
15. Have the results to be expected been presented clearly?	yes	no
16. Do the results to be expected appear to be achievable?	yes	no
17. What ideas are there on how products should be developed, and are they realistic?	yes	no
18. Do the expected results and product ideas meet the objectives of the overarching project convincingly?	yes	no
C. Integration/Synthesis		
1. Have the methods intended for consensus building and integration been presented clearly?	yes	no
2. Do the methods intended for consensus building and integration appear to be suitable to achieve the intended results and products?	yes	no
D. Scientific quality		
1. Are the objectives of the overarching project based upon the current state of knowledge?	yes	no
2. Does the research activity have internal logic? Does each step follow from the preceding one?	yes	no
3. Has work in the sub-projects been harmonized?	yes	no
4. Does the schedule appear to be realistic?	yes	no

E. Transfer of knowledge and technology (concept of implementation)			
1. Has it been made sufficiently clear how the practical implementation of the results and products shall be assured?		yes	no
2. Has it been made sufficiently clear how the results shall be transferred into (continuing) education?		yes	no
3. Has it been made sufficiently clear how the results shall be disseminated?		yes	no
4. Can the planned activities be realised with the available resources?		yes	no
F. Project organisation/Project management			
Internal organisation			
1. Are the tasks and competences clearly distributed (organisation chart, task specifications)?		yes	no
2. Does the project structure (organisation chart, task distribution) appear to be suitable for consensus building, integration and networking between the sub-projects?		yes	no
External organisation			
3. Does the manner in which external participants are to participate appear to be appropriate to the objectives of the overarching project?		yes	no
4. Are the contracts with external participants regarding the contribution expected from them sufficiently clear and binding?		yes	no
5. Is the procedure for establishing missing contacts clear?		yes	no
Infrastructure			
6. Is the infrastructure required for the overarching project available?		yes	no
Costs/Benefits			
7. What is the correlation between input and expected results and products?	good	fair	poor
8. Have the means applied for been sufficiently justified?		yes	no
9. Do the means applied for appear to be sufficient?		yes	no
10. Does the correlation of means applied for, own means, and means from third parties appear to be adequate?		yes	no
G. Competence of the management of the overarching project			
1. What is the extent of previous input (previous achievements) of the management of the overarching project to the contents of the overarching project, and how does its competence rate?	excellent	sufficient	insufficient
2. How does the management of the overarching project rate as regards the implementation of the intended methods for consensus building and integration?	excellent	sufficient	insufficient
3. How does the management of the overarching project rate as regards project management (previous input, education and training)?	excellent	sufficient	insufficient
H. Overall assessment			
1. What is the relevance of the overarching project?	high	medium	low
2. What is the quality of the overarching project?	high	medium	low
3. What is the likely success rate of the overarching project?	high	medium	low

Evaluation of Research Proposal (ex ante) – Sub-project

A. Formal requirements		
1. Requirements according to program call	achieved	not achieved
B. Contents/Objectives		
Objectives and questions		
1. Do the (problem-related and scientific) objectives follow from the objectives of the overarching project?	yes	no
2. Do the questions and hypotheses serve the purpose of reaching the objectives?	yes	no
3. Does it become sufficiently clear what the contribution of the sub-project towards the overarching project is to be?	yes	no
4. Has the relevance of the sub-project to reaching the objectives or to answering the questions of the overarching project been presented convincingly?	yes	no
5. Do the objectives of the sub-project appear to be attainable?	yes	no
Involvement of users and external participants		
6. Were the users sufficiently involved in the wording of the objectives and questions?	yes	no
7. Do the objectives and questions justify the participation of external participants?	yes	no
8. Has the contribution to be made by external participants been presented with sufficient clarity?	yes	no
Results/Products		
9. Have the results to be expected been presented clearly?	yes	no
10. Do the results to be expected appear to be achievable?	yes	no
11. What ideas are there on how products should be developed, and are they realistic?	yes	no
12. Do the results and product ideas to be expected meet the objectives of the overarching project convincingly?	yes	no
13. Do the expected results and product ideas meet the objectives of the sub-projects convincingly?	yes	no
C. Integration/Synthesis		
1. Have sufficient resources been budgeted for the promised participation in the processes of the overarching project (particularly consensus building and integration)?	yes	no
D. Scientific quality		
1. Are the objectives of the sub-project based upon the current state of knowledge?	yes	no
2. Have the minimal disciplinary requirements (standards) been met?	yes	no
3. Do the intended methods appear to be appropriate to reach the objectives of the sub-project, and to answer its questions?	yes	no
4. Does the research schedule appear to be consistent, and does each step follow from the preceding one?	yes	no
5. Has the work been harmonized with that of the other sub-projects?	yes	no
6. Does the research schedule appear realistic?	yes	no

E. Transfer of knowledge and technology (concept of implementation)			
1. Has it been made sufficiently clear how the practical implementation of results and products is to be assured?		yes	no
2. Has it been made sufficiently clear how the results shall be transferred into (continuing) education?		yes	no
3. Has it been made sufficiently clear how the results shall be disseminated?		yes	no
4. Can the planned activities be realised with the available resources?		yes	no
F. Project organisation/Project management			
Internal organisation			
1. Does the distribution of tasks in the project team appear to be suitable as regards participation in the processes of the overarching project (especially consensus building and integration)?		yes	no
External organisation			
2. Does the manner in which external participants are to participate appear to be appropriate to the objectives of the sub-project?		yes	no
3. Are the contracts with external participants regarding the contribution expected from them sufficiently clear and binding?		yes	no
4. Is the procedure for establishing missing contacts clear?		yes	no
Infrastructure			
5. Is the infrastructure required for the sub-project available?		yes	no
Costs/Benefits			
6. What is the correlation between input and expected results and products?	good	fair	poor
7. Have the means applied for been sufficiently justified?		yes	no
8. Do the means applied for appear to be sufficient?		yes	no
9. Does the correlation of means applied for, own means, and means from third parties appear to be adequate?		yes	no
G. Competence of the sub-project team			
1. What is the extent of previous input (previous achievements) of the sub-project team to the contents of the sub-project, and how does their competence rate?	excellent	sufficient	insufficient
2. How does the sub-project team rate as regards experience in cooperation in a project group?	excellent	sufficient	insufficient
H. Overall assessment			
1. What is the relevance of the sub-project to the overarching project?	high	medium	low
2. What is the quality of the sup-project?	high	medium	low
3. What is the likely success rate of the sub-project?	high	medium	low

Notes on Intermediary Evaluations

No catalogs of criteria for intermediary evaluations have been drawn up, since such catalogs (both for overarching and sub-projects) can be derived from the specific catalogs of criteria for the evaluation of the research proposal and/or the final evaluation of a specific program.

Some indications are given below on how to develop catalogs of criteria for intermediary evaluation, and what the focus of each evaluation should be.

First Intermediary Evaluation

- Objective:
To assess whether the projects are operative, i.e., whether work has begun, and the planned steps are being taken.
- Focal points:
Integration/Synthesis;
Internal and external organisation.

While the aspect **«Integration/Synthesis»** in the evaluation of the research proposal inquired whether the methods for consensus building and integration were presented clearly and

appeared to be suitable (overarching project), and whether sufficient resources were budgeted for participation in the processes of the overarching project (sub-project), the point now is to find out whether implementation of the respective methods has actually begun, and whether they appear to be successful.

The aspect **«Internal and external organisation»** has an analogous aim. An example will show how criteria for intermediary evaluations can be derived from the evaluation catalogs referring to the research proposal (see box).

Example for the Derivation of Questions (First Intermediary Evaluation):

The aspect «Internal and external organisation» examines, on the one hand, whether the internal structure of both the overarching project and the sub-projects is conducive to good cooperation. On the other hand, it examines whether cooperation with external individuals, organisations, etc., is structured and maintained in such a way that the objectives can be reached.

At the level of the overarching project, the aspect «Project organisation/Project management» in the evaluation of the research proposal examines the following points, among others:

Internal organisation

1. Are the tasks and competences clearly distributed (organisation chart, task specifications)?
2. Does the project structure (organisation chart, task distribution) appear to be suitable for consensus building, integration and networking between the sub-projects?

External organisation

3. Does the manner in which external participants are to participate appear to be appropriate to the objectives of the overarching project?
4. Are the contracts with external participants regarding the contribution expected from them sufficiently clear and binding?
5. Is the procedure for establishing missing contacts clear?

Questions corresponding to the objective of the first intermediary evaluation might now be:

1. Has the project structure been realised according to the research proposal and/or according to the conditions in the grant?
If not, have the changes been convincingly justified?
2. Are the external participants being involved as planned?
3. Are any missing contacts being established as planned, or have they been established in the meantime?
4. If the answer is no for items 2 and/or 3:
Was the reaction adequate (adapting the research schedule, the objectives and questions, the expected products, etc.)?

Second Intermediary Evaluation

- Objective:
To assess whether the projects are productive, i.e., whether the research schedules can be kept, and what changes might result as regards their objectives and questions.
- Focal points:
Contents/Objectives;
Scientific quality;
Transfer of knowledge and technology.

As regards **«Contents/Objectives»**, it is now possible, based upon intermediary results, to see whether any changes in objectives and questions are required for the remainder of the project, be that for the overarching project or for individual sub-projects. Questions such as the following need to be asked: Are the intermediary results convincing as regards objectives and questions? Does it appear likely that the contribution towards resolving the problem will be made? Have the ideas on product development been specified further? Are the external participants making their contribution? It should also be possible to assess whether it might be useful to complement the overarching project by additional sub-projects in order to reach the objectives or answer the questions, e.g., to take into account changes in the parameters or new insights.

The aspect **«Scientific quality»** asks whether procedures are «state of the art», whether the planned steps have been taken, and whether any changes to the research schedule are convincing, as well as whether the methods of consensus building and integration are being implemented appropriately, and whether intermediary results meet the minimal disciplinary requirements (standards).

The aspect **«Transfer of knowledge and technology»** in the evaluation of the research proposal inquires into the concept of implementation (as regards practical implementation, education and continuing education, publication, etc.). However, the question now is whether this concept has been adequately adapted and specified, e.g., whether steps are being taken to promote the reception of the results.

Third Intermediary Evaluation

- Objective:
To assess whether there will be an output from the projects, i.e., whether their objectives will be reached, and the diffusion of results is well on the way.
- Focal points:
Results/Products;
Transfer of knowledge and technology.

«Results/Products» and **«Transfer of knowledge and technology»** are now at the center of attention: the question here is whether the available results and products, both preliminary and to be expected, correspond to the (possibly updated) research schedule, whether the steps outlined in the (possibly updated and further specified) concept of implementation are being taken and appear to be successful, and whether the project is likely to be completed in time. One possible question might be whether the transfer of results into (continuing) education has been assured, or whether the treatment of the results for a wider audience has begun, and whether steps have been taken to promote the use of the products by the target audience. As regards the adaptation of the third intermediary evaluation, the criteria for the final evaluation are more relevant than those for the evaluation of the research proposal. ♦

Final Evaluation (ex post) – Overarching Project

B. Contents/Objectives		
Results/Products		
1. Do the products meet the objectives of the overarching project convincingly?	yes	no
2. Do the results meet the objectives of the overarching project convincingly?	yes	no
3. Has more been achieved than would have been the case by autonomous (sub-) projects? If so, the surplus value consists in:	yes	no
Objectives and questions		
4. Has the promised contribution been made to the resolution of the societal problem? Have the problem-related objectives been met?	yes	no
5. Has an additional contribution been made beyond that which was promised?	yes	no
6. Have the scientific objectives been met, the questions answered?	yes	no
7. Have the problem-related societal changes been considered adequately?	yes	no
8. Has the assumption been confirmed that the contribution could be made only by means of inter and/or transdisciplinary research? If so, in what way? If not, why not?	yes	no
Involvement of users and external participants		
9. Were users sufficiently involved in the development of the products?	yes	no
10. Did the external participants make the expected contributions?	yes	no
E. Transfer of knowledge and technology		
Practical implementation		
1. Have the products been designed in such a way that the users can actually use them?	yes	no
2. Have adequate steps been taken to promote the implementation of the products?	yes	no
3. Are the products already being used?	yes	no
4. Have the results been treated in such a way that reception by the users is likely?	yes	no
5. Have adequate steps been taken to promote the reception of the results?	yes	no
6. Are the results already being received by their audience?	yes	no
Education, continuing education		
7. Are the results being transferred to a sufficient number of courses for graduate and diploma studies, etc.?	yes	no
8. Is the teaching of the results in courses for graduate and diploma studies, etc., assured for a sufficient time period?	yes	no
9. Are the results being sufficiently transferred in PhD programs, and the like?	yes	no
10. Has a sufficient number of diploma and graduate papers been written?	yes	no
11. Has a sufficient number of PhD theses been written?	yes	no
12. Has a sufficient number of habilitation theses been written?	yes	no
13. Are the results being transferred to a sufficient number of courses in continuing education?	yes	no
14. Is the teaching of the results in continuing education programs assured for a sufficient time period?	yes	no

Dissemination			
15. Is there a sufficient number of scientific publications (e.g., specialised and interdisciplinary journals, books, electronic media)?		yes	no
16. Has the overarching project been presented at a sufficient number of scientific meetings?		yes	no
17. Is there a sufficient number of publications for the target audience (users) of the overarching project (e.g., specialised journals, newsletters of associations, books, electronic media, brochures)?		yes	no
18. Is there a sufficient number of publications for a wider audience (e.g., newspapers, journals, magazines, radio and TV, books, electronic media)?		yes	no
19. Has the overarching project been presented at a sufficient number of symposia, public events, etc., for the target audience of the overarching project, and/or for a wider audience?		yes	no
F. Project organisation/Project management			
Costs/Benefits			
1. What is the correlation between input and present results and products?	good	fair	poor
G. Qualification of the management of the overarching project			
1. Was the research schedule adhered to, and/or was it adapted with the required flexibility?		yes	no
2. Did the processes of consensus building and integration prove to be successful?		yes	no
3. Was the project management successful overall?		yes	no
4. Did the internal organisation prove to be successful?		yes	no
5. Did the external organisation prove to be successful?		yes	no
6. Did the involvement of external participants succeed?		yes	no
H. Overall assessment			
1. What is the relevance of the contribution of the overarching project?	high	medium	low
2. What is the quality of the results and products of the overarching project?	high	medium	low
3. What is the success of the overarching project?	great	medium	slight

Final Evaluation (ex post) – Sub-project

B. Contents/Objectives		
Results/Products		
1. Do the products meet the objectives of the overarching project convincingly?	yes	no
2. Do the products meet the objectives of the sub-project convincingly?	yes	no
3. Do the results meet the objectives of the overarching project convincingly?	yes	no
4. Do the results meet the objectives of the sub-project convincingly?	yes	no
Objectives and questions		
5. Has the promised contribution been made to the overarching project?	yes	no
6. Has an additional contribution been made beyond that which was promised?	yes	no
7. Have the (problem-related and scientific) objectives been met?	yes	no
8. Have the questions been answered, the hypotheses tested?	yes	no
9. Have problem-related societal changes been considered adequately?	yes	no
Involvement of users and external participants		
10. Were users sufficiently involved in the development of the products?	yes	no
11. Did the external participants make the expected contributions?	yes	no
D. Scientific quality		
1. Have the minimal disciplinary requirements (standards) been met?	yes	no
E. Transfer of knowledge and technology		
Practical implementation		
1. Have the products been designed in such a way that the users can actually use them?	yes	no
2. Have adequate steps been taken to promote the implementation of the products?	yes	no
3. Are the products already being used?	yes	no
4. Have the results been treated in such a way that reception by the users is likely?	yes	no
5. Have adequate steps been taken to promote the reception of the results?	yes	no
6. Are the results already being received by their audience?	yes	no
Education, continuing education		
7. Are the results being transferred to a sufficient number of courses for graduate and diploma studies, etc.?	yes	no
8. Is the teaching of the results in courses for graduate and diploma studies, etc., assured for a sufficient time period?	yes	no
9. Are the results being sufficiently transferred in PhD programs, and the like?	yes	no
10. Has a sufficient number of diploma and graduate papers been written?	yes	no
11. Has a sufficient number of PhD theses been written?	yes	no
12. Has a sufficient number of habilitation theses been written?	yes	no
13. Are the results being transferred to a sufficient number of courses in continuing education?	yes	no
14. Is the teaching of the results in continuing education programs assured for a sufficient time period?	yes	no

Dissemination			
15. Is there a sufficient number of scientific publications (e.g., specialised and interdisciplinary journals, books, electronic media)?		yes	no
16. Has the sub-project been presented at a sufficient number of scientific meetings?		yes	no
17. Is there a sufficient number of publications for the target audience (users) of the sub-project (e.g., specialised journals, newsletters of associations, books, electronic media, brochures)?		yes	no
18. Is there a sufficient number of publications for a wider audience (e.g., newspapers, journals, magazines, radio and TV, books, electronic media)?		yes	no
19. Has the sub-project been presented at a sufficient number of symposia, public events, etc., for the target audience of the sub-project, and/or for a wider audience?		yes	no
F. Project organisation/Project management			
Costs/Benefits			
1. What is the correlation between input and present results and products?	good	fair	poor
G. Qualification of the sub-project team			
1. Was the research schedule adhered to, and/or was it adapted with the required flexibility?		yes	no
2. Did the sub-project participate adequately in the processes of the overarching project (esp. consensus building, integration)?		yes	no
3. Did the external organisation prove to be successful?		yes	no
4. Did the involvement of external participants succeed?		yes	no
H. Overall assessment			
1. What is the relevance of the contribution to the overarching project?	high	medium	low
2. What is the quality of the results and products of the sub-project?	high	medium	low
3. What is the success of the sub-project?	great	medium	slight

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Please send to:
Schwerpunktprogramm Umwelt
Programmleitung
Länggassstrasse 23
CH-3012 Bern, Fax +41 31 307 25 26

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Editor:
Programme Mangement
SPP «Environment»
Dr. sc.techn. Rudolf Häberli
Länggassstrasse 23
CH-3012 Bern
Tel. +41 31 307 25 25
Fax + 41 31 307 25 26
E-Mail: sppe@snf.ch
Internet: http://www.snf.ch/spp_umwelt/overview.html

Editing/Layout:
mediatec Landolt, Bernard Landolt,
Worb; Walter Grossenbacher-Mansuy,
Bern; Rico Defila, Antonietta Di Giulio,
Bern

Cartoon front page:
Sylvia Vananderoye, Bern

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Margret Powell-Joss, Bern

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