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Methods

Toolbox of Methods Developed within TransImpact
Documentation of the Project Results 2015–2019

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Actor Analysis

The aim of actor analysis is to identify and categorise project-relevant societal actors. It is used to capture the interests, perceptions of problems and conflicts among the individuals and groups relevant to the respective research project.

The analysis can be divided into three steps:

- Identification of the actors
- Differentiation and categorisation of the actors
- Analysis of the relationships between the actors

The first step is to identify the individuals, groups and institutions who are central to the project context. The next step is to list these, map them out in terms of their network of relationships, arrange them in order and prioritise them. The final step is to consider the question of whether and how the respective actors can help to achieve the project goal, whether they may inhibit the project, and what influence they may exert. This question is one of project tactics.

Using this method to identify actor groups: The actor analysis explores in detail the actor groups in the project environment who may have an impact on effects, and this is an important contribution to the effectiveness of a research project. The analysis facilitates a strategic selection of participatory and dissemination partners, and it highlights which of these are important key institutions and advocates, or which actors have important relationships with several addressee groups. Actors who are able to reach many addressees within the target groups are particularly relevant in generating potential effectiveness and should therefore be given special consideration in the planning.

Using this method to identify mediators: Using this method, actors can be found who have relationships with important groups, networks or potential pick-up contexts, or who themselves are active in possible pick-up contexts. These actors, who may have an impact on effects, can contribute to transfer in their role as mediators.

This method is used in several requirements:

- Identifying actor groups
- Supporting mediators

References:

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Actor Communication

Communication processes are an important building block in generating potential effectiveness in transdisciplinary research (TDR).

Possible approaches to communicating with actor groups who may have an impact on effects are as follows:

Ways of initiating contact: Practitioners who are not yet well known to the team can be addressed by practitioners who are already working in the project team or by other practitioners already known to the team and acting in a mediatory role. Indeed, partners from practice often have a better sense of how, with whom, and when to initiate the first contact.

Professionalisation of communication: A communication strategy is essential in reaching actor groups who may have an impact on effects. To this end, it is helpful to involve professional partners such as communications agencies.

Dynamic concepts for the participation and approaching of groups who may have an impact on effects: Such concepts should ideally be set out in the problem definition phase and accompany the project throughout its duration. This means making provision for both opening processes, which address an expanded circle of people, as well as closing processes, which go back into the inner project circle. In addition, it is necessary to allow for resources for an iterative approach so that it is possible to respond, within the project implementation, to changes among the actor groups who may have an impact on effects.

Using this method to address pick-up contexts: Actors who may have an impact on effects also include the individuals in potential pick-up contexts. Considering these in a targeted way within the actor communication can initiate and facilitate transfer.

This method is used in several requirements:

- Identifying actor groups
- Addressing pick-up contexts

Actor Map

The actor map helps to identify and represent the actors relevant to the project and their relationships.

Because of their material resources, their position within their operational context and their knowledge, societal actors have particular ways of influencing effects, and they exert significant influence on the concept, planning and implementation of a project. The actor map (frequently also referred to as actor analysis or stakeholder mapping) is a central point of departure in many further planning and advisory steps and may be useful at different points over the course of the project. It can be used in situations in which it is important to acquire a picture of the actors involved. It is also an important tool in monitoring the relationships between the actors over the course of time. The starting point for compiling an actor map should be a clearly defined problem. The actor map is always a snapshot of the relationship between the actors and the problem, as well as the structure of relationships between the actors themselves. It should be

noted that the constellations of actors and their relationships may change over the course of time.

Depending on the problem we are trying to trace by compiling the actor map, the different actors within a collaborative system can be differentiated according to their significance. For example, there may be primary actors, secondary actors, key actors and veto players, although the boundaries between these distinctions are usually fluid. Primary actors are those who are directly affected by the project, whether as beneficiaries or as parties who stand to either gain or lose power and privileges through the project. Primary actors even include those actors who are disadvantaged by the project. Secondary actors, however, are those who are only indirectly or temporarily involved in the project, e.g. by providing services.

Using this method to observe dynamics and review the participatory concept: Over the course of the project, it is important to review the respective actors' potential impact on effects and, where necessary, plan to incorporate further partners. The repeated use of the actor map over the course of the project – and, as the case may be, with respect to the same problem – helps to record the changes in the constellation of actors as well as their relation to the problem and to the emerging proposals for solutions. The insights gained from the actor map may, for example, lead to an expansion of the monitoring groups or to a new collaboration with individual actors within the group.

This method is used in the following requirement:

- Reviewing the participatory concept

References:

- GIZ GmbH (Hrsg.): Kooperationsmanagement in der Praxis. Gesellschaftliche Veränderungen gestalten mit Capacity WORKS (2015). Wiesbaden: Springer Gabler.

Boundary Object

A boundary object is a term, a concept or a constructed artefact that all members of the project team use, or aspire to use; it therefore facilitates understanding across disciplines or between academia and practice.

Boundary objects „are all those objects that are plastic enough to be adaptable to the most divergent points of view, whilst at the same time preserving their identity throughout" (Star 2017a, 131, our translation). A boundary object is a term, concept or constructed artefact that all members of the project team use, or aspire to use; it therefore facilitates understanding across disciplines or between academia and practice. At the same time, every discipline or group has its own approach to the object, and specific interpretations differ. Boundary objects are open and permeable but also precise and specific enough for specialist discourse. Examples of boundary objects are terms such as 'sustainability' and 'resilience'. The bridging function of a boundary object makes the laborious processes of translation and transformation easier with respect to terms, theories and methods.

The use of boundary objects is a dynamic process, not a one-off event at a singular point in time. Within this process, there is continual alternation between an overarching, open

understanding of the object and a more specific (e.g. specialist or local) understanding. In some cases, the boundary object is employed throughout the entire research process; in other cases, the process may be time-limited (e.g. governed by the production of a joint publication). However, this is never planned in detail at the beginning; it is more of an open approach.

The concept of the boundary object in TDR practice is not only used for terms or concepts but also for joint products, theories, ideas, everyday notions, prototypes, meetings on site, or different kinds of publication (e.g. co-writing of guidelines). Star and Griesemer (2017b) identify four types of boundary objects: repositories, ideal types, coincident boundaries and standardised forms. These boundary objects were used, for example, to set up a natural history museum and, at the same time, to satisfy the visions and interests of the museum director, the financial backer, the amateur collectors, the trappers and the university administration.

Using this method to create occasions for knowledge integration and make use of opportunities: A boundary object enables the co-existence of different thinking styles, pluralistic understandings of the problem, and different options for solutions, whilst still integrating these under the boundary object in use across the project team. This makes a boundary object a suitable tool for knowledge integration.

Using this method to prepare results effectively and address pick-up contexts: Empirical studies have shown that preparing the results in such a way that they can be tailored to a different context represents a major challenge for the projects, for it is only in the new (pick-up) context that the potential for connectivity and the nature of the requirements in that context become clear. If a project is already in contact with a possible pick-up context, then collaborative development of a product, a prototype or a publication (a boundary object) lends itself as a method for the preparation of the results. This makes it possible to connect with the requirements of potential new contexts and increase congruence. Empirical studies have demonstrated the high resource intensity of transfer, indeed in both the original context and the pick-up context. A boundary object such as a prototype can provide a common basis for making the added value of the results tangible and easily accessible for potential pick-up contexts. In addition, boundary objects allow us to look at the solutions from different perspectives.

This method is used in several requirements:

- Planning in occasions for knowledge integration and making use of opportunities
- Preparing results effectively
- Addressing pick-up contexts

References:

- Bergmann, M. et al. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt/New York: Campus, S.106.
- Pohl, C., Hirsch Hadorn, G. (2008): Methodenentwicklung in der transdisziplinären Forschung. In: Bergmann, M.; Schramm, E. (Hg.): Transdisziplinäre Forschung. Integrative Forschungsprozesse verstehen und bewerten. Campus Verlag, Frankfurt am Main, S. 69-91.
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Gießmann, S. und Taha. N. (Hg.): Susan Star Leigh. Grenzobjekte und Medienforschung. Transcript Verlag, S. 91-115.
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Case Description

Case descriptions are an effective way of preparing the results.

The case description is an approach that has come from qualitative social research. The case description presents the essential elements of a case in summary form: “The task of the case description is primarily to mediate the presentation, summary and aggregation of the results following their publication” (Bohnsack 2008, 139, our translation). Depending on the function and understanding of case descriptions, various approaches and degrees of abstraction are commonly used. In transdisciplinary contexts, the term ‘case description’ is used for exemplary and context-specific representations of individual cases, e.g. detailed descriptions of individual projects and best practice.

The case description can also be a tool for abstracting results from research based on individual cases. This involves establishing constitutive rules – in the sense of typologies – that go beyond situation- and case-specific peculiarities. Here, the generalisation is not based on the frequency of occurrence, rather, on the theoretical elaboration of the constitutive elements. This approach makes it possible for transdisciplinary context-specific projects, too, to make statements on a more general level, even while they are still preparing their results. The case description can be combined with the methodological approach of thick description.

What is a case? A case can be defined in different ways, depending on the focus. A case can be, for example, a whole project, a region with a specific feature – such as high settlement expansion –, or the use of a particular software in a particular environment.

Where there are several cases, a case comparison or case-study comparison is also possible. A case-study comparison makes it possible to generalise by comparing different cases. Here, a tried-and-tested method is to select cases on the basis of comparisons with minimal or maximum contrast. It is not necessary to conduct all the case studies oneself; a comparison with the literature is also possible.

Using this method to prepare the results: The insights acquired through case descriptions and case-study comparisons may be useful in outlining the relevant elements in more detail for the purposes of transfer, and eventually in gaining knowledge about the mechanisms of transferability. This is also, and in particular, helpful in research on transdisciplinarity. For the projects themselves, however, a case description may also be in the form of a representation of their results that they can pass on into potential pick-up contexts. The case description helps to better understand the constitutive conditions of the case. It can also make it possible to form analogies in the pick-up contexts. A comparison of the case description with the factors in the pick-up context may also be productive for the new context.

This method is used in the following requirement:

- Preparing results effectively

References:

- Adler, C.; Hirsch Hadorn, G.; Breu, T.; Wiesmann, U.; Pohl, C. (2018): Conceptualizing the transfer of knowledge across cases in transdisciplinary research. In: Sustain Sci 13 (1), S. 179-190.
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Co-Authoring Publications

Jointly preparing (sub-)projects for particular target groups and particular formats.

Publications generated by a research project may be aimed at different target groups and may have different formats. Examples here are articles in specialist journals, guidelines for practitioners, monographs or anthologies, texts as teaching materials, popular science texts, handbooks or press releases. The decision as to which project findings to prepare in which format, and the division of labour for the writing process, structure the work processes in the project. Especially if joint project publications are planned at an early stage, partial results can be adapted with the publications in mind, even while they are still emerging.

Using this method to create occasions for knowledge integration and make use of opportunities: The findings from the individual sub-projects become visible in the process of writing. The joint publication format makes it necessary to decide at an early stage how the individual findings should be related to one another.

This method is used in the following requirement:

- Planning in occasions for knowledge integration and making use of opportunities

References:

- Bergmann, M., Jahn, T., Knobloch, T., Krohn, W., Pohl, C., Schramm, E. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt am Main: Campus Verlag. S. 113-116.

Co-Writing of Research Proposals

The co-writing of a research proposal allows researchers to consciously address the roles of the different project partners and clarify responsibilities, functions and tasks.

The desired content, approaches and objectives of the individual partners are defined and established in the research proposal. Collaborative or co-writing of this document – or individual parts of the proposal – in the problem definition phase offers an opportunity to

consciously address the roles of the various project partners within the project, clarifying their responsibilities, functions and tasks.

When establishing roles in the research proposal, it is important to note that although this requires a certain degree of definition and specification, it is also advisable to create some leeway for potential new developments.

In addition, this method is also suitable for clarifying the various interests involved, for when co-writing the proposal, the participating actors must also disclose their interests.

Not all partners need to be involved to the same degree in the collaborative writing of the research proposal. The project leaders can, for example, ask the practitioners about ideas, possible contributions and expected results, before combining these in their drafting of the proposal. The project leaders then send the draft proposal back to the practitioners and invite them to comment on it.

This method is used in the following requirement:

- Establishing clear roles

References:

- Lowry, P. B.; Curtis, A.; Lowry, M.R. (2004): Building a Taxonomy and Nomenclature of Collaborative Writing to Improve Interdisciplinary Research and Practice. Journal of Business Communication, S. 41-66.

Coaching as an Aid to Self-Reflection

The aims of coaching range from assessing and developing personal skills and perspectives through to overcoming conflicts in the team. In TDR contexts, coaching may, for example, take the form of advanced training programmes as a supplement to disciplinary training.

The fact that an individual has experience in inter- and transdisciplinary work does not necessarily mean s/he has acquired the necessary skills for it. Specific events or consultations which offer individuals opportunities to reflect on their experiences, and which develop and convey the knowledge required for inter- and transdisciplinary collaboration, have a very positive effect on collaboration within the team. Advanced training programmes, which are either "bought in" from external suppliers or conceived and implemented internally, generally result in a deeper engagement with one's own discipline as well as with one's own role, limits and possibilities within a TDR process.

For example, compiling skills profiles is a suitable tool for also capturing those skills that are at risk of being overlooked within the group. How these skills are captured, and which questions are used to capture, evaluate and make effective use of these, depends on the respective group. Compiling skills profiles can also be a tool used in the context of external coaching. In capturing skills, it is important not to ignore soft skills, which are fundamental in generating a positive working atmosphere in the group as well as in ensuring effective communication with actors external to the group.

Using this method to foster a culture of collaboration and knowledge integration in social and communicative ways: Effective participatory processes in transdisciplinary projects are

also based on the soft skills of the individuals involved. This means abilities such as openness and empathy are central to an awareness of the diversity of perspectives. Coaching and advanced training may sharpen awareness of the relevance of these skills. Mapping out the skills that are available and those that are lacking enables the projects to close gaps in the participatory structure and avoid and solve conflicts.

Using this method for reviewing the perception of roles: Coaching in the context of transdisciplinarity should not only be used to improve performance but also to facilitate reflection on one's own skills and the perception of roles. In an individual or group discussion supported by the coach, project participants can reflect on their own or their group situation and develop proposals for improvements.

In discussions as part of the TransImpact project, experts suggested that self-reflective processes with practitioners also continually question the academic role: What form of action should academia take? And what form of action is it allowed to take? How can its role in process shaping be reconciled with its role in the search for truth? What can academia contribute, and what is expected of it? It is not only the societal actors who can benefit from (self-)reflection on the perception of roles and a comparison with expectations, but also the academics. Coaching can support and promote this process.

This method is used in several requirements:

- Fostering a culture of collaboration
- Reviewing the fulfilment of roles
- Fostering knowledge integration in social and communicative ways

References:

- Defila et al.(2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: Vdf Hochschulverlag, S. 185, 189.
- Rabelt, V., Büttner, T., Simon, D. (2007): Neue Wege in der Forschungspraxis. Begleitinstrumente in der transdisziplinären Nachhaltigkeitsforschung. München: Oekom Verlag. S. 61ff.

Common Evaluation Processes

Common evaluation processes enable the formulation and use of criteria for judging the success of transdisciplinary projects. They provide a framework for integrating different data and perspectives.

Different aspects often play a role for different actors in the evaluation of transdisciplinary projects. The criteria by which the results are measured are, accordingly, heterogeneous, ranging from scientific plausibility, to technical and organisational implementability, through to social acceptance. The project team must put these different evaluation criteria in order. This means, for example, deciding what is and is not relevant, or defining the exclusion criteria, hierarchies and what should be prioritised.

The first step is to develop rough scenarios or strategies for how the project topic should be addressed. The next step is to identify the different dimensions of evaluation at play within the respective operational context. The project team can use this prior knowledge to set out the specific qualitative or quantitative criteria for an evaluation and the evaluation processes.

The project team may carry out this task at both the beginning (anticipatory) and the end (retrospectively) of the project. Only anticipatory development, however, is a reliable method for integration.

Using this method to create occasions for knowledge integration and make use of opportunities: Debating the possible evaluation criteria within the project team has an integrative effect, as it brings to light the different ideas and requirements. This process of understanding different points of view can also structure the perception of the problem even more systematically. In particular, discussing qualitative criteria within the project team is highly effective in fostering an understanding of other approaches.

This method is used in the following requirement:

- Planning in occasions for knowledge integration and making use of opportunities

References:

- Bergmann, M., Jahn, T., Knobloch, T., Krohn, W., Pohl, C., Schramm, E. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt am Main: Campus Verlag, S. 88-95.

Common Processes in Proximity to the Object Under Study

Shared experiences "on site" provide an opportunity for knowledge integration because they facilitate a better understanding of different perspectives.

More open formats for knowledge integration are shared experiences with a specific relation to the project topic, such as field trips to see similar projects, visits to practitioners or the area under study, or joint activities. In contrast to non-target-oriented informal dialogue, the focus here is always on the specific sub-problem or a particular question within the project.

A field trip or a visit to practitioners provides an opportunity to understand the methods, data, questions, explanatory models or practical contexts of other participating actors. Inspecting the object under study together, for example, provides a supportive context for exchanging know-how and academic knowledge in particular. All participating actors are, to a certain degree, compelled by their presence to engage with the shared situation on site, a situation which provides a common – both spatial and temporal – space of reflection.

Using this method to create occasions for knowledge integration and make use of opportunities: Shared experiences foster knowledge integration on the cognitive level, whereby participating actors appropriate knowledge about the context and receive stimuli for discussions about the object. The shared experience and the dialogue about it may also foster communicative integration, i.e. the clarification of specialist concepts, specific issues and context-specific terms. In addition, they help individuals get to know one another and foster social integration.

This method is used in the following requirement:

- Planning in occasions for knowledge integration and making use of opportunities

Constellation Analysis

Constellation analysis is a methodological approach for integrating heterogeneous knowledge in order to deal with complex problems, which is why it is also referred to as a "bridge concept".

Heterogeneous knowledge may include both academic knowledge – from different disciplines – and knowledge from practice. "Constellation" refers to closely interwoven social, technical and natural aspects that are seen as interrelated. Constellations demonstrate a certain degree of order, and there are relationships and interdependencies between their characteristic elements. These include natural and technical elements, actors and sign systems, e.g. laws. There are three steps to a constellation analysis:

1. A structured sampling of all elements relevant to a topic;
2. A graphic visualisation or mapping which makes the relationships between the elements visible;
3. A written analysis.

A constellation analysis generates a pattern of order for a specific problem or for the result components. It is important that the overarching perspective is accepted or shared by all the relevant actors. This mapping is developed by the relevant actors in a joint process. The visualisation step is a peculiarity of constellation analysis. It enables the illustration of complex relationships and makes it easier for actors with different kinds of knowledge to enter into dialogue. The third step, the written analysis, prevents simplifications.

Using this method to identify actor groups and mediators and to address pick-up contexts: Systematically capturing and visualising the problem and the actors with the aid of constellation analysis helps the project leaders answer the following questions: Who should be involved in the project, and when? Who should be informed about the current interim results? From whom can we expect potential resistance, and what influence might they have over the course of the project? At whom are the results aimed? In addition, this method makes it possible to agree on the key questions with the project partners and work out where the perspectives of the participating actors diverge. It is a tool for working together with the participating actors to describe, as early as in the problem definition phase, the precise nature of the problem with which the research project is concerned. The different knowledge and perspectives of the participating actors feed into this description. Mediators can also be identified at this stage; they are an actor group who may have an impact on effects. If the constellation analysis is conducted repeatedly, it can also be a tool for recording changes in the environment and subsequently identifying pick-up contexts.

Using this method to understand the operational context: In the problem-solving phase, this method provides a basis for understanding institutional rationales for action and decision-making processes as well as historical and current developments. It also identifies tried-and-tested solution strategies as well as existing collaborations and networks. Repeated use of this method over the course of the project helps the project leaders and coordinators evaluate whether the participating actors' different perspectives on the problem have been described appropriately and comprehensively (increasing potential effectiveness). In addition, repeated

constellation analysis can be used to capture both the dynamics within the operational context and those of the actors' interests.

This method is used in several requirements:

- Identifying actor groups
- Understanding the operational context
- Supporting mediators
- Addressing pick-up contexts

References:

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Developing Joint Products

Knowledge from different disciplines and from practice is integrated in the process of jointly developing a product.

Joint products may be, for example, market analyses, prognoses, prototypes or reports. Working on a joint product combines the participating actors' different approaches. The aim of transdisciplinary projects is to ensure that the resulting products can actually be used.

The requirements of a product and its possible applications determine how the necessary knowledge emerges within the project and how it is merged. It therefore makes sense to first of all clarify the requirements of the product. This means clarifying the functions the product is intended to fulfil and the expectations of the project team or the users. Market analyses are often required in order to establish the types of needs the product would meet. The requirements are divided into different sub-products, and these are each dealt with in sub-projects. It is important to regularly monitor and iteratively adapt the work within the sub-projects in order to ensure integration within the joint product.

Using this method to create occasions for knowledge integration and make use of opportunities: Working on a joint project has the effect of integrating heterogeneous knowledge bases (on this, see also the boundary object method) because it firms up the objective that the integrated results are intended to achieve. Regularly reviewing the sub-projects fosters calibration early on.

This method is used in the following requirement:

- Planning in occasions for knowledge integration and making use of opportunities

References:

- Bergmann, M., Jahn, T., Knobloch, T., Krohn, W., Pohl, Ch., Schramm, E. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt am Main: Campus Verlag. S. 106-108.

Discourse Field Analysis

The aim of discourse field analysis is to demonstrate which issues, key actors and positions exist within a specific thematic area.

To this end, discourse field analysis differentiates between secure and insecure knowledge, and analyses which knowledge is controversial within or between societal and academic groups. It is particularly suited to problems with a high level of complexity, and it helps to identify areas where societal and academic action is needed.

The discourse field is the context in which different perspectives on, and solutions to, problems are negotiated. Discourse field analysis asks which context the issue-related statements come from and what effect these statements have. One effect, for example, is where they develop the discourse further; this happens when different actors refer to a statement. Another effect might be where a statement motivates specific actions. The key questions in discourse field analysis are:

- Which issues are central to the public debates? What are the key actors' positions on these?
- Which knowledge is regarded as controversial or lacking? Which knowledge is uncontroversial?
- Are any new issues emerging? Who is introducing these?
- What kinds of societal action are needed, and can we derive from this analysis any areas in need of further research?
- At which points does societal discourse lead to practical actions (e.g. implementation projects)?

Discourse field analysis is primarily based on textual material ranging from academic studies to position papers through to press communications. In a simplified form, it can be conducted – following initial actor research – on the basis of interviews with experts.

Using this method to identify actor groups: Discourse field analysis is helpful in identifying actors within the environment who may have an impact on effects, as it captures the context of a problem in a systematic way. By focusing on the respective knowledge or the perception of the problem the project is addressing, the project team can, over the course of the project, engage in targeted ways with the specific actors who may have an impact on effects.

Using this method to understand the operational context: Discourse field analysis sharpens our perspective on current discourses and actors, and this also serves, over the course of a

project, as a basis for understanding institutional rationales for action and decision-making processes.

Using this method to explain and justify the selection of knowledge: Discourse field analysis provides an overview of the relevant issues and positions connected with a problem or question. It is therefore a suitable tool for adjusting the knowledge selected or available within a project to the broader context, and for identifying gaps in this knowledge.

Using this method to identify and address pick-up contexts: Being reflective means observing and being aware of changes in the environment. This allows us to identify windows of opportunity and take advantage of the possibilities these present. Sharpening perspectives through discourse field analysis can highlight where awareness of the problem is particularly pronounced in potential pick-up contexts, or who might be interested in the results of the project. This makes it possible to identify and address potential pick-up contexts in targeted ways.

This method is used in several requirements:

- Identifying actor groups
- Understanding the operational context
- Explaining and justifying the selection of knowledge
- Addressing pick-up contexts

References:

- Hartard, B.; Schramm, E (2009): Biodiversität und Klimawandel in der Debatte um den ökologischen Waldumbau – eine Diskursfeldanalyse. BiKF Knowledge Flow Paper Nr. 1. Frankfurt: LOEWE Biodiversität und Klima Forschungszentrum (BiKF).
- Jahn, T.; Lux, A. (2009): Problemorientierte Diskursfeldanalyse – neue Möglichkeiten und Anwendungsbeispiele. ISOE-Studientexte, Nr. 15. Frankfurt am Main: ISOE.
- Bernard, Barbara/Alexandra Lux (2017): How to feed the world sustainably: an overview of the discourse on agroecology and sustainable intensification. Regional Environmental Change, 17:1279–1290.

Establishing Integration Processes

When planning knowledge integration processes, it is important to clarify the question of who is involved in which phases of the knowledge integration processes.

There are three approaches to the integration of results (based on Pohl and Hirsch Hadorn, 2006 as well as Hoffmann et al., 2017):

- Collective group learning: Research results are discussed in an intensive interaction within a group. Subordinate questions are first of all discussed in smaller groups and later by the whole group, where they are then related to the overarching question; this process is repeated iteratively. The responsibility for the results lies with the whole group. This approach enables a reciprocal learning process. At the same time, a shared thinking style tends to be needed here, as well as high expectations of the depth of the knowledge integration.
- Negotiation among experts: Results are discussed in bilateral discussions between experts. Here too, the subordinate questions are discussed first. The responsibility for the results lies with individual experts.

- Integration through a leader or a leading group: Partial results are all communicated to a leading body, which is solely responsible for the knowledge integration and the overall result.

A TDR project should use a mix of these various approaches: Not all decisions should be taken by individuals, as this would contradict the principle of TDR; but neither must all actors be involved in all decisions, as this would make the processes inefficient and ultimately also ineffective. In each project phase, it must be decided whether knowledge should be integrated by the team (in which case, who will be in the team, e.g. individuals who are or are not involved in practice, and if the former, which groups will they be involved with) or by individuals (in which case, by whom).

One example of this would be to involve a larger team and practitioners in the selection of knowledge bases, but then ask a single competent individual to process the selected knowledge bases. The results would then be evaluated again and supplemented by a larger team.

Using this method to establish responsibilities and processes for knowledge integration: Planning participation in and responsibilities for processes of knowledge integration, and presenting these in a transparent way, contributes to smooth and successful execution.

This method is used in the following requirement:

- Establishing responsibilities and methods

References:

- Hoffmann, S., Pohl, C., & Hering, J. G. (2017). Methods and procedures of transdisciplinary knowledge integration: empirical insights from four thematic synthesis processes. Ecology and Society, 22(1).
- Pohl, C., Hirsch Hadorn, G. (2006): Gestaltungsprinzipien für die transdisziplinäre Forschung. München: oekom Verlag, S. 47ff.

Establishing Superordinate Research Goals

Defining superordinate research goals or a shared vision for a project right at the start provides orientation over the course of the project.

Defining superordinate research goals or a shared vision for a project right at the start provides orientation over the course of the project. Orientation towards a superordinate goal is particularly useful and important when major changes, problems and crises arise, for in these situations people tend to take a reactive rather than a structured approach and tend to work in rule-oriented rather than goal-oriented ways. Without a shared vision, there is a danger of "working to the rule", e.g. where people perform tasks formally or purely with reference to their own discipline, as it is set out in the proposal, without any apparent deeper meaning in this activity. At the same time, a rule-oriented approach offers less flexibility than an approach oriented towards research objectives, for these do not specify the pathway in detail. The shared vision also has the effect of framing and connecting the different project activities of the participating actors.

A boundary object, for example, may help in the formulation of superordinate research goals. Via the boundary object, all the perspectives and expertise involved can develop a shared vision

that offers a point of connectivity for all the expertise. Another way of formulating superordinate research goals is to work with paradigms.

Using this method to allow for adaptivity: Jointly formulating superordinate research goals during the problem definition phase allows for flexibility over the course of the project. The adaptability of a project is increased if its research objectives are continually kept in mind. In addition, this method prevents arbitrariness when making adaptations, since these must be made within a framework predetermined by the research objectives. Secondary objectives that are formulated at the start of the project may serve as a buffer and may be abandoned when a crisis arises, thereby freeing up resources for achieving the core objectives.

This method is used in the following requirement:

- Allowing for adaptivity

References:

- Bergmann, M., Jahn, T., Knobloch, T., Krohn, W., Pohl, C., Schramm, E. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt am Main: Campus Verlag. S. 91f.
- Defila et al.(2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: Vdf Hochschulverlag, S. 72f.

Explorative Interviews

Explorative interviews help in systematically acquiring information about people's attitudes, opinions, knowledge and modes of behaviour.

A productive dialogue on a level playing field requires an understanding of the participating actors, their work situation, their knowledge, their attitudes and their modes of behaviour. Although classical socio-empirical methods such as explorative interviews are not regarded as participatory methods in the sense of collaborating within the research process, they may still serve as an effective preparation for such processes and may therefore be considered as part of a participatory methodological mix.

The aim of explorative interviews is to tap into the respondents' broadest possible and latent fields of knowledge. The interviews also make clear which issues are particularly relevant for the respondents, i.e. which issues they consider to be suitable for mediation and worth mediating, and which less so. The explorative interview is a process of questioning that is unrestricted but structured by guidelines. It contains different questioning techniques: informal conversation, narrative interview, expert interview or reflective focusing. This questioning method is more suitable as an instrument for capturing subjective knowledge bases than for capturing 'objective' or representative data.

Using this method to understand the operational context and to incorporate knowledge about the problem: Socio-empirical methods can provide data on the operational modes and rationales within the operational context in which, later on, the effects of the project will emerge. Careful consideration must be given to the subjective relations and implications of the data collected in the explorative interviews.

This method is used in several requirements:

- Understanding the operational context
- Incorporating knowledge about the problem

References:

- Diekmann, A. (2007): Empirische Sozialforschung: Grundlagen, Methoden, Anwendungen. Rowohlts Enzyklopädie, Berlin
- Honer, Anne (1994): Das explorative Interview: zur Rekonstruktion der Relevanzen von Expertinnen und anderen Leuten. In: Schweizerische Zeitschrift für Soziologie, 20, 3, S. 623-640.

External Moderation

Potentially antagonistic discussions but also regular events within the research team can be led by an external moderator. The advantage of an external moderator is that s/he represents a neutral position and perspective.

If the project leader or coordinator takes on a moderating role, this dual function may lead to this person dominating the conversation or, alternatively, being unable to bring his/her own perspective into the discussion to a sufficient extent. It is important that participating actors recognise the external moderator. Provision can already be made within the research proposal for the external moderator's contribution. The scope of the contribution required of the moderator may vary from case to case, but it may sometimes also include schedules, workshop methods and target setting for events.

Using this method to clarify interests: A professional, external and independent moderator can be useful in the process of clarifying interests in the problem constitution phase because s/he can help to explain the interests of the different project actors, mediate from a position of neutrality in the case of conflicts, and make the network of relationships visible.

This method is used in several requirements:

- Clarifying interests
- Establishing clear roles

References:

- Nemnich, C. & Fischer, D. (2016): Praxis essen Wissenschaft auf? Von den Gefahren des Gelingens einer transdisziplinären Zusammenarbeit. In: Rico Defila & Antonietta Di Giulio: Transdisziplinär forschen – Zwischen Ideal und gelebter Praxis, S. 145 – 188. Frankfurt/New York: Campus Verlag.
- Inter 3 – Institut für Ressourcenmanagement (o.J.): Transdisziplinarität – Das Ideal der Zusammenarbeit zwischen Wissenschaft und Praxis als Dauerbaustelle.

Feedback Processes

Feedback formats not only provide an opportunity for dialogue about the content of the project topics, but also contribute to the social team-building process.

This may not only prevent conflicts but also strengthen commitment, motivation and solidarity within the team. The project leaders may initiate the feedback processes within the sub-groups

of the project as early as the problem definition phase. Over the course of the project, these processes may be elaborated into some form of team coaching.

Using this method to define responsibilities, functions and tasks: Feedback processes in sub-groups in the problem definition phase may help to negotiate and define the different responsibilities, functions and tasks. If changes emerge over the course of the project, the roles can be redefined through renewed feedback processes or team coaching.

This method is used in the following requirement:

- Establishing clear roles

References:

- Lerchster, R. & Lesjak, B. (2014): Forschungsteams organisieren. Eine gruppendynamische Perspektive. In: Dressel, G. et al. (Hg.): Interdisziplinär und transdisziplinär Forschen. Praktiken und Methoden, S. 79 – 89. Bielefeld: Transcript.

Focus Groups

Focus-group discussions give an insight into the values, perspectives and knowledge bases of selected groups and the areas in which action needs to be taken on their behalf.

Focus groups are a tool for conducting surveys in qualitative social research. They engage in moderated, thematic group discussions that are stimulated by an input and steered by key questions. They are suitable, for instance, for acquiring information about the motivations and knowledge requirements of particular actor groups, or for evaluating (interim) project results.

The advantage of focus groups is that, in contrast to individual interviews, the collective discussion inspires new ideas or reflection in the participants and also brings out opposing points of view. In contrast to the situation of the individual interview, which seems artificial, the aim of the group discussion is to generate an everyday conversation. The information generated by focus groups may therefore be very dense.

The criteria for selecting the focus groups are dependent on the problem under focus in the project. The first step is to define what constitutes a focus group and how this can be delineated. Examples might be actor groups within the project environment, future users of a product, or different social milieus. The second step is to clarify the criteria for selecting the participating individuals. The content of a discussion is highly dependent on the participants. The groups are usually homogeneous, but the participants differ in certain features.

Focus groups are usually documented in an audio-recording, and these recordings are then transcribed for the purpose of analysis.

Using this method to incorporate knowledge about the problem: The advantage of focus groups is that the perspectives or knowledge bases of actors external to the project can be captured at selected points in time over the course of the project. As an explorative method, focus groups can gather knowledge about the particular operational context of a project, the needs of groups, existing attitudes or knowledge bases, etc. They can also be used as a participatory approach in which opinions and perspectives, e.g. those of the people affected, are

fed into the project. Then, at a later point in time, the focus-group participants can evaluate and review the initial project results or concepts.

Using this method to prepare results effectively and address pick-up contexts: It is useful to reflect with individuals from other contexts on the problem at hand and the solutions developed within the project. In this way we learn how the problem is perceived elsewhere, how pronounced the awareness of the problem is in the other contexts, and, last but not least, what is required in order to solve the problem in the other contexts. This knowledge may then feed into a targeted preparation of the results and into a process of addressing further potential pick-up contexts. Focus groups – in particular those with potential pick-up contexts – may help to identify the requirements in advance, thereby enabling a tailored preparation of the results. In focus groups, furthermore, it is possible to approach individuals directly with regard to potential transfer.

This method is used in several requirements:

- Incorporating knowledge about the problem
- Preparing results effectively
- Addressing pick-up contexts

References:

- Henseling, C., Hahn, T., Nolting, K. (2006): Die Fokusgruppen-Methode als Instrument in der Umwelt- und Nachhaltigkeitsforschung. IZT WerkstattBericht Nr. 82, Berlin: Institut für Zukunftsstudien und Technologiebewertung.
- Krueger, Richard A.; Casey, Mary Anne (2000): Focus Groups. A Practical Guide for Applied Research. Thousand Oaks/ Cal.
- Flick, U. (2014): Qualitative Sozialforschung. Eine Einführung. 6. Auflage, Reinbek: Rowohlt Verlag. S. 248ff.

Formative Self-Evaluation

Formative self-evaluation is a process for analysing and evaluating one's own research work. The emphasis here is primarily on the aspect of learning from one's own work, for the sake of both ongoing and future TDR projects.

In the context of formative self-evaluation, the aim is an intelligent and critical analysis rather than an evaluation of the research. This form of evaluation should be set up as a discursive process in which all participants can learn something. Self-evaluation should ensure quality collective work in transdisciplinary contexts.

Like any form of evaluation, formative self-evaluation is based on the definition and verification of quality criteria. Together, these criteria form a catalogue which, depending on the resources or intentions of the participants, may consist only of basic criteria or may be supplemented with additional detailed criteria. Alternatively, it is also possible to fall back on pre-prepared criteria catalogues, such as have been developed by the research project Evalunet (for quality assurance in TDR). Setting up the criteria catalogue requires participants to make their understanding of the project aims transparent, as well as the basis upon which they are evaluating the quality of the processes and the (interim) results.

Within the project, there needs to be agreement on what the aim of the evaluation is. Opinions on this can be very varied. The spectrum ranges from institutional skills development, to quality assurance and general knowledge advancement, through to staff development. In terms of justifying the time and effort involved, a decision must then be made as to whether an evaluation should be undertaken by all or only by a few project participants. This will depend on the size and relevance of the project. In addition to the aims of the evaluation, there must also be a consensus on what kind of source materials are needed for the evaluation. Finally, the team must agree on a general process for the upcoming evaluation, in the form of an evaluation concept. When determining the aspects of this process, it is important to consider its discursive and formative character.

Using this method to apply adaptivity: The foundation for adaptivity is laid in the early project phase of the problem definition. This involves recording the structural and normative limits and rules of adaptivity and the ability to react in situations requiring adaptation. Criteria for formative self-evaluation can be derived from these specifications. Consequently, evaluation processes may form a basis for deciding on adaptive measures, and these, in turn, are a prerequisite for generating potential effectiveness.

This method is used in the following requirement:

- Adaptivity as a guiding principle

Tools of Formative Self-Evaluation (Selection):

Story wall

A story wall is a method for evaluating collective work processes that is supported by visual and narrative elements. It helps teams to evaluate past work processes retrospectively and from the individual perspectives of the participating actors, as well as to foster mutual understanding. It supports the optimisation of current and upcoming processes.

When using this method, the participants first of all agree on a rough timeline that represents the most important processes and events within a project. The second step is to refine the timeline together, e.g. by adding more detail for important parts of the project or at the organisational level. Next, the participants begin their individual evaluation of the important events and influences as well as the supporting and inhibiting factors. Subsequently, these personal reflections are brought together to form a joint story wall in stories and images along the timeline.

Bombing exercise

The bombing exercise helps to identify and formulate quality criteria for one's own research project. At the core of this method is the development of "anti-tips". The question of quality and success is tackled via its opposite: failure. In this paradoxical process, actors work through worst-case-scenarios (what are the preconditions for the project to fail?) in order to arrive at a formulation of positive counter-measures. Implicit concepts of quality can be derived from the counter-measures that most of the group agree on, and these can be formulated as specific quality criteria. The exercise should not be carried out if it is not possible to follow up with a discussion about the quality criteria and quality assurance measures.

References:

- Defila et al.(2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: Vdf Hochschulverlag, S. 304f.
- Rabelt, V., Büttner, T., Simon, D. (2007): Neue Wege in der Forschungspraxis. Begleitinstrumente in der transdisziplinären Nachhaltigkeitsforschung. München: Oekom Verlag. S. 50ff.
- Td-net – Networking for Transdisciplinary Research. Methoden zur Koproduktion von Wissen.
- Bergmann, Matthias et.al. (2005): Qualitätskriterien transdisziplinärer Forschung. Ein Leitfaden für die formative Evaluation von Forschungsprojekten. ISOE-Studientexte, Nr. 13, Frankfurt am Main.

Give-And-Take-Matrix

The give-and-take matrix is a method for dialogue within transdisciplinary teams or between sub-projects.

Central to this method is the visual tool of the matrix itself: all fields of work or sub-projects are noted on the matrix. At first, participants work within individual interest groups (sub-projects, fields of work or actor groups) and consider together what concessions can be made towards (gives) or requested from (takes) other groups. This is followed by a work phase in which the groups mix and present to each other the gives and takes they have previously decided upon. As they do so, the participants note down the gives and takes to and from the other groups and then collate these again in the output group. The groups then decide which concessions they would like to make to whom, and, finally, present these in a plenary session – based on the matrix, which is visible to all participants. To conclude, participants consider when and how the agreed dialogue between teams or sub-projects can be implemented in the future.

Using this method to clarify interests: The positive effects of this method and the visual tools used within it range from creating a shared understanding of the limits of each team through to discovering implicit interests. The work not only clarifies the different expectations of the participants but also forges new connections and makes visible the common potential within a research project.

Using this method to observe the dynamics of interests: The give-and-take matrix can be used both at the start of the project and throughout its duration in equal measure. Over the course of the project, it can be used within the core team or the wider research community as a corrective tool, e.g. for detecting changes in vested interests and operationalising these in order to produce effective results.

This method is used in several requirements:

- Clarifying interests
- Observing the dynamics of interests

Group Model Building

Group Model Building is a modelling method for the participatory analysis of problems.

In a multi-stage and iterative process, experts from academia and practice come together to collate and discuss system elements and their possible relationships, and illustrate these in a shared model. If a model proves valid, it is used as a basis for formulating recommendations

for action. Overall, group model building not only fosters a shared understanding of a given problem but also the ability to make decisions in relation to collectively analysed problems.

Group modelling processes can vary in terms of length, but they can be roughly sub-divided into five steps. (1) The first step is to identify the participating actors' different perceptions of the problem, followed by (2) hypotheses about the dynamics of the system underlying the problem. This may involve examining the contexts holistically, isolating individual system components, or identifying the different perspectives of the participating actors on the reasons why the problem has arisen. Different techniques may be employed in this respect – primarily, in order to expose implicit assumptions and differences in the language of the participating actors. The next step (3) is to build on this to develop a dynamic model. This model is (4) tested and, if necessary, corrected, before it is (5) used to develop recommendations for action in the form of individual decisions or entire strategies.

Using this method to understand the operational context and as an opportunity for knowledge integration: Because TDR primarily operates in usage contexts in which it is necessary to consider the existing constraints, complex ways of looking at the problem, and possible developments, this model concept is of central importance in the research. System models serve to represent (complex) networks of effects and identify the characteristics of these (complex) systems. On the one hand, it is about reconstructing slices of reality in such a way as to incorporate complex relationships into a clear structure. On the other hand, the system model functions as a tool in collective learning in the sense of a mental model. The system model also helps to familiarise the participating actors with the thought patterns of others, and therefore with how they structure the problem. In this respect, it not only helps in collating knowledge (knowledge integration) but also in the social integration of the participating actors – and therefore also in fostering the effectiveness of the research process.

This method is used in several requirements:

- Understanding operational contexts
- Planning in occasions for knowledge integration and making use of opportunities

References:

- Vennix, J. A. M. (1996): Group Model Building: Facilitating Team Learning Using System Dynamics. Hoboken: Wiley.
- Siokou C., Morgan, R., Shiell, A. (2014): Group model building: a participatory approach to understanding and acting on systems. Public Health Research and Practice, Vol. 25(1).
- Bergmann, M. et al. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt/New York: Campus, S. 95–102.

Individual Responsible for Integration

<u>One way of fostering knowledge integration is to explicitly anchor it in the project design and establish clear responsibility for it.</u>

Knowledge integration tends to be successful if it is planned into the project as a discrete task and allocated its own resources for the necessary procedural steps. Likewise, it also helps if it is clear which individuals within the project are responsible for knowledge integration and for guiding the integration processes. In larger projects in particular, it may be advisable to ensure

the individual in question is not also responsible for the tasks involved in project coordination. The knowledge integration role involves various different tasks, e.g.:

- Planning, monitoring and flexible adaptation of the integration strategy, always keeping the aims of knowledge integration in mind
- Selecting, shaping, guiding and evaluating individual integration methods
- Facilitating reflection or preparing knowledge

The individual responsible must therefore possess the relevant skills, e.g.:

- The ability to adopt a neutral position
- Openness to different thinking styles
- The methodological knowledge and ability to be able to support group work
- The expertise to maintain an overview of the content
- Training in approaches to moderation and project management

Experience in TDR is very useful in this role.

This does not mean that the individual responsible for knowledge integration should implement the integration measures alone, or decide alone which measures should be implemented. It is much more about ensuring that there is an individual responsible for the overall planning for knowledge integration, someone who, for example, considers and make suggestions for which integration methods would best suit which objectives and tasks. During the research process, too, the individual responsible may respond flexibly to emerging desiderata and necessary adaptations. This individual's role may also change, depending on the project phase and the task at hand. An individual may plan the integration or moderate selected integration formats in one project phase and then implement the integration of new findings him/herself in another. However, although an individual may be responsible for integration, this does not mean that integration is delegated to this individual by other project participants. Integration is, rather, an overall task for the project team.

Using this method to establish responsibilities and processes for knowledge integration: Naming the individuals responsible and the necessary resources makes the task of knowledge integration visible over the course of the project and fosters successful integration processes.

This method is used in the following requirement:

- Establishing responsibilities and methods

Informal Dialogue

Informal dialogue helps participating actors get to know one another and creates and maintains a basis of trust in order to ensure a positive atmosphere between individuals working together within the project.

The relevance of the possibility of informal dialogue between participating actors was emphasised several times in the TransImpact project forums. There is a broad range of possible formats for a non-committal dialogue between colleagues. The format must, however, always suit the project context and the participating actors. Some swear by longer breaks over a good

coffee; others find joint field trips with social evenings over the course of several days very enriching. On the surface, informal dialogue has no direct objective in terms of project work. These occasions may, however – without any moderation or creative techniques –, give rise to interesting conversations that implicitly or explicitly enrich the project. Many participating actors value the opportunity to broaden their horizons and their networks beyond the project. Such occasions also create trust, thereby facilitating further collaboration within new projects. Informal dialogue can therefore be one of the prerequisites for generating potential effectiveness and transfer.

Using this method to foster a culture of collaboration and knowledge integration in social and communicative ways: A key advantage of informal dialogue is that it strengthens solidarity within the group, for working together in the group is also about "enjoying good company". If this aspect is forgotten or omitted, the objective level of collaboration may suffer.

Using this method to observe the dynamics of interests: The motivations for, and interest in, taking part are usually addressed more directly in an informal dialogue than in official discussions. Listening attentively and dealing respectfully with the information enrich and support the coordination of the project in terms of observing the dynamics of interests.

Using this method to support mediators: Informal dialogue has proved to be important in supporting mediators. Mediators need to have network contacts and access to potential pick-up contexts. Opportunities for informal dialogue are very suitable for identifying mediators with the relevant contacts. If a project offers regular opportunities for informal dialogue, including with external actors who may have an impact on effects, this supports the work of the mediators, for on these occasions they can approach advocates and individuals from potential pick-up contexts directly. This may also build up trust between the mediators and the individuals from the potential pick-up contexts. This trust may lead to further collaboration.

This method is used in several requirements:

- Fostering a culture of collaboration
- Observing the dynamics of interests
- Fostering knowledge integration in social and communicative ways
- Supporting mediators

Integration Via Models

Models are important tools for translating a practical problem into academic research questions as well as for mediating between different disciplines.

Bergmann et al. (2010, 96, our translation) define models as "idealised representations of something (the object of the model), for someone (the subject of the model) and for a reason (the purpose of the model)". There are very different types of models: scale models, laboratory models, mathematical models, economic models, simulation models, conceptual models, and many more. Models can also use different media: there are linguistic text-based models, graphic models, computer models and replicas, e.g. architectural models. One possible way of differentiating models according to their aim is to divide them into functional models on the one hand, which illustrate real structures as precisely as possible, and ideal-type models on the other, which present relations in as abstract a way as possible.

The form and purpose of a model within a project depends on the aims of the project, the cognitive interest, the participating actors and the financial resources. In all cases, however, at the start of the process of developing the model, it is important to come up with a concept that connects theory and empiricism and decide which factors influence the model or are relevant to society. In addition, the development of the model must be iterative: new findings must be absorbed into the model, and the model must be repeatedly reviewed in the context of these.

Using this method to create occasions for knowledge integration and make use of opportunities: Models enable us to bring together different knowledge bases and establish interfaces between different disciplines and cross-disciplinary dimensions. Non-academic knowledge, too, can be fed into the model.

This method is used in the following requirement:

- Planning in occasions for knowledge integration and making use of opportunities

References:

- Bergmann, M., Jahn, T., Knobloch, T., Krohn, W., Pohl, C., Schramm, E. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt am Main: Campus Verlag, S. 85-105.
- Anwendungsbeispiel: Gaube, V. et al. (2008): Ein integriertes Modell für Reichraming. Partizipative Entwicklung von Szenarien für die Gemeinde Reichraming (Eisenwurzen) mit Hilfe eines agentenbasierten Landnutzungsmodells. Social Ecology Working Paper 106, Institute for Social Ecology, Wien.

Integrative Hypothesis Formulation

Integrative hypothesis formulation helps to identify and structure problems. It involves first of all collating hypotheses in an unstructured way and then linking these together in a later, integrative process.

The first step is for all project partners to formulate hypotheses on the question of why the problem at hand came about in the first place. The causes of the problem formulated in these hypotheses, and often perceived differently, are then collated and discussed, and the relationships and contradictions between them are presented in a network of effects. When the participating actors begin to interrelate these causes, the interdependencies between the individual hypotheses become apparent. The characteristics of the problem at hand come into sharper focus. The selection of participating societal and academic actors is very important in this method, for it is only their knowledge that is feeding into the hypothesis formulation and therefore into the collective perception of the problem. Here, for example, an actor analysis is highly suitable for identifying and selecting actors for integrative hypothesis formulation.

A good time to use integrative hypothesis formulation might be the kick-off meeting that concludes the problem definition phase. In addition, the visual methods of concept maps and the soft-system methodology create opportunities for combination or dialogue in relation to the structuring of practical problems.

Using this method for clarifying interests: The method of integrative hypothesis formulation helps project teams to differentiate and consolidate individual vested interests, for individuals'

own interests and their perception of the main causes and solutions of the problem are closely related.

This method is used in the following requirement:

- Clarifying interests

References:

- Angelo, T.A.; Cross, K.P. (1993): Classroom Assessment Techniques. A Handbook for College Teachers. San Francisco: Jossey-Bass Publishers, S. 197ff.
- Bergmann, M. et al. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt/New York: Campus, S. 75ff.
- Defila, R.; De Giulio, A.; Scheuermann, M. (2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: vdf, S.77.
- Siokoua C., Morgana, R., Shiella, A. (2014): Group model building. A participatory approach to understanding and acting on systems. Public Health Research and Practice, Vol. 25(1).

Iteration and Recursivity

Iteration means the solution to a research problem is developed gradually by repeatedly employing the same procedural steps. Recursivity means the output of a sub-area is evaluated and then becomes the input for the next procedural step.

In terms of the specific work of the project, iteration and recursivity mean that material is gradually enriched through contributions from academia and practice, e.g. through case studies or the incorporation of feedback. For example, knowledge that has been developed by an academic discipline within a sub-project can then be processed further by a different discipline, or academic knowledge can be evaluated and enriched by practice. Both iteration and recursivity enable an open learning process within the research project. Also, initial possible solutions are frequently tried out in practice, and feedback from practice is fed into a new step whereby the solution is adapted (recursivity).

The actual recursive work takes place in the project execution phase. However, this work must be planned early on, in the problem definition phase. It is important that the project planning provides for enough resources for recursivity in terms of staff and time. Two examples here are:

- The project planning may contain interface seminars in which the project participants discuss and evaluate interim results, and, if necessary, make changes to the planning.
- The project planning may set out a timeline for when the project team itself will review the project's relevance to the problem, the target definitions and the progress made in terms of achieving the project goals, and when it will compare these with the respective new insights acquired over the course of the project.

The planning and execution of iterative and recursive processes overlaps with the general tasks involved in research management and project-related evaluation or quality management.

Using this method to allow for and apply adaptivity: Iterative and recursive processes regularly compare interim results with changes arising from the research process. In so doing, they support an open, learning-focused research process and one which ties research into

practice – thereby increasing the potential effectiveness of the research project. The prerequisite for this is appropriate resource planning during the problem definition phase.

Using this method to explain and justify the selection of knowledge: The selection of knowledge is not a discrete process, rather must be repeatedly and iteratively reviewed over the course of the project. It is important to make comparisons with the broader environment of the project, e.g. with new publications, as well as with the insights generated by the project itself.

This method is used in several requirements:

- Allowing for adaptivity
- Adaptivity as a guiding principle
- Explaining and justifying the selection of knowledge

References:

- Bergmann, M. et al. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen, Frankfurt/New York: Campus, S. 132ff.
- KFPE (1998): Guidelines for Research Partnerships with Developing Countries. 11 Principles. Bern: Swiss Commission for Research Partnership with Developing Countries.

Monitoring

Internal monitoring of the project may be used to keep a check on the processes running in the project or to identify possible changes in the operational context.

In general, monitoring means overseeing and systematically capturing processes, e.g. through minuting. The focus of the monitoring may also be on the effects. Effect-oriented monitoring means continually and systematically observing and recording the progress and effect of a project. This gives an insight into where the project stands in relation to the intended effects. The perspectives of important participating actors can also be captured over the course of the monitoring. This takes into account the complexity of development projects as well as unpredicted events.

Using this method to prepare results effectively and address pick-up contexts: Monitoring is for establishing the effects within the project and using these as a basis for evaluation (e.g. formative self-evaluation). Ideally, the pick-up context will be included in the evaluation. The effects discovered over the course of the monitoring may also be used to interest potential pick-up contexts. Furthermore, the monitoring method can support transfer into a new context. The latter also makes it possible to evaluate the measures employed in order to promote transferability, or review which knowledge was transferred or appropriated. This information then feeds into the further development of tailored results. The monitoring may also help to draw attention to changes within the sphere of activity that may open up possibilities for the project.

This method is used in several requirements:

- Addressing pick-up contexts
- Preparing results effectively

Morphological Analysis

When preparing results, it is advisable to prepare various components. Project results can rarely be merged into a model that can be transferred in its entirety.

This is generally attributable to the complexity of the problem or to the extent to which the possible solutions are context-dependent. However, in combination with the necessary adaptive steps, existing approaches, methods, models and tools can certainly be used to stimulate similar processes in other contexts.

Abstract concepts such as the overarching and transferable idea of the multifunctional usage of (urban or rural) space may be helpful here.

Morphological analysis, as it is called, is mainly used in interdisciplinary and sometimes also in transdisciplinary research approaches in urban and rural planning, but also in sustainability research (cf. Baccini/Oswald 1999). Here, it is used to make the planning aspect accessible to other disciplinary approaches by, for example, representing the interaction between various planning components (transport infrastructure, building infrastructure, supply infrastructure, etc.). This is called a morphological network, and questions, too, can be attached to it, e.g. questions of (physiological) material streams. In addition, a visual representation such as this is suitable for incorporating practical everyday expertise. The representation as a network also makes it possible to adapt, add in or omit various components or nodes with a degree of flexibility.

Using this method to prepare results effectively: This method and the network character of the representation allow possible solutions to be altered and prepared with a degree of flexibility. This enables the pick-up contexts to select the most suitable possible solution according to the relevant influencing factors described.

This method is used in the following requirement:

- Preparing results effectively

References:

- Baccini, P.; Oswald, F. (Hrsg.) (1999): Netzstadt. Transdisziplinäre Methoden zum Umbau urbaner Systeme. Zürich: vdf Hochschulverlag.
- Streich, B. (2011): Stadtplanung in der Wissensgesellschaft. Ein Handbuch. 2. Auflage, Wiesbaden: VS Verlag für Sozialwissenschaften.
- Zur morphologische Analyse: Wirtschaftslexion24.com.

Multi-Stakeholder Discussion Group

In the multi-stakeholder discussion group, representatives of the actor groups involved in the project come together regularly to discuss the design and execution as well as the results and their implementation.

Regular dialogue – where possible, tightly synchronised (e.g. monthly) – between the participating actors on a level playing field (preferably in a neutral space) fosters collective knowledge generation and, at the same time, effective and adaptive project management. Moderated discussions facilitate access to implicit knowledge (tacit knowledge) as well as

communication between different thought collectives. The method helps to build trust, fostering reciprocal communication processes and therefore appreciation among the project participants. Regular collaboration strengthens acceptance of the results and identification with the project and its objectives. It is advisable to begin the dialogue in the multi-stakeholder discussion group format before the start of the project and conclude it with a collective evaluation of the research process.

A prerequisite for the success of a multi-stakeholder discussion group is an experienced moderator who can support the group work as a mediator and by flexibly shaping the discussions. This is because dialogue within a group in which there are different interests, different kinds of knowledge, and variation in the extent to which that knowledge is established and accessible, does not come automatically. To work, it needs not only effective support but also informal formats and settings, such as story-telling, joint field trips and other opportunities for informal dialogue.

Using this method to observe the dynamics of interests and review the participatory concept: The multi-stakeholder discussion group is a suitable tool in the hands of the project leaders or coordinators, as it helps to understand the different interests, expectations and positions of the participating actors, and to capture and manage the dynamics of these. Advanced skills may become visible during the group collaboration that are relevant in fulfilling or re-defining the roles within the project. The prerequisites for successful use of the format are continuity and regularity. This method builds trust as well as fosters the participating actors' commitment and therefore also the acceptance and effectiveness of the project results.

Using this method to create occasions for knowledge integration and make use of opportunities: Regular meetings and personal constancy are good prerequisites for ensuring that different perspectives and knowledge (including implicit knowledge) are articulated and new shared knowledge emerges. A multi-stakeholder discussion group is also a suitable format for evaluating the selection of knowledge at the beginning of the project or evaluating interim results.

Using this method to explain and justify the selection of knowledge: The members of a multi-stakeholder discussion group all have their own approach to the research problem and their own knowledge about the project topic. They build a suitable body for evaluating the existing knowledge and identifying possible gaps, and they also contribute knowledge themselves.

This method is used in several requirements:

- Observing the dynamics of interests
- Reviewing the participatory concept
- Planning in occasions for knowledge integration and making use of opportunities
- Explaining and justifying the selection of knowledge

Networking

Networking is an opportunity to connect individuals, informally organised groups, civic organisations or other institutions with one another in order to pursue shared goals, mediate information and establish contacts.

The aims of networking for the purposes of the project are to keep actors who may have an impact on effects regularly informed and, in turn, to learn more about the actors' needs, interests and objectives. To this end, the projects we examined addressed local politicians or other external individuals relevant to the field at an early stage, or involved them in the projects. Networking turns the focus outwards and draws attention to possible pick-up contexts. This method involves addressing advocates who can pass on the results, or who might themselves have an interest in their implementation. In addition, establishing networks may also contribute to the participating actors creating new projects together within other contexts, incorporating the results from the old projects.

Opportunities for networking are provided, for example, by informal gatherings such as field trips and social evenings in the pub. Larger information events involving the presentation of results, e.g. trade fairs, exhibitions, conferences, symposia or advanced training sessions, also offer ample opportunity for dialogue.

Using this method to support mediators: Networks are central to transferability. Purposefully giving mediators the opportunity to network with one another may create new constellations of collaboration. Networks spanning mediators and potential pick-up contexts are the first step in mediating the results from the project into new contexts. Here, networking can be used as a way of pointing out the project's potential transferability or addressing potential pick-up contexts.

This method is used in the following requirement:

- Supporting mediators

Observation

Observation is a method of qualitative social research; it generates knowledge about modes of behaviour in a specific context.

There are different processes for observation: the person who is observing can observe covertly or overtly, or in a participatory manner. Observations can be carried out systematically or unsystematically, with or without standardised observation schemes.

The idea behind participatory observation is that certain issues or dynamics between actors are not necessarily articulated, rather only become visible in interactions. It is also important to consider the influence of the person observing on that which is being observed.

The data acquired through observation can be supplemented, for example, with interviews, thereby broadening the knowledge acquired through the perspective of the actors. It is advisable to clarify the role of the person observing and their access to the context of the problem, so that no one is unsettled by the process, and so the data collected does not fail to reflect the everyday situation.

The data collected during an observation is first of all recorded in note form (partly during the observation situation itself) and then developed into an observation report with as much detail as possible. The data collection may be supported by audio or video recordings.

Using this method to incorporate knowledge about the problem: Observation helps researchers understand the problem under focus, the behaviour of the participating actors and

the rules governing the respective context. The implicit knowledge gained in this way, about how people behave in these contexts, is central in the further study of the problem.

This method is used in the following requirement:

- Incorporating knowledge about the problem

References:

- Flick, U. (2007): Qualitative Sozialforschung. Eine Einführung. Reinbek: Rowohlt Verlag, S. 281 ff.
- Knoblauch, H. (2001). Fokussierte Ethnographie: Soziologie, Ethnologie und die neue Welle der Ethnographie. Sozialer Sinn, 2(1), 123-141.

Organisational Chart

An organisational chart provides information about the project structure and processes as well as about who, in which role, is responsible for what.

An organisational chart consists of a graphic and a related commentary text. The organisational chart should be as simple and comprehensible as possible and as informative as necessary. This tool provides information about the kinds of advisory boards and groups a project has at its disposal, who is responsible for what, or who makes which decisions, who belongs to which institution, and who is subject to directives from whom. A useful addition here would be information on who fulfils which function within his/her "mother institute" and what capacities and resources are available to him/her. Often, project participants are not "made available" or funded for the entire duration of the project. A valuable piece of information is also what proportion of individual participating actors' standard working hours are set aside for the project. This is important information to have when it comes to shaping and managing the processes.

Using this method to review how the roles are fulfilled: Whether a project member fulfils his/her role in the project depends not only on whether s/he possesses the required knowledge and the necessary skills. An organisational chart can make visible the factors that structurally foster and/or inhibit the perception of roles. Regular collective reviewing of the validity of the organisational chart and the structural implications may also provide insight into whether the allocation of roles should be reviewed. Often, a process of reviewing highlights the need for structural changes, which may entail a specification of new roles or a redefinition of roles.

This method is used in the following requirement:

- Reviewing the fulfilment of roles

Practitioners: Integration Through Mediation

Integration with the practitioner via a mediator means having individuals in the academic project team who constantly mediate the transfer between practitioners and the research team.

The mediator's job is to facilitate, as far as possible, a seamless transfer of relevant information between academia and practice. Ideally, the mediator belongs to both groups. For example, the individual may work in a research-oriented department of the practice and be a fully-fledged member of the project team. In the mediator role, it is essential that the individual is recognised

by both groups as, in principle, being a member of their group. This is to avoid conflicting roles and responsibilities. The transfer activities must give a great deal of consideration to the respective culture of the practitioner.

Using this method to understand the operational context: The mediator may significantly increase both the integration of practical requirements into the research and development project and the resulting adaptation of the project results to the demands of practice (generating effectiveness).

This method is used in the following requirement:

- Understanding the operational context

References:

- Bergmann, M. et al. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt/New York: Campus, S. 130f.

Project Advisory Board or Monitoring Group

Project advisory boards and monitoring groups help to integrate a broad range of stakeholders in the development of a research project.

Project advisory groups and monitoring groups provide a place for all those actors who cannot be integrated into the actual research team or steering committee, such as users, parties affected by the problem, experts or specialists. The functions of these monitoring boards mainly consist in supporting and advising a project as well as discussing research results. Their duties should include "capturing" the needs of users and evaluating the results from their point of view. In addition, though, they also function as advocates, mediating communication about the project, which may increase visibility as a result. In so doing, they open up an important bi-directional interface with the environment of a research project and foster the integration of actor groups who may have an impact on effects. Factors to consider when setting up advisory boards or monitoring groups are, inter alia, their size, their objectives and the authority granted to the participating actors. These parameters help to determine how active the work of the respective advisory board will be, and to what extent it will be perceived as influential.

Using this method for adaptivity as a guiding principle: The actors from the project environment who come together in the advisory board benefit from first-hand information and the opportunity to actively introduce their skills and interests into a current project. The project team, in turn, gains an additional layer of self-reflection and acquires important insights into the structure of the participating actors' needs.

Using this method to prepare results effectively and address pick-up contexts: Individuals from potential pick-up contexts may also be invited to join an advisory board or monitoring group. Their perspectives, their perception and their awareness of the problem, as well as their needs in their respective operational context and environment can be identified and incorporated at an early stage. A target-group-specific preparation of the results may draw on the findings of work that has been undertaken in conjunction with an advisory board or a monitoring group, both in terms of content and design. This method makes it possible to address pick-up contexts

directly. A further advantage is that the members of the advisory board or monitoring group track the development of the project and are therefore familiar with the opportunities and challenges presented by it. This makes it easier for them to weigh up the added value of a transfer into their own context. If they decide on a transfer, the information and insights acquired through the monitoring may enable appropriation in the new context.

This method is used in several requirements:

- Adaptivity as a guiding principle
- Effective preparation of results
- Addressing pick-up contexts

References:

- Defila et al.(2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: Vdf Hoschulverlag, S. 221f.
- Projektmanagement Handbuch

Project Partner Survey

As early as the proposal phase, the initiators of the project may conduct a survey of interests among potential project partners that provides an overview with relatively little time and effort.

Surveys by means of questionnaires or telephone interviews supported by guidelines are possible tools here. In the first instance, the results of this survey serve as a basis for deciding whose expertise will support the project and therefore who should be involved. It is important to make the specific interests and expectations of the individual actors clear very early on. The answers can then feed into a revision of the original draft proposal. This revision is then sent back to the selected project partners, and they are invited to comment on it.

Using this method to clarify interests: The survey provides an opportunity to capture the interests of potential project partners and incorporate them, as appropriately as possible, into the proposal.

This method is used in the following requirement:

- Clarifying interests

Public Relations Work/PR

Targeted external presentation, e.g. through actor communication, ensures that attention is drawn to the project and its results not only within academia but also elsewhere – and it does so while the project is still running.

Whereas academic publications in selected journals may be enough to attract attention in the respective academic community, different PR activities are needed in practice in order to make the results of the project public. PR tools can be useful here. If you want to do more than simply keep the public informed about the project, such as communicate the project's added value for selected target groups, thereby encouraging them to appropriate the results, an integrated public and communication concept that combines the following measures may be useful:

On the internet: project homepage, newsletter, social media (linking up also with private and semi-professional networks), videos

Events: symposia, information events, exhibitions, roadshows

Printed material: flyers, brochures, readers (also make these accessible online)

Interactive products: exhibitions, workshops, interactive internet products, web-tutorials

Media presence and advertising: adverts in print media, press releases, interviews with project participants in daily newspapers

Because these tasks are resource-intensive and require particular skills, we recommend entrusting professional agencies with the PR work. Funding providers generally offer, within the framework of a funding programme, the possibility of using their platforms and events to present the project to a broader public. Often, funding providers select flagship projects that are advertised via additional PR measures.

Using this method to attract attention and address pick-up contexts: Targeted PR work generates curiosity around results and attracts the attention of actors in potential pick-up contexts.

This method is used in the following requirement:

- Addressing pick-up contexts

Risk Analysis

The purpose of a risk analysis is to construct and evaluate scenarios and, where necessary, plan additional resources for managing these. In so doing, it is important to always bear in mind how the risk analysis will actually be used.

This method is not about predicting the future or creating a sense of panic within the team. The aim is, rather, to anticipate possible difficulties over the course of the project, develop, in a forward-looking way, alternative courses of action, and raise awareness of different types of risks and management strategies within the team. Relevant questions in this context are, in the first instance, related to content: what kinds of decisions, changes and problems is the team facing over the course of the project? It is then possible to discuss, on a higher level, the likelihood of the respective risks occurring, the potential damage posed by these risks, the types of overlying risk present, and how to avoid unfavourable developments in advance, or, in acute cases, how to manage these. One important effect of this work is an increased flexibility within the team when it comes to the point where drastic changes really are needed. The team is better prepared, has perhaps already developed a suitable alternative course of action, and is therefore under less pressure than a team that is unprepared.

Using this method to allow for adaptivity: Risk analyses allow a project to develop, in a forward-looking way, various alternative courses of action for possible future deviations – which are not entirely avoidable or predictable –, thereby increasing flexibility through non-rigid planning.

This method is used in the following requirement:

- Allowing for adaptivity

References:

- Borgert, S. (2013): Resilienz im Projektmanagement. Bitte anschnallen, Turbulenzen! Erfolgs-konzepte adaptiver Projekte. Wiesbaden: Springer.
- Renn, O. (2004): The Challenge of Integrating Deliberation and Expertise. Participation and Discourse in Risk Management. In: Mac Daniels, T.L.; Small, M.J. (Hg.): Risk Analysis and Society. An Interdisciplinary Characterization of the Field, S. 289–366. Cambridge: Cambridge University Press.

Role Plays

In projects with a high number of participating actors from different operational contexts and disciplines, and therefore also from different cultures of thinking, it is advisable to use methods that allow the participating actors to relate to other situations and undergo a shift in perspective.

This facilitates an understanding of other peoples' motives and interests, as well as their potential scope of action – and their limitations. It also helps in developing options for action. One of these methods is role play.

Participants in a role play take on pre-defined roles within the framework of a specified situation and represent the interests connected with the roles in the play. By way of preparation, the scenario and the roles can be developed and the distribution of roles decided together. The role play is moderated, and it is decided in advance under what circumstances the moderator should intervene in the proceedings, when and how the role play will end, and what the objective is.

The subsequent evaluation of the role play reflects the individuals' perception of the roles and the course of the role play. The participants can then freely discuss, evaluate and record the insights gained and the options for action developed according to the specific objective. Alternatively, several role plays based on a particular problem may be conducted in parallel in small groups.

Using this method to prepare results effectively and address pick-up contexts: Preparing results effectively also involves addressing a target group. This method can help to identify potential pick-up contexts and describe the interests and needs of the individuals who will potentially be active in those contexts. It can also capture the contextual conditions and possibilities of such individuals and create awareness of the conditions in the pick-up context. This makes it possible to approximate to the interests of the actors who are not present, as well as to their potential scope of action. Knowledge such as this may also be helpful in addressing potential pick-up contexts.

This method is used in several requirements:

- Addressing pick-up contexts
- Preparing results effectively

Scenario Development

Scenarios can be used to identify different possible future developments. Various knowledge bases converge in the scenarios.

Considering selected relevant factors in the scenario development highlights possible future developments. In terms of a rough outline, the process has four steps:

1. The object (the scenario space) is defined. This encompasses the topic, the problem, the timeframe and the parameters of the scenario. It is also established here which sources are being consulted for information.
2. The key factors that will influence the future developments in the scenario space are identified. These may be content variables or parameters, but also developments or events.
3. Each key factor is analysed in terms of the ways in which it may develop in the future.
4. The scenarios are generated by selecting for each scenario the manifestations of the key factors that fit together well, thereby ensuring the consistency of the scenario. The scenarios can be presented differently: visually, narratively or with mathematical techniques.

The specific procedures for selecting the object and the key factors may look very different. The Stakeholder Visioning Method focuses specifically on non-academic expertise. In this form of scenario development, practitioners collectively develop visions for the future.

Using this method to create occasions for knowledge integration and make use of opportunities: Often, in transdisciplinary contexts, scenarios are developed on a participatory basis in one-day workshops with experts or practitioners from different disciplines. Qualitative and quantitative knowledge, too, may be taken into account in the development of the key factors. Through this participatory approach, it is possible to incorporate into the scenarios different actors' implicit knowledge or existing knowledge from previous studies. If the key factors are defined collectively, this also contributes to collective learning processes. The finished scenarios are then able to be used as visualisations for knowledge transfer and for discussions going forward. Scenarios are also a way of dealing with insecure or inadequate knowledge bases.

This method is used in the following requirement:

- Planning in occasions for knowledge integration and making use of opportunities

References:

- Kosow, Hannah, Gaßner, Robert, IZT WerkstattBericht Nr. 103. Institut für Zukunftsstudien und Technologiebewertung, Berlin
- Innovation Lab, Salzburg Research Forschungsgesellschaft
- Keller, Stefanie (2018): Visioning

Searching for Existing Information

Research that involves searching for existing information may supplement personal knowledge.

Knowledge integration may involve incorporating practitioners, for they carry knowledge about the context of the problem. However, it is also possible to integrate knowledge from other sources. This is where classical research methods come in. Depending on the project topic, the relevant data sources may be, for example, historical archives, previous project results, socio-empirical surveys, measurements or mappings. These help, for example, to incorporate knowledge about the history of projects, e.g. historical conflicts or collaborations, into the project, and understand the effects on the project content.

Using this method to incorporate knowledge about the problem: The results yielded by searching for existing information may supplement personal contributions from actors. They enable a better understanding of the context of the project and the problem at hand, and the absorption of this knowledge into proposed solutions.

This method is used in the following requirement:

- Incorporating knowledge about the problem

Social Network Analysis

Social network analysis is a method for exploring the patterns of relationships between actors.

The actors who are the focus of the network analysis may be individuals, organisations or social groups. The network analysis examines not the features of the individual actors but the kinds of relationships between the actors, e.g. communication, behavioural roles or hierarchies.

In order to conduct a network analysis, it is first of all important to establish the area of application and define and identify actors. The data used for the analysis may come from interviews, documents, surveys, observations, etc. This data is codified and transferred into a matrix. The connection data are evaluated and presented graphically using a software programme.

Key starting points for the analysis are as follows:

- The centrality of an actor within a network (i.e. the quantity of this actor's relationships says something about the prominence of this actor within the network)
- "Betweenness" as a measure of the dependence of the other actors on this actor
- The proximity of one actor to other actors through direct or indirect relationships
- The reach of the actors within the network
- The size of the network
- The centralisation of the network or the formation of sub-groups within the network
- The closeness of the connections within a network

Using this method to incorporate knowledge about the problem: Knowledge about the existing social networks in the context of the problem helps in processing the problem adequately, identifying the pivotal actors in accordance with the respective research question, and integrating these into the research activities.

This method is used in the following requirement:

- Incorporating knowledge about the problem

References:

- Adler, S., Grünmayer, S. Schmidt, M. (2010): Konzepte der Netzwerkanalyse. Herkunft, Bedeutung und Basiskonzept der sozialwissenschaftlichen Netzwerkanalyse. Report, Universität Wien, Fakultät für Psychologie, FB Sozialpsychologie.
- Müller-Prothmann, T. (2007): Wissensnetzwerke: Soziale Netzwerkanalyse als Wissensmanagement-Werkzeug.
- Baumöl, U., Ickler, H. (2018): Soziale Netzwerkanalyse.

Staging a Message

"Staging" a message means conveying the propositional content of the message with the aid of elements that make the message clearer, more tangible and therefore more accessible to the recipient.

Depending on the issue and the question, different individuals and groups from different fields of scholarship and practice come together in transdisciplinary projects. A basic prerequisite for their collaboration is functioning, effective communication. In terms of what is being communicated, and how, the project team needs to develop a concept that is subject to recursive and regular reviewing. TDR should, if possible, take a dialogic and reflective approach in all phases of the research.

Communication in TDR happens on different levels and in different settings: within the system of practice, within the academic system, between practice and academia as well as in the context of surveys and/or communication with actors external to the project. The communication in these settings should take into account the different ways in which people absorb and process information, incorporating their interests and needs. In so doing, it is important to translate or "stage" the message for the target groups.

A tried-and-tested form of staging a message is any kind of visualisation that can be realised in initial sketches, visual reports of meetings and discussions, through to project posters. Materialising interim results in models, prototypes or demonstrators (depending on the subject area) supports communication and therefore understanding. Further possibilities are – strongly depending on the group, issue and target group – role plays, public debates, etc.

Using this method to foster a culture of collaboration: Transparent and symmetrical internal communication is a prerequisite for establishing a basis of trust for collaborative work in the group. It is also a prerequisite for knowledge integration, which is not possible without an appropriate exchange of information. Communication geared towards a target group of actors external to the project who are having an impact on effects fosters the generation of potential effectiveness.

This method is used in the following requirement:

- Fostering a culture of collaboration

References:

- Defila et al.(2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: Vdf Hochschulverlag, S. 267f.
- Reitinger, E., Krainer, L., Zepke, G., Lehner, U. (2014): Kommunikation beobachten, ihr einen Rahmen geben und sie reflektieren. In: Dressel, G.; Berger, W.; Heimerl, K.; Winiwarter, V.: Interdisziplinär und transdisziplinär forschen. Praktiken und Methoden. 1. Aufl. Bielefeld: transcript Verlag. S. 135-149.

Stakeholder Analysis

A stakeholder analysis captures external influences on a project.

Different factors can be captured:

- Social environmental factors are individuals, groups or institutions that may influence a project in some way. Compiling these actors may provide the basis for a differentiated actor analysis, actor map or constellation analysis.
- Objective environmental factors are issues or facts that affect a project, e.g. legal regulations, but also media discourses, public opinions, other research projects or the existing requirements of a project. The objective environmental factors may form the basis for a later risk analysis.
- Temporal environmental factors are events, decisions or activities before the start, during, or at the end of the project which influence the project.

One form of representation for a stakeholder analysis might be a table with social, objective and temporal environmental factors that also marks, and differentiates between, whether these factors are internal (e.g. existing requirements of a project) or external (e.g. other research projects) to a project.

Stakeholder analyses, however, can also be prepared graphically. The project is placed at the centre, and the stakeholder and environmental factors are arranged around the project. The greater the influence on the project, the larger the factor's symbol. The proximity or distance of a factor to the project is also illustrated graphically. A graphic illustration such as this can be used as a basis for role playing as a way of identifying the different expectations of the project and developing strategies for dealing with these.

Using this method to incorporate knowledge about the problem: This structured examination of the project environment and the project's stakeholders helps the project team assess the context in which the project is taking place, which knowledge bases related to the project topic are available, but also which actors may be relevant to the development of the project or its effectiveness. If the stakeholder analysis is conducted at regular intervals, this also makes it possible to capture changes in situations. This knowledge is a prerequisite for integrating knowledge within the project.

This method is used in the following requirement:

- Incorporating knowledge about the problem

References:

- Rabelt, V., Büttner, T., Simon, D. (2007): Neue Wege in der Forschungspraxis. Begleitinstrumente in der transdisziplinären Nachhaltigkeitsforschung. München: Oekom Verlag. S. 99.
- Windolph, A. (ohne Datum): Die Umweltanalyse einfach erklärt.

Strengths and Weaknesses of the Collaboration

Regular reflection on the collaboration helps in identifying difficulties and conflicts in good time; it also enables targeted improvement of the collaboration and helps to foster a collaborative culture.

The strengths and weaknesses of collaboration can be openly examined, collated and collectively discussed. There are also standardised tools for capturing and evaluating the positive and negative aspects of collaboration within the team. One of these is the so-called Team Climate Inventory (TCI). This diagnostic tool was conceived in order to aid team development. The tool consists of 44 questions that can be answered in less than 15 minutes. The test assumes that good collaboration requires a good team climate. Four characteristics determine the climate within a team: vision, task orientation, participative safety, and support for innovation. The profile of strengths and weaknesses within the group depends on the respective manifestation of these four characteristics.

Using this method to foster a culture of collaboration: The aim of regular reflection on collaboration is to check whether the rules and principles of the collaboration – either decided upon previously or tacitly accepted – are still appropriate and functional. Taking a reflective approach to the nature of the collaboration facilitates a smoother research process and reinforces the participating actors' desire to work within the team towards shared goals (increasing their potential impact on effects).

Furthermore, capturing the strengths and weaknesses of the collaboration highlights whether there is a need for additional skills. It may be necessary to discuss whether this need can, or should, be met by adding to the team members or by providing the existing team members with further training.

Using this method to review how the roles can be fulfilled: Repeatedly capturing the strengths and weaknesses of the collaboration may be used as a monitoring tool to review whether the roles can be fulfilled as planned, or whether there is a need for additional skills. It may be necessary to discuss whether this need can, or should, be met by adding to the team or by providing the existing team members with further training.

This method is used in several requirements:

- Fostering a culture of collaboration
- Reviewing the fulfilment of roles

References:

- Defila et al.(2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: Vdf Hochschulverlag, S. 208f.
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Systemic Analyses

Systemic analysis considers structures of relationships and dynamics between different actors.

Systemic approaches come from the fields of consultancy and coaching and are also used in organisational development. They were originally conceived in order to analyse disturbances in systems (e.g. within a family, a company or an organisation) and identify possible modes of intervention. The focus question is the cooperation between the individual parts of the whole system: how do the actors or institutions within the social systems interact and communicate with one another, and what patterns are identifiable within these processes of interaction?

Systemic approaches do not consider an event or pattern of interaction in isolation but in terms of its functionality within the overall structure. In this respect, interventions or changes have an impact across the whole system.

There is a multitude of methods for implementing systemic approaches. These range from moderation methods through to methods for representing and analysing processes and structures. One example is the organisational constellation.

Using the method to incorporate knowledge about the problem: A systemic consideration of the actors or a selected organisation existing within the context of the problem supports the understanding of relations and may make it easier to decide which actors and knowledge bases to incorporate, but also to identify where changes or interventions need to be made. The solutions developed may also be adapted to the necessities of the existing relationships and dynamics.

Using this method to address pick-up contexts and support mediators: A systematic examination helps to make the dynamics in the environment comprehensible. It is important to pay attention to these dynamics so that new pick-up contexts can be identified. In addition, a systemic examination can also help to identify mediators within the project and highlight the extent to which they are embedded in various contexts. Increased awareness of mediators' embeddedness and the possibilities this creates supports them in their activities. Under the focus of transferability, it has also become clear that it is helpful to be aware of the fact that potential pick-up contexts are equally embedded in their respective environment. Being aware of these dynamics from the perspective of the project, too, makes it possible to respond better to the needs of the pick-up contexts.

This method is used in several requirements:

- Incorporating knowledge about the problem
- Addressing pick-up contexts
- Supporting mediators

References:

- Systemische Gesellschaft (ohne Datum): Was ist systemisch?
- Systemische Gesellschaft (ohne Datum): Systemische Methoden
- Deutsche Gesellschaft für Systemische Therapie, Beratung und Familientherapie e. V. (ohne Datum): Systemische Organisationsberatung und Organisationsentwicklung

- Midgley, G; Wilby, J. (1995): Systems Methodology: Possibilities for Cross-Cultural Learning and Integration. Hull: Centre for Systems Studies Press.
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Tandem Principle

The tandem principle supports a permanent and equal cooperation between disciplinary experts and practitioners within a shared research project.

Tandems are also used in interdisciplinary ways, i.e. between two different disciplines. Within the framework of this method, the working groups within the individual sub-projects are made up of interdisciplinary and cross-institutional practitioners and academic experts. Depending on the number of perspectives involved, this gives rise to inter- and transdisciplinary tandems (or tridems), which carry out the respective project-relevant procedural steps together. This reinforces the equality of different perspectives within the overall research process, as well as the continual integration of the knowledge involved.

The tandem principle can be introduced in the problem definition phase, after the process of jointly describing the practical problem is complete and an academic scope of work, including a workflow, has been developed. This method can also be introduced at a later point in time, and can furthermore be combined with other team-building methods, e.g. the Venn diagram tool or skills profiles. These help the teams capture the individual expertise and skills of all the participating actors before the tandem is formed, and relate these to one another.

Using this method to establish responsibilities, functions and tasks: Establishing inter- or transdisciplinary tandems or tridems in the problem definition phase makes it possible, in the first instance, to allocate clear roles for interdisciplinary dialogue during the project execution. This enables a more systematic and effective implementation of the dialogue. In general, this method also helps to make the results and texts more intelligible (and more vernacular). In addition, the tandem principle establishes clarity around which actors are actually part of the project and which functions and tasks fall within whose area of responsibility.

Using this method to create occasions for knowledge integration and make use of opportunities: Close collaboration between people from different backgrounds makes it possible to engage with the collaboration partner's thinking style and knowledge. The different perspectives are automatically integrated if there is shared decision-making on procedural steps and approaches within the project.

This method is used in several requirements:

- Establishing clear roles
- Planning in occasions for knowledge integration and making use of opportunities

References:

- Baccini, P. & Oswald, F. (Hg.) (1998): Netzstadt. Transdisziplinäre Methoden zum Umbau urbaner Systeme. Zürich: vdf, S. 34.
- Bergmann, M. et al. (2010): Methoden transdisziplinärer Forschung. Ein Überblick mit Anwendungsbeispielen. Frankfurt/New York: Campus, S.123.

- Defila, R.; De Giulio, A.; Scheuermann, M. (2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: vdf, S.189.

Target-Group-Specific Representation

The target-group-specific representation of results is a basic prerequisite for making the results useful to others in as tailored a way as possible.

It is first of all important to be fundamentally aware of the audience for whom the results are being written up and at whom they could potentially be directed. To a certain extent, the literature differentiates between arenas (the political arena, the civic arena, the media arena, the economic arena and a "future arena") which must be addressed in different ways (Krainer et al. 2016). In addition, the fact that different actors appropriate and use the results differently should also be taken into account. Participatory actors from practice may tend to draw on examples of best practice in their attempt to implement solutions for their context, whereas actors from the natural sciences tend to use theoretical models. Furthermore, there is a fundamental canon that argues that the preparation of results ought to be guided by principles such as intelligibility. Visualisations can be helpful in this. A target-group-specific representation of results requires, in the first instance, an actor analysis. Once the target groups have been identified, it is possible to gear the preparation of results towards their needs.

Using this method to prepare results effectively: A target-group-specific representation also enables the team, at an early stage, to look beyond the project and aim for possible transfer by asking: Is the knowledge captured in the results adequate enough to enable transfer? Is the representation of the context specifics adequate enough to be able to draw conclusions with regard to comparable contexts? Is the level of abstraction of the generalised findings adequate enough for the actors in the pick-up context to be able to interpret and re-contextualise it? Do the form and shape of the representation provide a point of connectivity for the target group (particular actors in the pick-up context)?

This method is used in the following requirement:

- Effective preparation of results

References:

- Bergmann, M; Brohmann, B.; Hoffmann, E.; Loibl, M.; Rehaag, R.; Schramm, E.; Voß, J.-P. (2005): Qualitätskriterien transdisziplinärer Forschung. Ein Leitfaden für die formative Evaluation von Forschungsprojekten. ISOE Studientexte, Nr. 13. Frankfurt am Main.
- Krainer, L.; Winiwarter, V. (2016): Die Universität als Akteurin der transformativen Wissenschaft. Konsequenzen für die Messung der Qualität transdisziplinärer Forschung. GAIA, 25(2). S. 110–116.
- Bastow, S.; Tinkler, J.; Dunleavy, P. (2014): The Impact of the Social Sciences. How Academics and Their Research Make a Difference. London.

The Delphi Method

A Delphi survey is a survey of experts, conducted in two or several rounds, which brings to light different opinions and perspectives on an issue.

A Delphi survey is moderated by an individual person or a small team; there are several steps to it:

1. A group of experts is selected. The experts remain anonymous.
2. The facilitator sends the experts a questionnaire or open questions on the issue under focus.
3. The facilitator summarises the answers and sends them back. The experts evaluate each statement on a numerical scale according to how far they agree or disagree with these, and then justify their responses.
4. The facilitator evaluates the answers and identifies where the experts are in agreement and where there are different opinions. In order to do this, the average values of agreement and divergence must be calculated and the justifications summarised. The results are sent back to the experts, who are asked to repeat their evaluation in the context of the group values and the arguments. They can also respond to arguments by other experts. This step can be repeated in several rounds.

A Delphi survey brings to light the areas in which experts are in agreement and those which divide opinions. It also captures the arguments for and against the positions. The assumption is that differing opinions will approximate or at least stabilise over several rounds.

Using this method to explain and justify the selection of knowledge: The experts' evaluations quickly demonstrate which issues give rise to conflicts and which are uncontroversial. The evaluations by actors external to the project therefore provide some insight into the kinds of knowledge bases that exist and where, within the project, knowledge must be integrated with particular care.

This method is used in the following requirement:

- Explaining and justifying the selection of knowledge

References:

- Linstone H A, Turoff M 1975. The Delphi Method. Techniques and Applications. Reading: Addison-Wesley.
- McDonald D, Bammer G, Deane P 2009. Research Integration Using Dialogue Methods. Canberra: ANU E-Press, S. 41-50.
- Td-net Toolbox

Thick Description

Thick description helps to represent the results acquired in the research process – embedded in the context of their development.

Thick description has its origins in ethnology (Geertz 1987). A thick description is not just a descriptive representation of the phenomenon that is being described (usually social activity) but also of the context or the relations in which the phenomenon is observed. In addition to description, it also includes the understanding and the interpretation of the situation in the respective context. The role of the researchers and their approach is also reflected upon. It may involve, for example, describing the context in which the project was executed, the central assumptions, the development of the results and the role and contribution of the participating actors. Explanations of which conditions have fostered or inhibited the development of the

results may also be useful. This kind of description can help to generate suppositions and expectations about the deeper connections between the phenomena under study.

Thick description can be useful in capturing and representing the results of transdisciplinary projects. The context-specific results described in this way may, due to the precise description of the conditions, serve as a basis for further development and implementation in other contexts. Thick descriptions may also form the basis for so-called case descriptions.

Using this method to prepare results effectively: Thick descriptions allow teams to prepare the results in such a way that readers can acquire information about the conditions under which a project in a specific context has either functioned or not functioned. Based on a thick description, pick-up contexts can weigh up for themselves, even without any direct contact to the original context, whether it will be useful and feasible for them to transfer the (partial) results, or how the solutions should be adapted to their own context.

This method is used in the following requirement:

- Preparing results effectively

References:

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- Geertz, C. (1987): Dichte Beschreibung. Bemerkungen zu einer verstehenden Theorie von Kultur. Frankfurt/Main: Suhrkamp.
- Giseke, U. (2015): Urban Agriculture for growing City Region. Connecting Urban-rural Spheres in Casablanca, London/New York: Routledge.
- Ponterotto, J.G. (2006): Brief note on the origins, evolution and meaning of the qualitative research concept 'thick description'. The Qualitative Report 11(3), S. 538-54.

Validating the Selection of Knowledge – Supported by Effective Preparation

It is important for the selected knowledge to be validated by the project team, by practitioners and possibly also by other experts from the topic area, both when collating this knowledge and also when refining it.

This process limits arbitrariness or randomness in the selection of knowledge and increases the breadth of the knowledge captured. It involves preparing the selected knowledge (or the selected perspectives, theoretical approaches, etc.) in such a way that it is intelligible and clear for all participating actors. Visualisations such as mind maps may be helpful in this. Capturing the knowledge bases in tabular form and reinforcing these with a caption is also possible. The decisions or criteria determining which particular knowledge bases or perspectives have and have not been included must be transparent and justified.

One method of validation or evaluation is to ask the practitioners to prioritise the knowledge bases according to their relevance to the problem at hand. Expert interviews can also be helpful in a prioritisation. If an evaluation by a third party is not possible, it is at least helpful to put temporal distance between the knowledge capture and the (renewed) critical examination.

Using this method to explain and justify the selection of knowledge: Early feedback and validation by the project team and other actors prevents relevant knowledge being overlooked

or wrongly weighted. In addition, a transparent selection enables an open discussion of which knowledge should and should not be drawn upon in solving the problem.

Using this method to prepare results effectively: This method is a suitable tool for reviewing the validity of the results on the level of both content and design. The following questions are useful with regard to the dimensions of the preparation of knowledge: Are the results comprehensible? Have the most important aspects been captured? Is any supplementary information needed? When implementing the method, the presentation of the results can also be evaluated in terms of its suitability for mediation.

This method is used in several requirements:

- Explaining and justifying the selection of knowledge
- Effective preparation of results

References:

- Flick, U. (2014): Qualitative Sozialforschung. Eine Einführung. 6. Auflage, Reinbek: Rowohlt Verlag. S. 248ff.

Visualisation

Visualisations help to make different perspectives and complex information more comprehensible, thereby bringing knowledge together. In addition, through the creative process associated with them, they trigger the generation of new knowledge.

Information is processed more quickly by the human brain if it is presented not only linguistically but also visually. Recalling and using information also comes easier if this is recorded graphically. Visualisations of knowledge can improve knowledge transfer, support discussions, illustrate complex facts and make different perspectives visible.

Visualisations can also directly trigger processes of knowledge integration. For example, different actors can work together to sketch out models or structures. Unlike texts, sketches can be generated very easily and re-worked collectively. The creative activity involved in the visualisation of the established knowledge bases may foster new insights.

Examples of visualisations are mind maps, diagrams or visual metaphors. Concept maps, for example, are suitable for representing different perspectives on the research object: the various actors sketch the problem under focus in the project from their perspective and are guided in this process by general questions (e.g. who are the relevant actors?). A glance at the drawings quickly shows where the group is in agreement and where the perspectives diverge.

One way of representing the knowledge bases and skills relevant to a project is a knowledge map. Where possible, this should also include areas of ignorance or lack of knowledge.

Using this method to create occasions for knowledge integration and make use of opportunities: Engaging with different perspectives and graphic representations of knowledge enables communication about existing knowledge. Used as a creative technique, visualisations can generate new knowledge.

Using this method to prepare results effectively: When structuring the content of publications, such as guidelines or handouts, visualisations can provide further access to the content and therefore help to mediate the knowledge more intelligibly.

This method is used in several requirements:

- Planning in occasions for knowledge integration and making use of opportunities
- Effective preparation of results

References:

- Defila et al. (2006): Forschungsverbundmanagement. Handbuch für die Gestaltung inter- und transdisziplinärer Projekte. Zürich: Vdf Hochschulverlag, S. 77.
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- Eppler, Martin J.; Burkhard, Remo Aslak (2004): Knowledge Visualization. Towards a New Discipline and its Fields of Application. Università della Svizzera italiana.
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