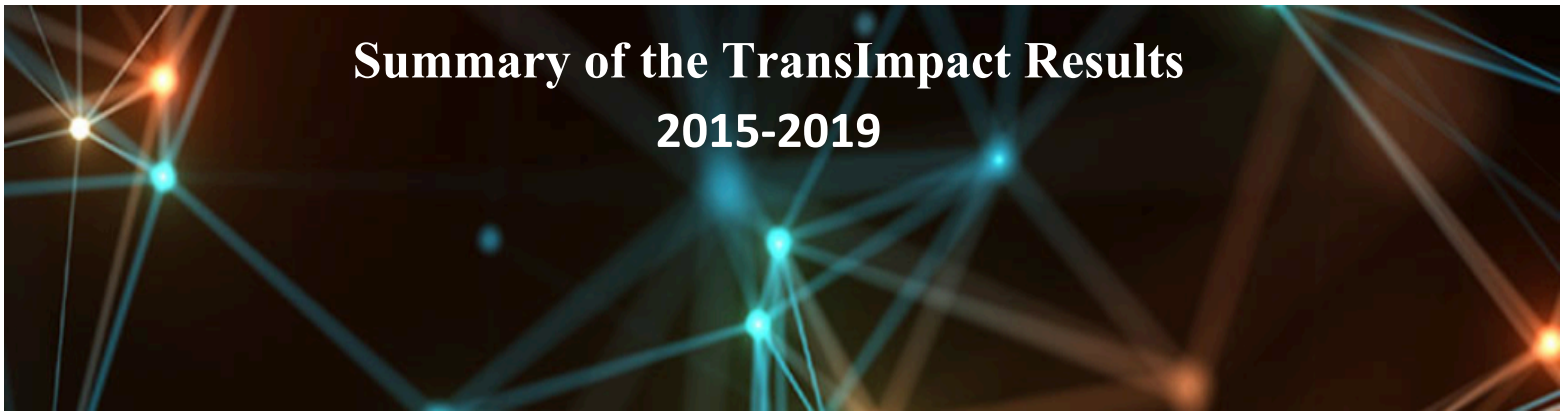
Summary of the TransImpact Results 2015-2019



This folder contains the TransImpact results on the four main topics developed in the project:

1. Participation

2. Defining the Problem

3. Transferability

4. Knowledge Integration

Emilia Nagy, Lena Theiler, Martina Schäfer, Alexandra Lux, Matthias Bergmann, Thomas Jahn, Oskar Marg (2020)
Participation: Researching and Learning together – Adaptivity as a Guiding Principle.
Summary of the TransImpact Results; Main Focus: „Participation“.
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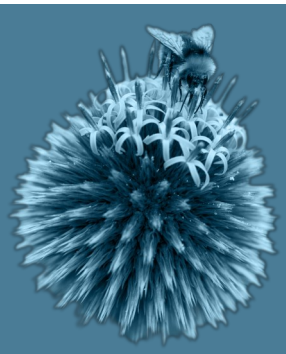
Participation



Researching and Learning together - Adaptivity as a Guiding Principle

Summary of the TransImpact Results; Main Focus: „Participation“.
Documentation of the Project Results 2015-2019.

Participation: Researching and Learning Together – Adaptivity as a Guiding Principle

The participation of actors from economics, civil society and politics in research processes makes it possible to develop workable solutions to a problem. But how do we shape successful participation?

1. Background: Participation – A Key Element of Transdisciplinary Research

A key element of transdisciplinary research (TDR) is the participation of non-academic actors in the research process. These may be practitioners from civil society, administration, politics and companies, but also citizens who are either interested in or affected by the research. The involvement of societal actors is necessary in enabling us to address complex problems sustainably and activate and generate the potential for the desired effects. In this sense, participation encompasses several aspects. Through their participation, societal actors gain access to research processes and have the opportunity to co-shape these. Furthermore, they also contribute to the dissemination of research results, and, ideally, their participation will add value to both their working environment and their everyday lives.

The advantage for the researchers is that they can gain access to know-how and expert knowledge from practitioners. They can become acquainted with new perspectives on the problem at the heart of their project and address the various interests and needs of the societal actors.

How these functions of participation are fulfilled within the research practice depends on the specific project and context. The shaping of participation is therefore closely connected with the question of who should be involved, and when, in what role, and to what end. Each project therefore needs an individual concept that provides for specific and appropriate forms of participation in each individual phase of the project. The different forms of participation are essentially defined by how the participating actors communicate with the project owners and what influence the participants have on the knowledge that is to be generated and the shaping of the project. We distinguish between three forms of participation:

- **Information:** This rather weak form of participation consists in informing the relevant actors in the respective problem area about the project or its results in order to produce transparency. Conversely, information and data are acquired for the research by collecting know-how using classical sociological methods (e.g. questionnaire surveys,

case studies). Here, the respondents have hardly any influence on the development of the project.

- **Consultation:** Consultation consists in selected actors giving feedback on the project. Ideally, their contribution to the research process and the research results is reflected back, e.g. via presentations of the interim results. In this advisory role, practitioners can directly influence the development of the project and the project results – and thereby the effectiveness of the project. This kind of participation, e.g. in the form of advisory committees, is a widespread participatory format in TDR.
- **Collaboration:** Through their close involvement in the research process, collaborating actors can influence and be co-responsible for the course of the project. They play an equal role in generating knowledge and participate in the dissemination and implementation of the results. This form of participation is the most time-consuming.

Participation is characterised by a recurrent opening and closing of processes (iteration). This is particularly useful when the aim is to involve actors or actor groups in varying quantity, degree and intensity. Opening up the participation processes can generate greater societal representation within the research project, for the participating actor groups can be represented by different individuals in different phases of the project.

Forms of participation with greater influence on the shaping of processes and results often take place in smaller groups. Larger groups, on the other hand, are used for acquiring data and expanding the project's knowledge base. The opening and closing of processes can also mark the boundary between inter- and transdisciplinary collaboration: interim results generated by interdisciplinary means are enhanced or evaluated with the involvement of practitioners.

The results of the project analysis by TransImpact indicate that an appropriate combination of forms of participation as well as ensuring that the entire process is subject to iterative opening and closing are more important in the effectiveness of a research project than the respective individual participatory methods used. Furthermore, our results showed that the specific development of the project is crucial in the effectiveness of the research and in generating potential effectiveness. By realising participation, researchers can facilitate a responsible dialogue with societal actors. This dialogue has a transformative power and can generate change. All participants, whether practitioners or academics, benefit from reciprocal learning processes and from tapping into new or expanded possibilities for action. If these opportunities are actively seized – above all, by the societal actors –, this can foster effectiveness. The possible effects of participation are manifold:

- changes in the subjective perception of a problem
- reciprocal learning processes between academia and practice

- acceptance and implementation of academic findings
- appropriation of new competencies by sharing ideas with other actors
- promotion of existing and development of new networks

2. Participation – Researching and Learning Together

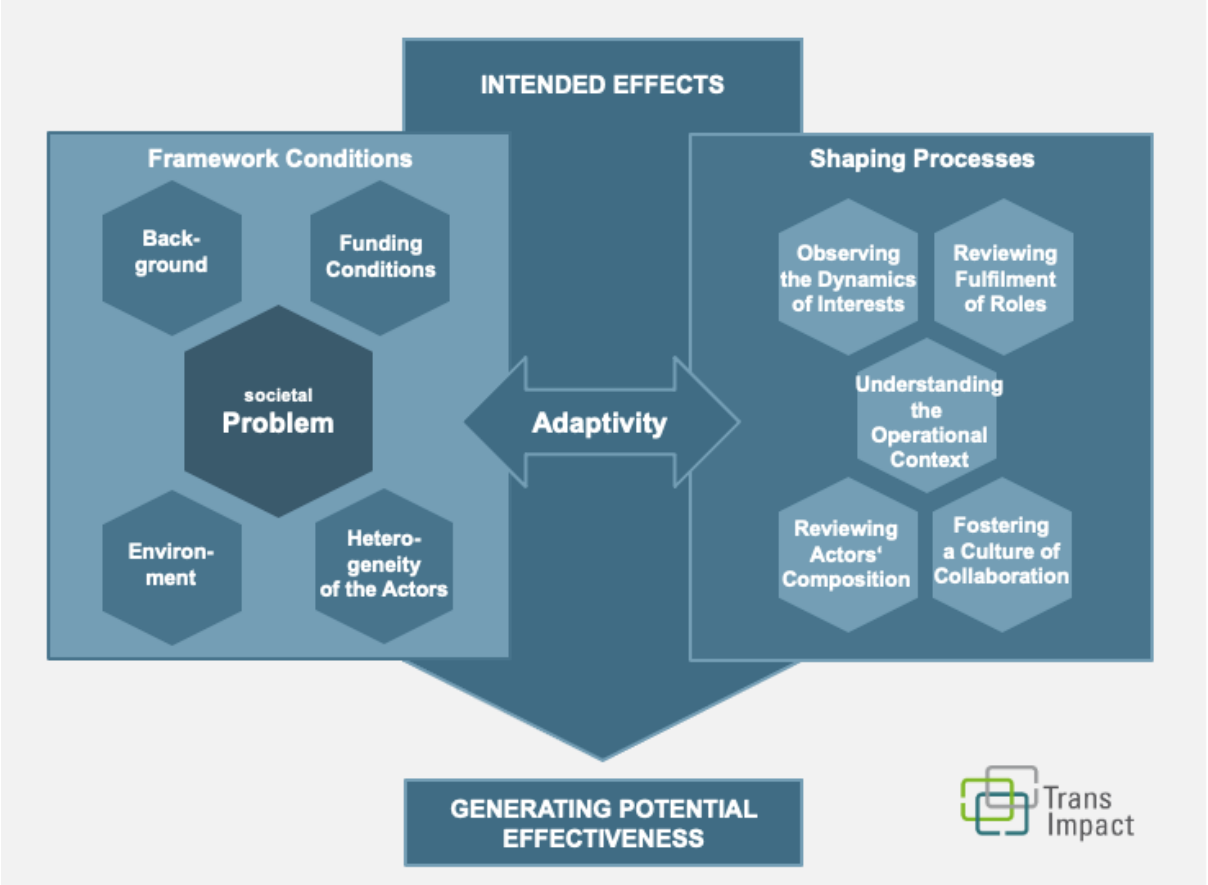
One of the most important motives for participation is the desire to include the broadest possible spectrum of perspectives, experiences and knowledge about the problem the research project is addressing. This is bound up with the aim of developing sustainable solutions that are connective in practice. The assumption here is that findings that are generated together with practitioners may also be more readily accepted, implemented and disseminated by the societal actors than those that are generated without their involvement. Practical implementation and societal effectiveness are also fostered by the participation of actors who, for example, have some influence on decision-making processes in politics and administration or have access to important networks. It therefore makes sense – especially on a strategic level – to involve advocates who can mediate and help to implement the results obtained.

There are a number of questions around how participation should be shaped: who should be involved, in what role, and to what end? The answers differ from project to project. This is why an adaptive participatory concept is necessary. Such a concept connects the effects the project is aiming to achieve with the specific forms and intensities of participation for each phase of the project. Considering the potential effects early on, particularly with respect to these questions, is therefore both prudent and important. The basis for later potential effectiveness is formed in the phase of defining the problem. The potential for effectiveness can only be influenced positively if thought is given to how a project might produce effects (anticipated impact chains), e.g. through the selection of participating actors and through strategic considerations of their role.

The analysis of the TransImpact research projects was focused on the participatory methods and approaches used in the problem-solving phase. Our study showed that it was not so much the individual participatory methods and approaches that were crucial to the effects of a project, rather a considered combination of these methods. This methodological mix is reflected in the participatory concept. Moreover, the adaptability of this mix to the project dynamics is essential in the generation of potential effectiveness.

The figure below summarises our results on the importance of participation in generating potential effectiveness. Two elements are central to this. The first is the societal problem

defined in the problem definition phase – this becomes a framework condition for the research. The second is the ability to respond to externally and internally generated project dynamics. We call this the adaptivity of the project and regard it as a key guiding principle in generating potential effectiveness.



Scheme for Generating Potential Effectiveness with the Participation of Societal Actors

3. Possibilities and Limits of Participation

To better understand the possibilities and limits of an effective shaping of transdisciplinary projects, it is helpful to consider the framework conditions and shaping processes separately. The discussions in the project forum on participation confirmed that transdisciplinary projects cannot be considered in isolation from their framework conditions, especially with regard to their potential effectiveness. The framework conditions, e.g. the background to or environment of a project, significantly affect the decisions taken at the start of the project. It is in this initial phase that the researchers establish the societal problem to be addressed, the main features of the project design, and therefore also the participatory steps. In contrast to the shaping processes, though, the framework conditions are difficult to influence.

4. Results and Recommendations

The analysis of the projects under the thematic focus of participation showed that the specific development of participatory processes is crucial in the effectiveness of the projects. Observing and managing the dynamics in participatory processes are essential in order to foster the generation of potential effectiveness and make it possible to activate this later on. In so doing, it is important to consider the following points:

- Continual co-reflection on possible impact chains supports the generation of potential effectiveness. The actual realisation of the effects the project aims to achieve depends on a multitude of factors and can, ultimately, never be guaranteed. Nonetheless, some of these factors can be influenced positively within the framework of participation, e.g. by including actors who will have a relevant influence on the effects.
- Where practitioners participate in TDR projects, these projects are "susceptible" to externally generated dynamics. Societal actors react quickly and sensitively to changes. Their rationales for action are often different to those of the researchers, as their decisions are influenced by questions of profitability, utility and interests.
- The relation between the participating actors and the initial problem may change in the course of a project. Interim results may give the research process a new direction, and in this case, some actors may no longer see their interests represented. But the more intensively societal actors are involved in a transdisciplinary project, the more strongly their perspective on the problem will influence the research process.
- Research practice shows that transdisciplinary projects are usually initiated and primarily proposed by academics. Participatory processes are therefore initiated and shaped from an academic perspective. The more intensive the collaboration with societal actors, the more important it becomes to ensure processes of self-reflection on the understanding of roles – including, and above all, academic roles.
- One key aspect of project management is an iterative and recursive reviewing of the participatory concept. Adjustments to the participant structure and the methodological mix must not, however, cause researchers to lose sight of the original societal problem. This is no trivial undertaking, since the understanding, or even the structure, of the problem may change over the course of the project. This may happen, for example, if more knowledge about the problem becomes available or the framework conditions, e.g. legal situations, change.

Effective participation must therefore encompass several dynamic relations at the same time. Our analysis of the projects demonstrated that process shaping and reflection are highly relevant in the project dynamics. Our results indicate the central importance of three factors: observing, understanding and assessing (1) the operational context, (2) the dynamics of interests, and (3) the manner in which roles are adopted and fulfilled. Taken together, these factors can foster a strong project dynamic that necessitates an iterative reviewing and adaptation of the

participatory concept. Of course, this kind of project management and process shaping in turn requires a positive culture of collaboration.

By describing shaping processes and requirements, we have created an operational framework that enables researchers to take a reflective approach to handling the project dynamics and generating potential effectiveness. Sometimes, the shaping processes have an important role to play early on in the problem definition phase. For those working on the project, these processes generate different requirements in terms of generating potential effectiveness. In this respect, these requirements are a point of orientation in terms of shaping individual and context-specific participatory concepts. Our compilation of exemplary methods and approaches, which respond to the individual requirements, should support you in reflecting on your own project-specific methodological mix.

When compiling the methods and approaches, we drew on sources that describe the methods, tools and approaches of TDR. These can be extended further – and at this point we would like to invite you to contribute to the continuing discussion in the transdisciplinary community.

5. Requirements

Adaptivity as a Guiding Principle

The guiding principle when it comes to participation is adaptivity, but this must not lead to arbitrariness. On the one hand, the potential effectiveness inherent in the problem definition must be activated, increased and expanded. On the other hand, it is important to respond simultaneously to external and internal project dynamics without acting opportunistically or jeopardising the fundamental project objectives. This is because adaptivity must not compromise the reliability of, or trust in, the research processes.

In the requirements for the problem definition phase, we have already indicated the necessity of allowing scope for adaptations over the course of the project. In the course of the TransImpact project, we have also shown that the ability to make readjustments is a key quality in TDR and therefore essential to its effectiveness. Participation provides an appropriate framework for this, as it enables identification and management of project dynamics. Furthermore, the participation of societal actors provides direct access to the operational context in which the intended effects are to be produced.

So, what are the conditions of adaptive project management within TDR? A distinction needs to be made between revisable and non-revisable decisions, and appropriate assessment

processes need to be put in place. Provisional clarifications and specifications are made in the problem definition phase. The requirements for successful participation help to identify the internal project dynamics in order to be able to respond to them. What is crucial here is therefore "understanding the operational context", "fostering the culture of collaboration", "observing the dynamics of interests" and "reviewing fulfilment of roles". The key to adaptivity lies, to a certain extent, in observing, understanding and assessing within these very closely interwoven fields. In order to fulfil these requirements for generating potential effectiveness, we need to contextualise the content, but we also need (self-)reflective methods.

How the necessity and urgency of the adaptations is measured is case-specific. Every situation and every project is dependent on the context. This is why each project needs its own reflective processes that allow the project partners to make decisions about possible readjustments. Only in the course of the research project does it become clear which of the intended effects are likely to be achieved and where there may be further potential effects. Here, it is possible to make readjustments where necessary, by increasing or decreasing the inclusion of individual actors. Opening and closing the processes is also an appropriate tool for involving actors or actor groups in varying degree and quantity.

What we should not forget here is that adaptivity has issue-related and structural limits. The guiding principle of adaptivity reaches its limit where it is no longer expedient to continue specific activities. The option to constructively terminate research activities must also remain open.

The following methods may be helpful in understanding the operational context: formative self-assessment, iteration and recursivity, project advisory board or monitoring group. On this, see ⟶ Toolbox.

Reviewing Fulfilment of Roles

We have already formulated the requirement to establish clarity as regards individual roles within the project group. In the context of participatory processes, the central question is now whether these roles can be fulfilled as anticipated. In the project analysis, for example, the following roles were highlighted as relevant: border crossers between research and practice, pilots to navigate the operational context, "door openers" to provide access to actors who will have a relevant influence on effects, gatekeepers to facilitate successful communication, shunters for implementation, ambassadors for the project and its aims, and intermediaries to

mediate the results. When reflecting on roles and how to appoint them, it is also important to consider the various roles that academics adopt within TDR processes. Acting as a moderator, a crisis manager or a knowledge broker are just some of the many different roles that cannot be reduced purely to professional expertise.

It also became clear that some roles only develop out of the project constellation and dynamics – sometimes, it is only in the course of the project that the necessity of these roles becomes clear, and sometimes, the roles that have been envisaged are not fulfilled in the appropriate way. This is when it may become necessary, for example, over the course of the project, to involve further partners and adapt the participatory concept to different framework conditions. Furthermore, some processes also require the same person to take on several roles.

The following methods may be helpful in reviewing the roles: coaching as an aid to self-reflection, an organisational chart, identifying the strengths and weaknesses of the collaboration. On this, see ⟶ Toolbox.

Understanding the Operational Context

It is an important prerequisite for successful participation and therefore also for the societal effectiveness of transdisciplinary projects that the non-academic project actors have a robust understanding of the operational contexts. The focus here is on developing a vision, shared by all project participants, of the societal and academic aims and application scenarios of the knowledge the project will generate. Where there are different understandings, there is a risk that the solution strategies developed within the project will not satisfy the important requirements of the operational context and will therefore not be connective in practice.

The understanding of operational contexts encompasses institutional rationales and decision-making processes just as much as it does knowledge about historical and current developments in the practical field of investigation. Furthermore, knowledge about tried-and-tested solution strategies, as well as about collaborations and networks in the respective sphere of activity, is also relevant. The development and fostering of mutual trust is closely connected with understanding the operational context. It is very advantageous if the researchers enter into the collaboration with pre-existing knowledge, whilst still being open to, and valuing, new information. The understanding of the operational context can be fostered by approaches at the level of project governance. An example of this is when academic and non-academic actors jointly lead projects and work packages where the tandem principle can be applied.

The following methods may be helpful in understanding the operational context: discourse field analysis, explorative interviews, group model building, constellation analysis, practitioners: integration through mediators. On this, see ⟶ Toolbox.

Observing the Dynamics of Interests

To ensure an effective participatory process, it is not only important to clarify the vested interests of all the participating actors at the start of the project. These interests must in fact also be continually monitored over the entire course of the project. The interests of the participating actors relate either to the specific content or the strategic orientation of a project and are influenced by pragmatic considerations. Sometimes, interests are not communicated openly, and sometimes they change over the course of the project, which can have an influence on the motivations of the participating actors. It is essential to observe such changes when, for example, a decision must be made as to whether, to what intensity, or in what form further collaboration is profitable for all parties. It is also important to take into consideration the range of interests in the process of knowledge generation, as this ensures the connectivity of the knowledge in the respective sphere of activity. However, not all interests are negotiable, and not all outcomes will necessarily be approved of by all actors. Acknowledging dissent, too, can be productive in terms of how the research process progresses.

With respect to the interests represented within the project, the question of power relations is a relevant aspect of TDR, something that has been pointed out several times in the project forums and at the validation workshops. We should not lose sight of this aspect in the context of TDR: it requires further research and discussion.

The following methods may be helpful observing the dynamics of interests: give-and-take matrix, informal dialogue, multi-stakeholder discussion group.
On this, see ⟶ Toolbox.

Fostering a Culture of Collaboration

Effective participatory processes in transdisciplinary projects are based on the soft skills of the individuals involved. Skills such as openness and empathy are key to understanding the multiplicity of perspectives within a project. Skills like these are fostered by creating space and opportunities for an open and, to a certain extent, informal dialogue. Ideally, this will not only generate a trusting and open atmosphere in which the non-academic actors feel they are taken seriously, but should also make it possible to identify and influence the group dynamics that

are necessary for effective participatory processes. The different project participants have varying levels of willingness and ability in terms of perceiving internalised paradigms of thought and action and expanding or revising these, and this may strongly influence joint project work. These processes require time and patience, but also the intuitiveness to recognise the need for understanding.

The following methods may be helpful in fostering a culture of collaboration: coaching as an aid to self-reflection, staging a message, informal dialogue, identifying the strengths and weaknesses of the collaboration. On this, see ⟶ Toolbox.

Reviewing the Participatory Concept

Participation by actors who will have a relevant influence on the effects is essential for effective TDR projects. In the requirements for the problem definition phase, we stated that the basis for the participatory concept is created by identifying the relevant actor groups. Within this concept it is decided who will be involved in the project, to what intensity, when and in what capacity, and what relevance their participation will have in the success of the project. Over the course of the project, it is then important to review the relevance of the respective actors in terms of their influence on the effects, and, if necessary, plan to involve further partners. Relevant changes may be made, for example, where particular actors do not possess the practical knowledge originally anticipated, or where they do not have the expected networks or leeway in decision-making. New findings over the course of the project or changes in discourses within the project environment – changes that may in fact be engendered by the project itself – may have an influence on the selection of actor groups with a potentially relevant influence on the effects. They may be selected because they themselves will implement the project results in future, or because they will be affected by the implementation or the results in some other respect.

The following methods may be helpful in reviewing the participatory concept: actor map, multi-stakeholder discussion group. On this, see ⟶ Toolbox.

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6. Further Reading

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Defining the Problem -– Making the Implicit Explicit.
Summary of the TransImpact Results; Main Focus „Defining the Problem“. Documentation of the Projetct Results 2015-2019.
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Defining the Problem

Making the Implicit Explicit

Summary of the TransImpact Results; Main Focus „Defining the Problem“.
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Defining the Problem – Making the Implicit Explicit

The description of the societal problem has a fundamental influence on the effectiveness of TDR. But what do we need to take into account here, and in what ways can we shape the generation of potential effectiveness?

1. Background: Problem Definition – The First Phase in Transdisciplinary Research Projects

Transdisciplinary projects must be fundamentally relevant to practical problems. The TDR mode is particularly suited to complex societal problems for which individual academic disciplines are unable to find any solutions on their own, e.g. where a problem has both societal and technical aspects. Furthermore, this mode is suitable where the motivation to research the problem comes from outside academia, such as in the case of politically controversial questions or those that affect the whole of society, e.g. in the context of developing renewable energies when there is dispute over the location of new power lines or the building of wind power stations.

The problem definition phase is characterised by a few fundamental elements, such as are also described in the literature on TDR. There are of course also various conceptions, distinctions and definitions in the literature on problem definition, but what we are concerned with here are the commonalities: the problem definition phase involves deciding who the academic and societal project partners will be, as well as agreeing on a description of the practical problem to be addressed.

The problem description must then be translated into a common TDR subject and objective. This involves formulating research questions in such a way that they take into account both practical and academic contexts. Here, research questions must primarily be formulated in a problem-oriented (and not a discipline-oriented) way in order to support integrative research work.

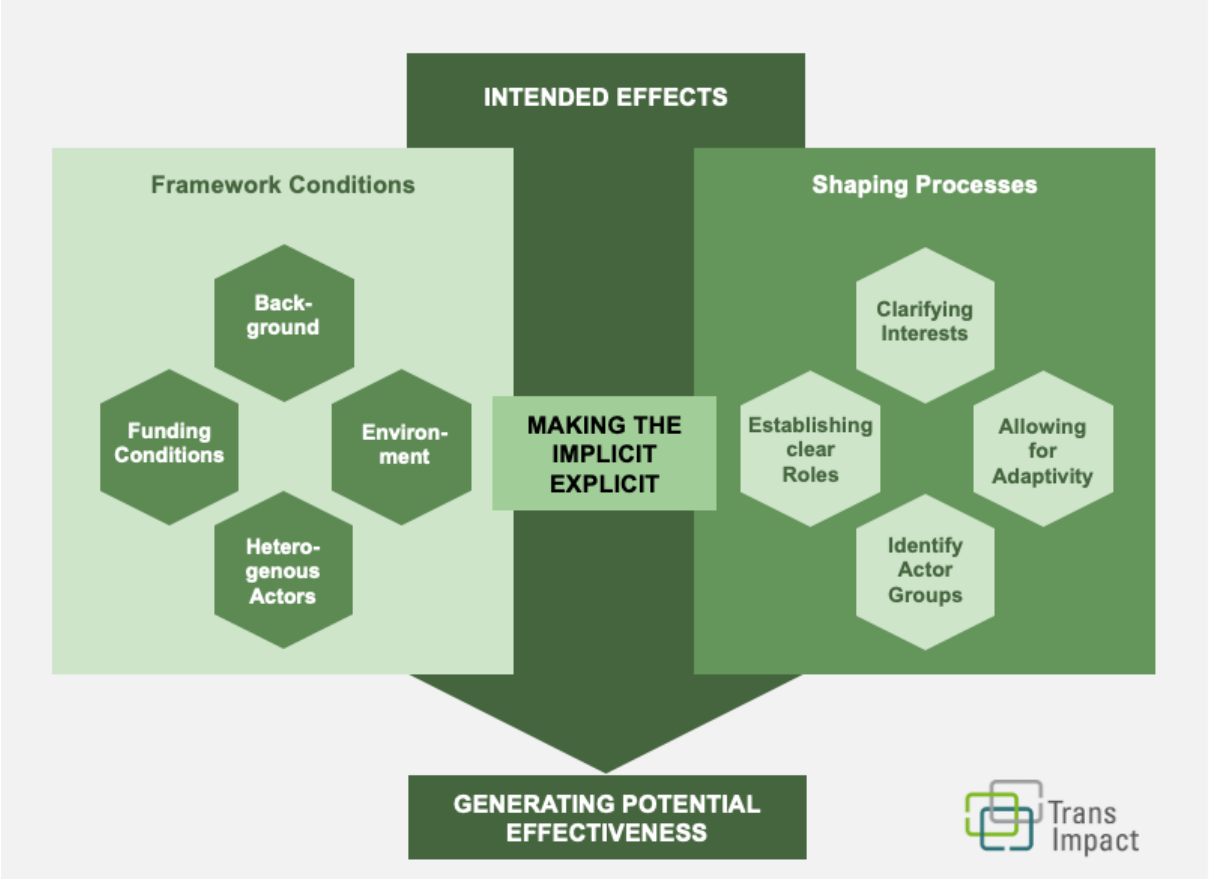
Ultimately, the aim is to develop a project structure and, ideally, an integration strategy. The start of the joint project – e.g. an approved proposal, a kick-off meeting or the concluding of the initial exploratory phase of the project – constitutes the end of the problem definition phase. It is now that researchers must establish the relevance to the problem, draft the initial project design and set out the expected results. This generates, early on, a deeper understanding of the problem under focus. Central to the effectiveness of TDR here is the need to pick up on both

practical and academic aspects of the problem. This process of knowledge production combines cognitive, organisational and social challenges.

2. Defining the Problem – Making the Implicit Explicit

The problem definition phase begins with determining the practical problem to be addressed and extends through to "translating" this problem into specific research questions. The scope of possible later effects is already established in this phase. But what possibilities does this phase offer in terms of shaping potential effectiveness?

During the problem definition phase, the focus is mainly on organisational questions. Here, researchers usually respond intuitively to the framework conditions, which are often taken as a given, such as the requirements of the funding providers in terms of project scope, duration and partners. The project analysis by TransImpact has shown that a prerequisite for consciously generating potential effectiveness is making these framework conditions, as well as the rather unconscious ways in which we deal with them, explicit – i.e. making them visible.



Scheme for Generating Potential Effectiveness in the Problem Definition Phase

3. Limits and Possibilities of Shaping

One key outcome of the analysis of various transdisciplinary projects by the TransImpact research project is the distinction between the structures that are most important and most difficult to influence: "framework conditions" on the one hand, and high-priority, active opportunities for action – "shaping processes" – on the other. At the same time, this differentiation offers a helpful perspective in terms of coming to a better understanding of the problem definition phase (see figure):

- Projects develop and are conducted under framework conditions that are only partially subject to influence. These framework conditions may foster or inhibit the effectiveness of projects. With respect to potential effectiveness, particular consideration must be given to the following framework conditions in the problem definition phase: the history of research projects, funding conditions, the heterogeneity of the actors, and environmental conditions.
- Shaping processes indicate where the main possibilities for action lie in terms of consciously generating potential effectiveness in the problem definition phase. This allows researchers to establish priorities for their approach in this phase. These shaping processes place requirements for generating potential effectiveness on those working on the project: they must clarify interests, establish clear roles, identify actor groups in the environment who may have a relevant influence on the effects, and allow for adaptivity (see further below).
- Methods and approaches indicate how the requirements can be implemented in practice. Examples of these are described here under the respective requirements.

4. Results and Recommendations

The history of research projects is an important factor in generating potential effectiveness. At the time of the problem definition, this history is a framework condition, since it can no longer be retrospectively changed. Here, lines of research, i.e. a succession of several projects, have a greater potential effectiveness than individual discrete projects. This is because the end of a project becomes the historical background to a subsequent project – ultimately, it is a type of effect. Here, there is accordingly more scope for shaping, for the future is taken into consideration. The extent to which a research project's historicity is significant in generating potential effectiveness can be captured if it is detached from the point in time at which it is being considered.

Making explicit, early on in the TDR project or even right at the beginning, the types of effects the researchers themselves and their partners wish to achieve is important in generating

potential effectiveness – this is a central insight, but it is rarely implemented. To this end, it is helpful to systematically differentiate between different types and degrees of effects (e.g. short- and long-term effects or local, regional and national effects) and to distinguish between results and effects.

The TransImpact research project showed surprisingly clearly the significance of heterogeneity within the many actor groups in transdisciplinary projects. This means that the differences between the various groups of practitioners are just as great as between the different groups of academics. Above all, the range of different skills, knowledge and interests is relevant in the generation of potential effectiveness, in both a productive and an obstructive respect. Here, the various interests should be made explicit early on and the respective roles within the research project should be clearly established.

5. Requirements

Allowing for Adaptivity

Adaptivity means the challenge of adapting the project design to changes over the course of time, and maintaining – and ideally even increasing – the relevance to the problem despite the necessary adaptations. It is precisely this focus on the relevance to the problem that is a crucial prerequisite in actually achieving the desired effects. The challenge consists in combining the clarifications and specifications set out in this early phase with an equally necessary openness to adaptation. In this respect, this requirement is different to, for example, “clarifying interests” or “establishing clear roles”, the aim of which is to establish clarity and make decisions as early as possible.

On the one hand, this means leaving the articulation of the intended results open enough to be able to respond flexibly to changes internal or external to the project. On the other hand, at the start of the project we need a good definition of the initial problem and core objectives so that the project and the participating actors have a constant point of orientation. A concept that is substantial in terms of content has an inherently strong basis for adaptations; in other words, it harbours the necessary openness to change without succumbing to the danger – associated with adaptivity and flexibility – of becoming arbitrary.

The following methods may be helpful in allowing for adaptivity as a guiding principle: iteration and recursivity, risk analysis, establishing superordinate research goals. On this, see ⟶ Toolbox.

Identifying Actor Groups

The questions of which practitioners should be involved in a project, when and how they should be involved, and to whom they should address the results, are, for various reasons, pivotal in the development of effectiveness:

- The participating actors (individuals or institutions) ensure the problems under focus and the intended solutions are relevant to their practice, and, as specialists or as parties affected by the problem, they bring their knowledge to the project.
- Projects can only be effective if it is clear which people, groups or institutions the research project results will affect.

Plans should already be made in the problem definition phase for when and in what form project results will be communicated to the relevant actors. The communication agenda must be developed in the problem definition phase, even though the content of the results cannot yet be known at this point in time.

The following methods may be helpful in identifying actor groups: actor analysis, actor communication, discourse field analysis, constellation analysis.
On this, see ⟶ Toolbox.

Clarifying Interests

In order to generate potential effectiveness early on, the interests of the actors participating in a research project should already be disclosed, discussed and taken into account in the problem definition phase.

This has several advantages:

- The motivation for participating in a project increases if the participating actors' own interests are addressed by it.
- Clarifying the different interests right at the beginning of the collaboration may prevent conflicts. Without this clarification, antithetical interests may later on impede or prevent the progression of the project.

Differing interests among the participating actors are not, however, negative per se for collaboration within the project. They can also unlock creative potential and lead to new insights, e.g. by each challenging the other's respective position. We therefore recommend involving not only familiar actors in the project but aiming for the greatest possible variety of

knowledge and skills when selecting the project partners. Otherwise, the creative potential of the research project and the search for solutions to the problem will be limited.

The following methods may be helpful in identifying actor groups: external moderation, give-and-take matrix, integrative hypothesis formulation, project partner survey. On this, see ⟶ Toolbox.

Establishing Clear Roles

The project participants should decide during the problem definition phase which actors and which institutions involved in the project should be given which tasks, responsibilities and functions. This allocation needs to be well-founded and to take into account the respective individual and institutional abilities. The distribution of these roles within the project is an organisational and communicative task. There is a range of reasons why it is important for the generation of potential effectiveness:

- The functions and contributions of the individual project actors are the foundation for relevant and connective project results.
- If the roles of the actors are already made transparent in the problem definition, this may avoid later conflicts around functions and tasks as well as demarcation problems.

Researchers and practitioners may influence the intended effects in different ways, depending on their abilities. For example: practitioner A is involved because of his/her know-how, whereas practitioner B is involved because of his/her position and skills as a mediator to the decision-makers; these differences should be taken into account, and their respective tasks and roles within the project should likewise be different.

The following methods may be helpful in establishing clear roles: co-writing of research proposals, external moderation, feedback processes, tandem principle. On this, see ⟶ Toolbox.

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Emilia Nagy, Anna-Christine Ransiek, Alexandra Lux, Lena Theiler,
Matthias Bergmann, Thomas Jahn, Oskar Marg, Martina Schäfer (2020)
Transferability – Looking Outwards. Summary of the TransImpact Results; Main Focus: „Transferability“.
Documentation of the Project Results 2015 - 2019.
2020/10/04
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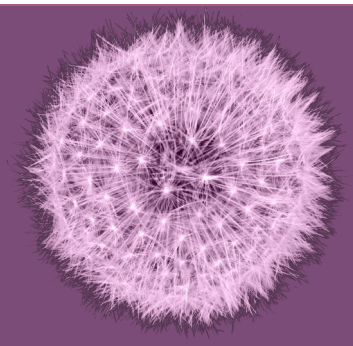
Trans Impact

Transferability



Looking Outwards

Summary of the TransImpact Results; Main Focus: „Transferability“.
Documentation of the Project Results 2015 - 2019.

Institut für sozial-ökologische Forschung
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Bundesministerium für Bildung und Forschung
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Transferability – Looking Outwards

Transdisciplinary research (TDR) is particularly effective when it compiles results that are relevant beyond the individual case under focus. How can this transferability be designed into the research process?

Transdisciplinary projects address complex problems, e.g. adverse effects on the landscape due to urban sprawl or a lack of water supply in a particular region. These problems are always embedded in contexts, i.e. in local, social, economic, cultural and temporal conditions, and they are observed and addressed by different actors in different ways. This means that the problems of a sustainable water supply or of health policy present very differently in different contexts. Even the possible solutions may differ. The challenge of TDR is to provide knowledge and possible solutions for complex societal problems that offer connectivity towards academia and practice and can ideally also be implemented in other contexts beyond the individual case.

How can we transport the solutions we have developed into other contexts, thereby making them applicable more broadly? This question comes under the focus of transferability.

For the purposes of the TransImpact project, ***transfer*** means the process of taking knowledge from one context and appropriating it into a new one. Producing ***transferability*** means that a project processes knowledge and makes it available in such a way that enables actors in another context to pick up on this knowledge and make use of it in their context under the local conditions. In one of the projects we studied, for example, an approach to promoting the health of women in difficult circumstances was first developed in a small town in a rural region. The approach was then transferred to smaller and larger municipalities in the rural and urban environs in the same federal state and later on tried out in cities on a national level.

The point of departure for transferability, i.e. what is transferred, is complexes of knowledge: these consist of different knowledge bases. These knowledge bases include academic findings, expert knowledge, e.g. from politics, the know-how provided by participating actors from practice, affected parties' and participating actors' experiential knowledge, or the project coordinators' knowledge about how to shape the processes within the project. Such knowledge is, to a certain extent, attached to individuals, or it can be prepared in the form of project results, e.g. in products, such as a handbook, software or publications, or implemented solutions, such as prototypes or pilot systems. How accessible the knowledge is for others depends on the preparation and mediation of the project results.

Many transdisciplinary projects deliberately prepare their results in ways that make them transferable. The funding providers usually expect to see a utilisation plan early on as part of the proposal.

If the results are prepared and made available effectively, transfer is, in principle, possible without any direct dialogue between the project and the new context. The empirical studies by TransImpact, however, suggest that the probability of transferability can be increased by personal mediation of the results. Furthermore, in the discussions in a project forum focused on the projects under study, participants pointed to the advantage of actively engaging with the new context with a view to successful transfer. In so doing, the project participants coined the terms “uptake responsibility” and “pick-up context”. We are adopting the latter and using it in our terminology under the focus of transferability. This term points to the fact that it is important to look outwards, and that those who may take up the results must also share in the responsibility for this.

Transfer does not mean merely replicating results. Knowledge that has arisen out of the *original context* in which the transdisciplinary project was embedded is selected and appropriated into the new context, the *pick-up context*. The knowledge is modified and enriched in different processes of appropriation. This is why there should not be a wholesale transfer of “recipes” when trying to solve problems. On the contrary, even just a single idea or the intention to contribute to the solution may be taken up in a different context. Provisional results and partial solutions are likewise suitable for transfer. Transfer may happen during the course of a project or even much later on, and it may happen in either a planned or an unplanned way.

As already mentioned at the beginning, transdisciplinary projects operate in the space between two competing challenges: on the one hand, making knowledge available for as tailored a solution as possible for the original context; on the other hand, making tried-and-tested knowledge available for other contexts. For this second challenge, we must consciously look beyond the project.

TransImpact conducted an empirical study into which methods and approaches projects can use to produce or strengthen conditions that promote (i.e. generate the potential for) the transfer of their results into a different context. The following key possibilities and challenges emerged in the empirical study:

1. The Possibilities and Challenges of Transferability

Transfer is always happening

TransImpact assumes that in principle every transdisciplinary project has the potential for transfer. Knowledge and experiences acquired in the project are carried on by all participants into their work in other contexts. For example, once a project has been completed, the project participants know more about each other's work contexts than they did before. They can use this (often implicit) knowledge again later on in other contexts.

In addition, initial results or ideas may be picked up on by actors in other contexts even while the project is still underway. Transfer that happens in this manner is difficult to trace back and is barely controllable on the part of the project, but it can be strategically addressed through the external presentation of the project and the participating actors' engagement with networking.

Transfer out of the original context can only be planned and managed to a limited extent

From the perspective of the project, whether and how transfer takes place in reality can only be planned and managed to a limited extent. For example, it is not possible to influence from within the original context whether the pick-up context can mobilise resources for an appropriation and adaptation of results. The decision as to which results are taken up from the original context, and whether they are taken up at all, lies with the actors in the pick-up context, for it is only the persons who are active in this context who know exactly what they need and what they are capable of. As mentioned above, the participating actors in the pick-up contexts, too, are responsible for the successful transfer.

A direct dialogue between the contexts supports successful transfer. The actors from the original context can strategically address the individuals involved in the potential pick-up contexts and prepare their results in such a way that they are accessible and useful for different pick-up contexts. Often, however, a dialogue is not possible. It is therefore useful to "prepare" results in such a way as to give them different orientations, thereby addressing different actors and also targeting different kinds of appropriation. These could be, for example, field trips, books, guidelines, workshops or software that allow users to reflect on, imitate, try out or apply possible solutions. This preparation will never be fully tailored, however. Transfer cannot be reduced to replication.

Transfer is a reciprocal process

Transfer goes beyond sending and receiving. Ideally, individuals from both contexts will be actively involved in the process of transfer. The participating actors in the pick-up context interpret the results, translating and developing them further – in the best-case scenario, together with actors from the original context – with a view to appropriation.

Addressing, approaching and engaging in dialogue with actors from pick-up contexts requires capacities and skills on the part of the mediators. Not all those who know the project results are in a position to attune this knowledge to the needs of the actors and pass it on. It is therefore useful to plan for the appropriate individuals and financial resources early on. If transfer takes place once the project has been completed, direct dialogue between the contexts is sometimes no longer possible, for personal continuity in the original context is often compromised because the project has been phased out.

Transfer requires a systemic perspective

In terms of transfer, it is important to take into account the fact that projects are embedded in a broader environment. A project that consciously aims to generate the potential for transfer needs to be clear about its own contextual conditions and those of the pick-up contexts, for even the latter are embedded in a broader environment. Every project, has, for instance, its own history and its own relation to a more general sphere of activity. The actors each have specific competencies and room for manoeuvre within their context.

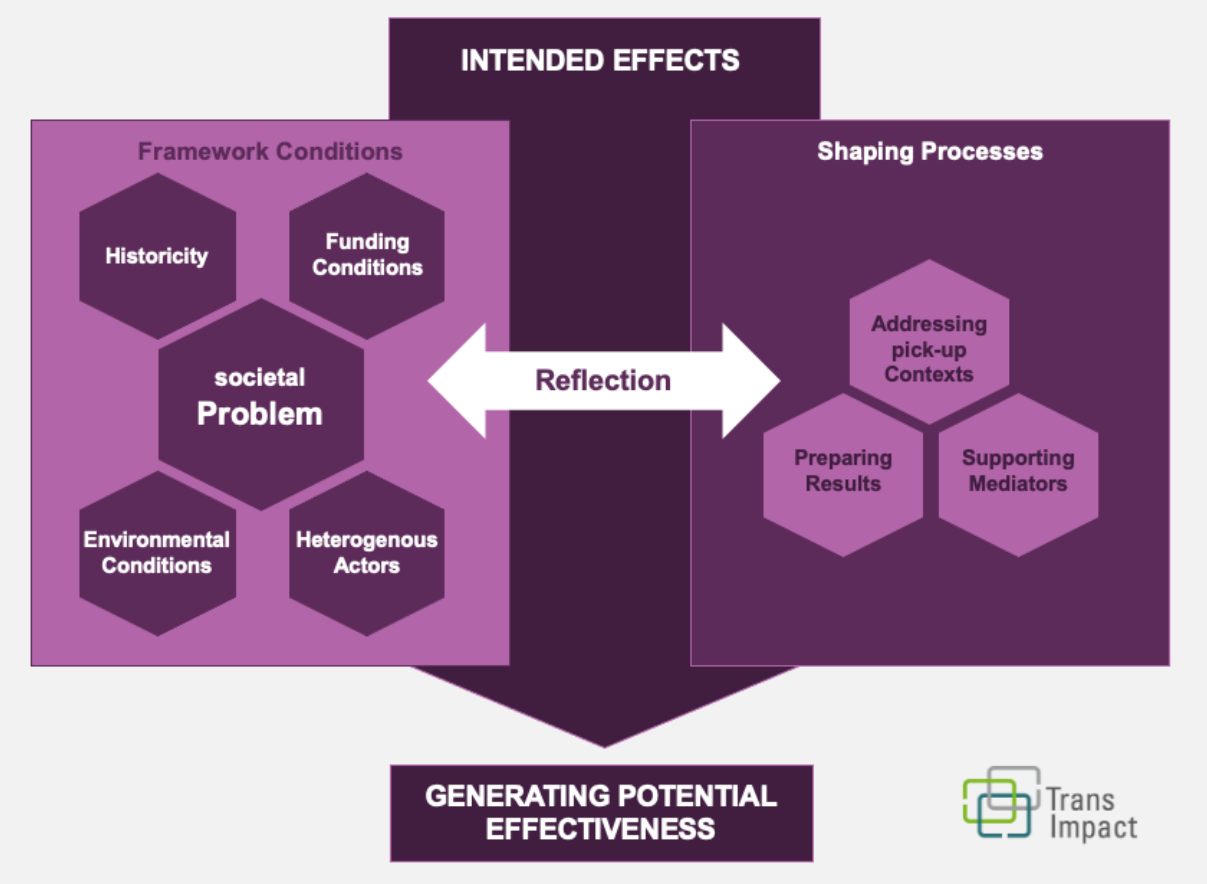
Consciously generating the potential for transfer is resource-intensive

Generating the potential for transfer is a continuous task within the project, and decisions must be taken on this when formulating the intended effects. This is the only way to ensure effective planning for the appropriate resources. Not every project has to, or is able to, achieve the same in this respect. The assessment of transfer potential and the shaping of specific measures are always connected with the project's objective or the question it is asking: is the project about acquiring a sound understanding of the problem in its respective environment, e.g. where the gaps are in a particular area's water supply? Or is the project about developing possible solutions and implementing them in a new context? For whom are the findings and possible solutions relevant? Whom do they affect? The generation of transfer potential is also dependent on the nature of the problem under focus: how complex, well-known or widespread is the problem? How is the urgency of the problem perceived in the broader environment? The approaches to generating transfer potential vary depending on the answer to these questions.

Some projects rely on events or publicity, others on mediation by particular individuals, whereas others prefer to prepare their results specifically for the target group. Others already cooperate with actors from potential pick-up contexts during the course of the project and jointly reflect on the transfer potential of their results.

2. Main Shaping Processes and Framework Conditions for Transferability

The TransImpact results indicate how projects can generate transfer potential from the beginning and which measures they can take to strengthen this potential. The shaping processes depicted in the diagram can be translated into requirements.



Scheme for Generating Potential Effectiveness Through Transferability

3. Relation Between Transferability and the Framework Conditions

The framework conditions historicity, funding conditions, heterogeneous actors and environmental conditions are also relevant from the perspective of transfer potential. Under the focus of transferability, too, the aim continues to be to contribute to solving the societal problem.

Under the focus of transferability, the perspective on the framework conditions differs from the other areas of focus in the TransImpact project (problem definition, participation and knowledge integration). With the focus on transferability, the project looks outwards and beyond its own environment. The results of a project (in contrast to the processes within the project) and their mediation take centre-stage. Activities that address possible pick-up contexts become important. Under the focus of transferability, looking outwards also means considering the history and post-history, i.e. the historicity of a project.

4. Overarching Guiding Principle: Reflection

Reflection is the element that connects the framework conditions and the shaping processes. It is a guiding principle that should be taken into consideration throughout the process.

In order to facilitate transfer, it is important, throughout the entire course of the project, to reflect on:

1. The environment: Changes may take place during the course of the project, e.g. changes in law, an escalation of the problem or a change in the societal perception of the issue. These changes are windows of opportunity which open up, or close down, new possibilities for action or change others' perspectives on the project.
2. Possible effects over the course of the project: The analysis showed that effects that are already emerging during the course of the project may indicate and promote the potential for transfer. Effects point to the fact that something is "working well" and may also be interesting for other contexts.

Furthermore, the project participants should actively try to draw the attention of other contexts to their own project, results or effects. For example, potential pick-up contexts can be addressed and informed through publicity or effective preparation of results.

With our description of the requirements "preparing results", "supporting mediators" and "addressing pick-up contexts" as well as with the proposed methods, we offer suggestions for possible ways of generating transfer potential.

When compiling the methods and approaches, we drew on sources that describe the methods, tools and approaches of TDR. These can be extended further – and at this point we would like to invite you to contribute to the continuing discussion in the transdisciplinary community.

5. Requirements

Addressing pick-up contexts

In order to disseminate results beyond the immediate project context, it is essential to identify and address possible pick-up contexts during the course of the project – and if possible also afterwards. To this end, it is helpful to repeatedly remind oneself – from the start of, but also during, the project – of the other contexts in which the results could be used. The following points and questions may be used as suggestions in this regard:

- Relevance to the problem / similar problem: Where is the need? To what extent have other contexts already become sensitised to the societal problem? In one of the projects, for example, participants indicated that a potential change to the law in their subject area contributed to other actors becoming interested in their project.
- Definition of objectives: What is the aim of my project in terms of transfer? Is transfer an intrinsic aim of the project (an empirical project, for example, formulated in advance its intention to "become famous" even beyond its own context), or is the focus on researching a single context? Who is my target group – other transdisciplinary projects, academics or practitioners?
- Pick-up context: How are possible pick-up contexts structured? Are there any affected parties or decision-makers who should be addressed and integrated? What scope do they have for shaping? In what conditions are they embedded?
- Attention: How can the project attract attention to itself and awaken interest? What existing contacts can be used? Where can we establish new ones? What kind of "advertising" can be effective in making the proposed solutions visible?

In order to answer these questions, other requirements must also be taken into consideration. For example, mediators can help to establish contacts. The needs of the pick-up context can be fulfilled by tailoring the preparation of results. Here, decisions must be taken as to which content to select.

The following methods may be helpful in addressing pick-up contexts: boundary object, actor communication, discourse field analysis, focus groups, constellation analysis, monitoring, publicity/PR, project advisory board or monitoring group, role plays, systemic analysis. On this, see ⟶ Toolbox.

Effective preparation of results

Each project produces potentially transferable knowledge for different pick-up contexts. This knowledge is stored in products (e.g. in publications, tools or handouts), process descriptions, visions, scenarios or pilot projects (brought together here under the term "results"). The projects

studied by TransImpact developed, for example, handbooks on the shaping of TDR for other researchers, possible courses of action and solutions in the form of information sheets for practitioners, and tools for direct application. Results were compiled for both academia and practice.

The following aspects of content are pivotal in preparing the results:

- Preparation of context-related knowledge
- Generalisation or preparation of de-contextualised knowledge

These two aspects are of equal importance. Participants of the projects we studied recommend connecting these two aspects when preparing the content of the results. For example, a project can formulate some guidelines with generalised recommendations, enrich it with specific project examples and, in addition, present the contextual conditions of its own project work in detail. Accordingly, a combination of generalisation and context-specific description is particularly suitable for presenting results. Furthermore, there is already a broad canon of recommendations for the preparation of results, such as comprehensibility, visualisations or specific preparation for the target group. The combination of different approaches further promotes the transferability of results. In addition, individuals from the pick-up context can already be incorporated into the preparation of results, thereby taking their needs into consideration.

The following methods may be helpful in preparing the results effectively: boundary object, case descriptions, focus groups, monitoring, morphological analysis, project advisory board or monitoring group, role plays, thick description, validation of knowledge selection – supported by effective preparation, visualisation and specific presentation for the target group. On this, see ⟶ Toolbox.

Supporting mediators

Transfer can also take place via individuals. Referred to as mediators, these individuals convey knowledge from one context to another, and they are central to the translation and adaptation of results for a new context. They may be project participants (such as ambassadors) or external individuals. They may be active in the project environment (such as intermediaries) or may work as professional knowledge brokers. Individuals from the pick-up context are also potential mediators. Ideally, mediators will have links to academia and to the needs of practitioners.

Mediators may undertake the following tasks:

- They inform the wider environment – and therefore also potential pick-up contexts.
- They pick up on and use project results and pass these on.
- They advertise the project and its results.
- They identify the experiences and knowledge from the project that may be useful in other contexts. They introduce this knowledge either in an institutionalised form, e.g. in consultation sessions, workshops, etc., or in a less institutionalised form, e.g. in informal meetings.
- They translate the knowledge developed within a project for new contexts, and advise, support and monitor the adaptation to the new conditions.
- They participate in the implementation of existing results in the new context.

Not every person is suited to these tasks as a mediator. In order to be able to mediate, an individual needs, for example, a certain status, networks and expertise. It is also an advantage if mediators are known to potential actors in pick-up contexts.

As a general rule, it is important to become aware of the contexts in which the project participants can promote transfer as potential mediators, and how they can do this. It is then also important to actively allocate this role to them, sensitise them to their role and support them in it. If the mediator role falls mainly to external individuals, it makes sense to involve these people right from the start. For example, early on in the project, they can comment on designs for possible products intended for appropriation into other contexts. Finally, considering mediators from a strategic perspective also involves reflecting on developments and dynamics over the course of the project that may lead to a need for new mediators.

It is important to describe the role of the mediators – including their interests – clearly, and to encourage and support the selected individuals in this role. To support mediators, for example, it is helpful to increase their awareness of the societal problem. It is likewise advisable to promote networking both between mediators and between mediators and potential pick-up contexts.

The following methods may be helpful in supporting mediators: actor analysis, informal dialogue, constellation analysis, networking, systemic analysis. On this, see ⟶ Toolbox.

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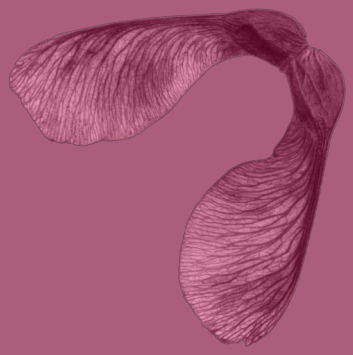
Oskar Marg, Lena Theiler, Emilia Nagy, Alexandra Lux,
Matthias Bergmann, Thomas Jahn, Martina Schäfer (2020)
Knowledge Integration – Bringing Together Different Perspectives on the Problem.
Summary of the TransImpact Results; Main Focus: „Knowledge Integration“. Documentation of the Project Results 2015 - 2019.
2020/10/04
Available at www.td-academy.org

Knowledge Integration



Bringing Together Different Perspectives on the Problem

Summary of the TransImpact Results; Main Focus: „Knowledge Integration“.
Documentation of the Project Results 2015 - 2019.

Institut für sozial-ökologische Forschung
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Bundesministerium für Bildung und Forschung
FONA

Knowledge Integration – Bringing Together Different Perspectives on the Problem

Integrating different academic and societal knowledge bases allows us to generate robust knowledge for potential solutions to problems. But how do we shape successful knowledge integration?

1. Background: Knowledge Integration – Relevance and Challenge for Transdisciplinary Research

Essentially, the aim of integrating different knowledge bases is to help with solving complex problems; this integration is not undertaken out of pure cognitive interest, i.e. not for its own sake. Knowledge integration in transdisciplinary research (TDR) can be defined as the interlinking of different knowledge bases in relation to a problem. Here, knowledge is understood as a rational and well-founded insight – in contrast to assumption, opinion and belief – as well as everyday and experiential knowledge in a more comprehensive sense.

Integration, in its general sense, means joining together individual parts to make a whole. This may give rise to new connections between these parts. Academia frequently distinguishes between cognitive (put simply: content-based), communicative and socio-organisational integration. In TDR projects, the communicative and socio-organisational dimensions of integration are ascribed particular significance. These are essential in facilitating cognitive (content-based) knowledge integration, which is where the focus of TransImpact lies.

There are also limits to knowledge integration: some knowledge bases – such as theories or methods – are too different to one another and therefore cannot be connected. And if individuals participating in a research project find it difficult to see things from the perspective of the other members, this means knowledge integration will likewise be limited within the project. Ultimately, of course, resources are needed for knowledge integration. Here, the funding conditions have a primary role to play: transdisciplinary knowledge integration is often laborious, which means it requires corresponding temporal and financial leeway on the part of the funding providers.

As well as the limits to what is possible, however, there are also limits to what is necessary: because the aim of transdisciplinary knowledge integration primarily consists in generating knowledge for potential solutions to problems, different knowledge bases often do not need to

be merged entirely into a new knowledge unit (e.g. a new theory or method). Often, additive methods are enough. For example, in the case of the problem of air pollution due to vehicle exhaust fumes in a town, this might mean using a method from chemistry for the sub-problem of analysing the exhaust fumes, and a method from political science for the sub-problem of managing the behaviour of car drivers; both results would then be connected with one another without any need to combine the two disciplinary approaches. Furthermore, the limits of what is necessary are also connected with the (potentially different) requirements of the project participants in terms of the depth of knowledge integration: it may be the case that individual people would like to connect different knowledge bases more deeply with one another than would be necessary for generating the relevant knowledge for solving the problem. Finally, as well as the possibilities, the funding conditions also influence the requirements for knowledge integration.

The process of knowledge integration can be analytically divided into five optimal steps; these can then be evaluated and, if necessary, repeated (in TDR practice these steps are usually not as linear as presented here):

- *Formulating questions:* All team members should discuss the research problem together and co-define it. The results in turn determine the scope of knowledge integration.
- *Gathering knowledge (opening):* The project team surveys and gathers new knowledge relevant to possible solutions to the problem. Here, it should be explained, as far as possible, why particular knowledge bases are considered relevant and others are not. The respective knowledge of the individual participants determines the parameters of selection here.
- *Processing knowledge:* The project team differentiates, categorises and organises the knowledge bases. This should happen in a way that is comprehensible to all participants, for it is only on this basis that the next step can be completed.
- *Honing knowledge (closing):* The project team reduces the knowledge previously gathered and processed, based on its relevance to the problem or question at hand. This step is necessary for both content and pragmatic reasons (not all knowledge can be integrated).
- *Connecting knowledge:* The project team connects the selected knowledge bases or, in the narrower sense, integrates them. This may mean, for example, that the different knowledge bases are brought together as elements within a model that also makes the connections between these elements visible. New insights are generated in this way, and these in turn provide possible answers to questions or contribute knowledge towards solutions to problems.
- *Evaluating:* The project team reviews the (provisional) results to see whether they contribute to solving the problem or whether relevant knowledge is lacking. If necessary, the steps are repeated.

2. Knowledge Integration – Bringing Together Different Perspectives on the Problem

Knowledge integration in TDR involves connecting different perspectives on a problem addressed by the respective project and forming an integrated perspective. Such different perspectives may come, e.g. in the problem of air pollution in a town, from sociology, chemistry and a municipality, with each of these contributing specific knowledge to the problem. The main objective behind making such connections between different – professional, disciplinary, practical – knowledge bases in TDR is to generate socially robust knowledge. This is characterised by greater connectivity, and it tends to offer more practical solutions than would be the case with a single discipline – this would typically only develop solutions for disciplinary sub-problems, which, moreover, are often not applicable in practice. In the example of air pollution in a town, this might mean, for example, that knowledge about human modes of behaviour (sociology), about the composition of exhaust emissions (chemistry) and about possible policies for managing the problem in the town (municipality) are taken into account when developing possible solutions. This knowledge then has greater potential effectiveness: in particular, it may contribute to solving societal problems but also to academic research.

However, before the different forms and types of knowledge can be connected with one another, they must be gathered, developed and honed, based on the respective problem under focus in the project. Whereas we saw in the analysis under the thematic focus of participation that individuals must be involved (as knowledge brokers), the focus of knowledge integration also deals with knowledge bases that are detached from individuals. These may be written sources or survey results.

3. Results and Recommendations for Generating Potential Effectiveness

The study of the research projects by TransImpact showed that the following points should be taken into particular consideration in the generation of potential effectiveness through knowledge integration:

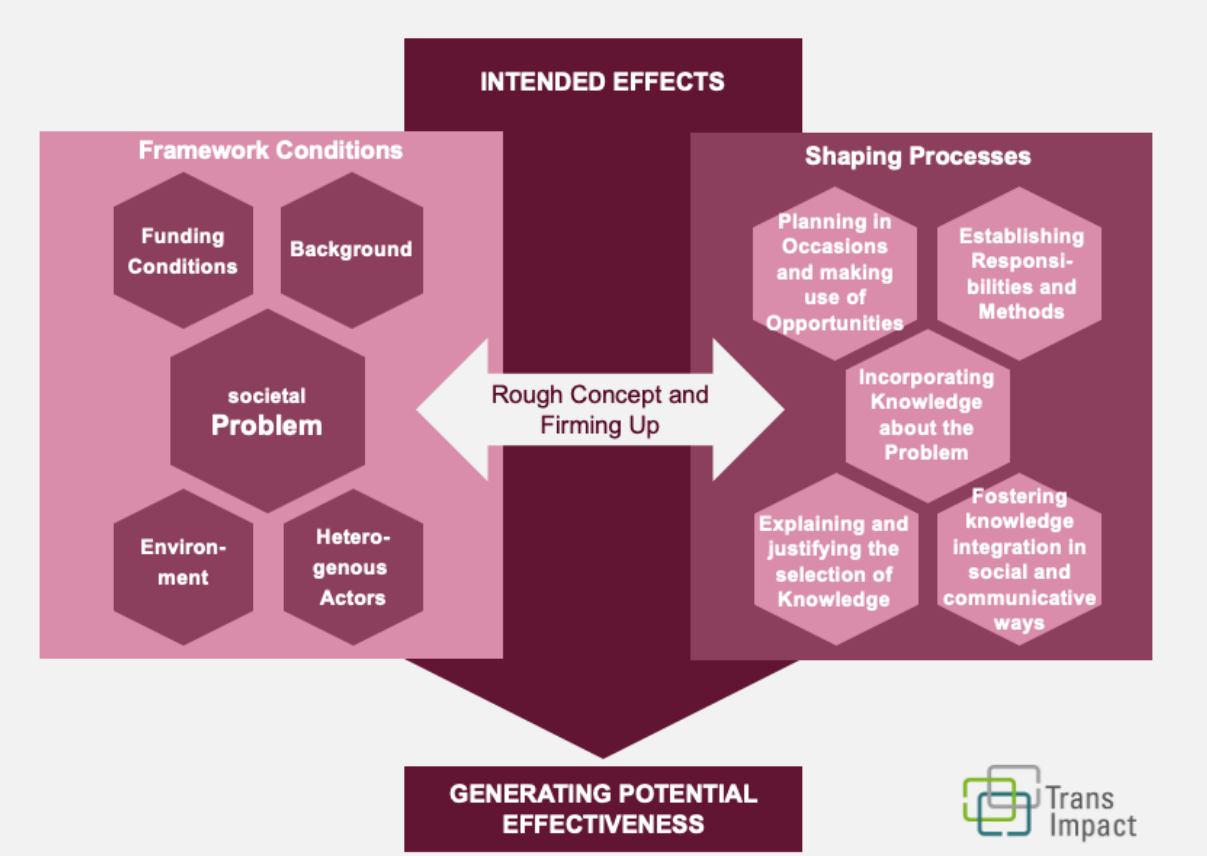
- If academic and non-academic knowledge is included in a TDR process, this increases the connectivity of the results and therefore also their potential effectiveness. In addition, it strengthens the practitioners' trust in the process and its results. This in turn increases their willingness to engage in the joint project and ultimately also their acceptance of the results they have developed together with other actors.
- Effective knowledge integration is primarily facilitated by processes based on tangible, socio-communicative and emotional experiences. If members of a research team, for example, meet at the place under study, they can get to know, and come to a better

understanding of, a problem and its real-world context together in that setting. This would be a kind of "multi-sensory learning".

- Furthermore, the integration of knowledge is always connected with the participants engaging in joint learning processes: the participating actors absorb new knowledge and become acquainted with new perspectives. This influences their decisions and actions within the project but also in other contexts.
- In the generation of potential effectiveness, it is not only important how different knowledge bases are integrated – we will go into this in more detail below –, but also which knowledge bases are integrated. Research processes can only be effective if the knowledge bases to be integrated are relevant to solving the problem.
- Both the processes and the products of knowledge integration – e.g. publications, concepts or recommendations for action – are important in the generation of potential effectiveness. The quality of the processes and products of knowledge integration are closely intertwined with one another:
    - Successful processes of knowledge integration are essential to the quality of products and projects. On the other hand, effective processes of integration alone do not guarantee high-quality or effective products.
    - Working on joint (intermediate) products promotes knowledge integration.
    - The results of knowledge integration beyond the research process are documented in the joint products. In the case of effects at a significant spatial or temporal remove from the project – according to our thesis –, these are more dependent on the products than on the processes of knowledge integration executed within the project. This is because it is very difficult to mediate these processes to people who have not taken part in them.

4. Main Shaping Processes and Framework Conditions for Knowledge Integration

The diagram below summarises TransImpact's main findings on knowledge integration and the generation of potential effectiveness. In it, we distinguish between framework conditions and shaping processes, thereby focusing on the aspects that can be actively shaped.



Scheme for Generating Potential Effectiveness Through Knowledge Integration

Framework conditions for effective knowledge integration

Framework conditions are very difficult to influence, but they are important in order to understand the possibilities for, and limits of, generating potential effectiveness in transdisciplinary projects (on the left-hand side in the diagram). The history of TDR projects has proved to be a particularly relevant framework condition for knowledge integration. It is understood as a preliminary phase or preliminary project, as a history of the problem at hand and as the prior knowledge of the project participants. But the funding conditions, too, are an important framework condition, e.g. as regards the selection of knowledge bases or the temporal resources for knowledge integration, which is often time-consuming.

Shaping processes, requirements and methods for knowledge integration

In contrast to the framework conditions, which are difficult to influence, the shaping processes (on the right-hand side in the diagram) show the areas of knowledge integration in which it is possible to actively generate potential effectiveness. The shaping processes can each be translated into requirements to be fulfilled by the project participants. These should provide helpful orientation in terms of what to give particular consideration to in the effective shaping of knowledge integration in transdisciplinary projects. For each requirement, we have again

compiled example methods and approaches based on the relevant literature, in order to provide even more specific tips on possible ways of integrating knowledge. Please feel free to add to these via the comments function. By doing so, you will also be contributing to the continuing discussion.

5. Overarching Requirement: Rough Concept at the Beginning – Firming Up and Adaptation During the Process

Overall, the results of TransImpact show that achieving a balance between planning and openness is important in shaping knowledge integration effectively: at the beginning of the project, it is helpful to design a rough strategy for knowledge integration during the transdisciplinary project. This is about clarifying questions, such as what the aims of knowledge integration are, who is responsible for it, and which knowledge bases should be integrated, when and how. The intended effects of knowledge integration should also be thought through at this early stage. This rough concept must then be firmed up and adapted to the respective situation and framework conditions. The following guidelines are helpful in this early strategic planning:

- What are the aims and limits of knowledge integration? In other words, what is necessary and what is possible? One of the considerations here should be what kind of knowledge the project aims to generate through integration (e.g. systemic, operational or orientational knowledge), what the interests and requirements of the various project participants are, and how much scope the framework conditions allow for knowledge integration, which is often time-consuming.
- Which member of the project team is responsible for shaping the integration processes, and what skills does this person need to have? Which team members are involved in the various integration processes? We will go into further detail on this central question and offer tips on methods under the requirement "establishing responsibilities and methods".
- Which knowledge bases (subjects, disciplines, practical knowledge) should be integrated? Which knowledge is central in generating potential effectiveness? Knowledge about the problem at hand should be taken into consideration here (more on this under the requirement "incorporating knowledge about the problem"), and the selection of knowledge should be explained and justified (more on this under the requirement "explaining and justifying the selection of knowledge"). The knowledge bases may be attached to individuals (as knowledge brokers) or other sources (e.g. documents or survey results).
- As a general rule, knowledge integration is not a single occurrence but a continuous task with culmination points at which knowledge is integrated in more intensive ways. There should therefore be clarity around when the main occasions for knowledge integration will take place.

- How is knowledge integrated? There are different methods and approaches for different phases and tasks. Examples of methods and approaches are visualisations, discourse field analysis or informal dialogue. As a general rule, it is important to plan in enough time, space and occasions (such as writing common guidelines) for knowledge integration. In addition, the project should allow for iterative loops, and consideration must be given to how, roughly, the knowledge will flow between the different elements of the integration strategy, e.g. how the insights acquired in a stakeholder workshop will be picked up on and processed by an academic team. You will find more tips on how to deal with this question under the requirement "planning in occasions for knowledge integration and making use of opportunities".

The planning for the integration process that takes place at the beginning of the project serves as a template and point of orientation for the individual phases of the process. This kind of planning also ensures important aspects of knowledge integration are not forgotten.

Over the course of the project, researchers should continually keep in mind the issue of knowledge integration. On the one hand, the strategy must be firmed up in the implementation during the research process. Here, the focus, for example, may be on which specific practitioners will be invited to participate in the initial stakeholder workshop, and which integration methods will be used in the workshop. On the other hand, the planning must be adapted to the respective situation in the research project and to the framework conditions, since these may be in constant flux.

6. Requirements

Planning in occasions for knowledge integration and making use of opportunities

Integrating different knowledge bases requires time and space, and it does not happen of its own accord. Rather, specific occasions should be planned in for it. Such occasions for knowledge integration might be, for example, joint products, concepts or models, but also shared experiences such as field trips. These occasions for knowledge integration, i.e. situations or processes in which knowledge is integrated, should be scheduled at the start of the project when planning the research design. Over the course of the research project, these occasions must be firmed up and, where necessary, adapted. In addition, for the duration of the project, researchers must continually identify and respond to newly emerging opportunities (and also necessities) affecting knowledge integration, which means paying very close attention.

Furthermore, they must consider how they can use these opportunities to bring different kinds of knowledge together. The approaches and methods of knowledge integration can, in general, be differentiated in terms of structured and informal formats:

- Structured approaches and methods of knowledge integration help to bring together knowledge bases in specific ways. Here, the term "structured" refers not to the possible results but to the methodological approach. Structured formats presuppose that the participating actors know and share the basic assumptions behind the methods used. These formats are easier to integrate right at the start of the project than informal formats are, but they can also be adapted or added in while it is running. One example of a structured approach is a stakeholder workshop in which practitioners from the region under study use visualisations to develop and discuss different future scenarios for their region. These scenarios can then be taken forward as the research process continues.
- Informal formats for supporting knowledge integration, too, aim to generate knowledge that will contribute towards possible solutions to problems. However, this objective is more open and less direct than in the case of structured approaches and methods of knowledge integration. The underlying idea is that it is also possible to integrate knowledge about specific issues through social and communicative integration. Planning for informal formats is only possible to a limited extent. These can be very valuable right at the start of a project. However, throughout the research process, researchers must keep an eye out for situations that present opportunities to use informal formats. On the surface, informal approaches may seem banal, e.g. "having a coffee together". But they may help to foster an understanding of the problem, the moral concepts or the normative contexts, to initiate knowledge development, or to resolve differences in the case of resistance to, or conflict within, the integration processes.

The selection of integration methods should be based on what needs to be integrated, and to what end. In a more practice-based project, it is better to use integration methods focused on practical solutions to problems.

The following methods may be helpful in planning in occasions for knowledge integration: boundary object, developing joint products, common assessment processes, shared experiences in proximity to the object under study, group model building, integration through modelling, co-authoring publications, multi-stakeholder discussion group, scenario development, tandem principle, visualisation. On this, see ⟶ Toolbox.

Incorporating knowledge about the problem

It is important to know and understand the context of the problem at hand and integrate this practical knowledge into the project. This increases the connectivity and usability of the project's findings and their acceptance among the practitioners. If the project team is too

cemented in its own respective specialist ways of thinking, or if its research is undertaken out of pure cognitive interest and has no societal relevance, the effectiveness of the project is compromised. By incorporating knowledge about the problem and its context, the project team increases the societal robustness and relevance of the findings, which helps to generate potential effectiveness. This may seem trivial, but it is central to the potential effectiveness of TDR in particular, where the focus is on developing knowledge in order to find possible solutions to problems. Knowledge about the problem may encompass various aspects, e.g.:

- Knowledge about the history of the problem at hand, e.g. historical conflicts or collaborations in the area under study that also affect the project and the actors participating in it.
- Ongoing changes in the framework conditions of the problem over the course of the project; these must be constantly observed (e.g. the development of the electricity market in a project on the energy transition).
- It is not only the context of the societal problem that must be taken into consideration but also the academic context (every academic discipline, for example, has its own "community" with its own culture).

Other aspects of incorporating knowledge about the problem have already been mentioned under the requirement "understanding the operational context" under the focus of participation and are relevant here, too. In addition, knowledge about the context of the problem is also about qualitative selection of the knowledge, i.e. deciding which knowledge from the problem context is relevant to the project or to solving the problem. In so doing, it is important to consider what knowledge the participating practitioners need to have.

The following methods may be helpful in incorporating knowledge about the problem: observation, explorative interviews, focus groups, stakeholder analysis, research, social network analysis, systemic analysis. On this, see ⟶ Toolbox.

Explaining and justifying the selection of knowledge

In generating potential effectiveness, it is not only important how different knowledge bases are integrated but also which knowledge bases these are. If the transdisciplinary project brings together knowledge bases that are not relevant in generating insights that contribute towards possible solutions to the problem at hand, it is not possible to generate potential effectiveness. This is why it is important to make the right choices when selecting the knowledge to be integrated. In addition, this process of selection puts some parameters around knowledge

integration, focusing it on specific objectives, questions and problems. This is also necessary for pragmatic reasons, for not all knowledge can, or must, be integrated.

For knowledge integration to be successful, the decision-making processes involved in the selection must be explained or made transparent. They should be based on proven methodology and the current state of research, and the selection decisions should be clearly justified – this is also to ensure their legitimation. Implicit knowledge and the limits of the scope of one's own knowledge must also be made transparent, as far as possible. Otherwise, arbitrary and thoughtless selection decisions, characterised by unchallenged assumptions, value judgements or unconsidered interests, threaten to compromise the quality and potential effectiveness of the findings. This also affects the selection of theories or research problems. A key selection criterion should be the relevance to the problem. This means repeatedly reviewing the selected knowledge to see whether it is making a relevant contribution to answering the research question.

The knowledge here may come from the literature, from socio-empirical data, or even from individuals as knowledge brokers. This is where knowledge selection intersects with the requirement to "review the participatory concept" under the focus of participation, and the requirement to "identify actor groups" under the focus of problem definition. In contrast to these requirements, knowledge integration may also involve knowledge bases that are detached from actors, and that are not necessarily transdisciplinary.

In terms of the selection process, first of all, a selection is made from a larger knowledge pool (gathering new knowledge), and later from a narrower pool (honing of knowledge that has already been gathered). This process of opening and closing is repeated several times. In addition, the question of how the knowledge bases under consideration are selected is bound up with the question of who makes the selection: a well-founded 'selection of the selectors' is also important; this is connected with the requirement to "establish responsibilities and methods".

The following methods may be helpful in explaining and justifying the knowledge selection: Delphi, discourse field analysis, iteration and recursivity, multi-stakeholder group discussion, validation of the knowledge selection – supported by effective preparation. On this, see ⟶ Toolbox.

Fostering knowledge integration in social and communicative ways

The social, communicative and cognitive (i.e. content-based) dimensions of knowledge integration mutually determine one another: if one of these dimensions is lacking, integration cannot be successful.

- On the one hand, knowledge integration does not work without social and communicative integration: if there is 'friction' in the research team and there is a negative atmosphere, the participating actors will find it very difficult to see things from the perspectives of other team members. This means it will not be easy to integrate different knowledge bases, work together to generate content-based knowledge for possible solutions to problems, and generate potential effectiveness.
- On the other hand, social and communicative integration within the project team cannot succeed if content or knowledge integration is not successful: if a project partner is obviously performing his content-based work to only a very limited extent, it is very unlikely the culture of collaboration within the project can be "saved" purely by social and communicative integration measures. By contrast, successful content-based (and communicative) knowledge integration also fosters social integration: if, for example, interim results are presented (clearly and comprehensibly) within the project team, and if these have been compiled according to the highest quality standards, this also increases the potential for a positive atmosphere within the team.

The social dimension of integration within the research team is primarily characterised by aspects such as trust in one another, transparency of communication and processes, commitment to verbal agreements, respectful interactions, and listening to one another. This makes participation enjoyable, enables open dialogue between participants, and creates a basis for critical and therefore also informative enquiry, as well as for finding compromises where there are antithetical interests. Harmonious interaction within the project team should not, however, come at the cost of knowledge acquisition (e.g. where a project partner is selected purely because s/he is already known to the participants and not because s/he is a relevant knowledge broker). It is important for the project partners to have a common purpose, for this is what unites different interests.

Communicative integration requires a conscious and common understanding of the different usage of terms within the project. If this understanding, or translation, is not achieved, there is a risk of project participants from different backgrounds talking past one another without being aware of this. If, for example, pictorial language and examples are used within the team, or if the project team members define key terms together, this may be helpful in establishing a common understanding and reciprocal translation of key terms.

The requirement to foster the communicative and social dimension of knowledge integration is a task that runs throughout the project and is not based on specific objectives. In general, it is directed at all project participants. In addition, the specific approaches and methods that present themselves are always dependent on the respective project and the actors participating in it.

The following methods may be helpful in fostering knowledge integration in social and communicative ways: coaching as an aid to self-reflection, informal dialogue. On this, see ⟶ Toolbox.

Establishing responsibilities and methods

Under the previous focus themes in the TransImpact project, we have already seen that the question of responsibility is important in the generation of potential effectiveness. Under the focus of problem definition, this responsibility takes the form of "clarifying roles", and under the focus of participation, it takes the form of "reviewing fulfilment of roles".

The planning and execution of processes of knowledge integration is a complex and laborious task. Without the allocation of clear responsibility here, there is a risk the project will fail to integrate knowledge bases, either because no attempt at all is made to do so, or because the processes happen only by chance or have no clear objective. This can lead to frustration. To increase the likelihood of successful knowledge integration, it is necessary to ensure that …

- … clear responsibility is allocated for the overall planning of knowledge integration processes, without allowing the relevant person to make all the decisions on his/her own. This means that the person selected for this task must have the appropriate skills: the task of integration in the transdisciplinary context requires a wealth of experience in TDR projects. This individual can use this experience to evaluate the project at hand more effectively. In addition, due to having access to a larger methodological 'toolkit', s/he is able to react more appropriately to different situations.
- … there is clarity around who (and how many people) are involved in the different processes of knowledge integration, the making of individual decisions and the generation of results.

The following methods may be helpful in fostering knowledge integration in social and communicative ways: appointing an individual responsible for integration, establishing integration methods. On this, see ⟶ Toolbox.

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