Researchers' experiences with transdisciplinary project practices – Results from an ex-post survey of INKA BB researchers

Julia C. Schmid

Andrea Knierim

Ulrike Knuth

Verena Toussaint

Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF) e.V.

Institut für Sozioökonomie

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Abbreviations used

INKA BB	Innovation Network of Climate Change Adaptation Brandenburg Berlin (Innovationsnetzwerk Klimaanpassung Brandenburg Berlin)
SWOT	Strengths, Weaknesses, Opportunities, Threats
Td research	Transdisciplinary research

1. Introduction

INKA BB - the Innovation Network of Climate Change Adaptation Brandenburg Berlin – was a network of scientists and practitioners who, by working together, aimed to meet the challenges brought about by climate change in the domains of agriculture, other forms of land use, water, and health management (www.inka-bb.de). The development of climate change adaptation strategies was the overriding objective pursued by all partners involved in the network. The particular strength of INKA BB was its close transdisciplinary collaboration between scientists and practitioners. Under this network umbrella, innovative adaptation strategies were developed, tested and implemented in 20 individual projects, which each united a number of practitioners and scientists around a concrete issue. This practice-oriented research was supported by three cross-cutting projects on methods for coordinated strategy development (project no. 1), data about regional climate change impact projections (project no. 2) and methods for knowledge management and transfer activities (project no. 3).

With INKA BB reaching its end of funding, several steps were undertaken within project no. 1 to evaluate results and successes of the network association. This included a comparative analysis of the final SWOT-analyses prepared in 2013/2014 (cf. Schmid and Knierim 2014) as well as the realisation and analysis of a web survey of the practice partners involved in INKA BB (cf. Knuth et al. 2014, Schmid et al., forthcoming).

What was missing from this picture was a more detailed and explicit evaluation of the network processes and outcomes from the viewpoint of the participating researchers. While the final SWOT-analyses, written without exception by the respective scientific project staff, contained many detailed insights and conclusions on the individual project level, a more explicit evaluation of project processes and outcomes, standardised across all researchers and projects involved, seemed necessary to complete the general assessment. This is even more so, since the SWOT-analysis reports showed significant differences in length and detail, leaving the impression that the information provided was not sufficiently coherent to allow for general statements and cross-cutting conclusions.

With this in mind, a survey of the INKA BB scientists was designed and implemented in summer 2014 in order to create a reliable overview of researchers' perceptions and valuations of their experiences with INKA BB. In five thematic sections the survey investigated (i) researchers' professional background and roles in the projects and (ii) the characters of the projects they were working in, and sought for (iii) a rating of researchers' personal experiences in INKA BB, (iv) their evaluation of the procedural research design, and

(v) additional final remarks and assessments of the four main conclusions drawn in the SWOT - Synthesis report 2014 (Schmid and Knierim 2014).

In the report at hand, we present the first and mainly descriptive results of the thematic sections one to three, and five. Five main questions are analysed. Firstly, who are the researchers in INKA BB and what is their professional background? (→ Description of sample population, chapter 3); Secondly, how do they assess the outcomes of their respective projects? (→ section 4.1); Thirdly, what are particularly positive and negative experiences in INKA BB? (→ section 4.2); Fourthly, how do researchers assess the conclusions drawn in the cross-sectional SWOT synthesis? (→ section 4.3); And, lastly, as a cross-sectional interest: what are the personal and/or project-related characteristics shaping the respondents' assessments of project processes, results and experiences?

These main parts are framed by chapter 2 in which we provide details of the methodological approach applied, and chapter 5, in which we briefly summarise and discuss main findings and draw some first cross-cutting conclusions.

2. Methodological approach

The survey was designed in summer 2014 and conducted in September and October 2014. In the following sections, we present the data collection process and the data processing methods.

2.1 Conception and implementation of the survey

Methodologically, a standardised Web survey was chosen because it provided the possibility to effectively reach a large number of INKA BB scientists who are, as a group, rather diverse and geographically dispersed. The survey was administered via SoSci Survey (www.soscisurvey.de). It underwent one external pre-testing round with seven researchers from the domains of agriculture, landscape, and water and health management and with an even distribution between researchers acting as project leaders or as ordinary scientific staff within the projects.[1] After final revision, the survey was online from 24.09.2014 until 31.10.2014. It comprised 30, mostly close-ended questions organised in five main sections (table 2-1).[2]

Respondents were first asked to provide socio-professional data and to inform about their role and involvement in their respective projects (section A, Table 2-1). This was followed by question upon the structural and procedural characteristics of the projects and the perceived

[1] All seven pre-tested questionnaires contained valuable remarks and suggestions about how to improve the test version. We are grateful for the time devoted and once again thank the researchers involved.

[2] The entire questionnaire is to be found in appendix A7.

project outcomes (section B). Both parts were designed in such a way that full anonymity of respondents was maintained. Thus, we refrained from inquiring about, for example, the respondents' age, gender, and the particular project's title. In a third thematic section, we asked respondents to personally evaluate a number of items recurrently cited in the literature as valuable benefits of joint research processes and also inquired upon challenges they were facing in their project work (section C). Subsequently, the focus turned explicitly to the methodological research framework common to all projects under the frame of the INKA BB network association. Here, respondents were asked to assess the three main elements of this framework, i.e. the phase-based research concept, the use of the tool SWOT-analysis, and the possibility to receive methodological support by social scientists (section D). In the final section, respondents were asked to assess the four main conclusions that were drawn in the 2014er SWOT-Synthesis report (Schmid and Knierim 2014) and to enter as many "final comments" and remarks regarding their involvement and perception of INKA BB as wanted.

Table 2-1: Thematic sections addressed in the questionnaire

Thematic section	Description / Examples	Epistemological interest
(A) Researchers' socio-professional characteristics and role in project	Professional experience in science (years); Experiences with td-research (no. of projects); Disciplinary background; Role in project (e.g. researcher, management/leader, PhD student).	Who "are" the researchers in INKA BB?
(B) Project's structural and procedural characteristics and outcomes	Field of action (e.g. water management, agriculture); Size and structure of project (e.g. no. and type of partners), Degree to which shared problem definition existed between partners; Degree to which potential outcomes were reached.	How do the researchers involved assess the processes and outcomes of their projects? In how far is this influenced by the projects' structural traits and/or socio-economic characteristics of respondents?
(C) Experiences made and challenges encountered	Degree to which commonly expected benefits of joint research processes (e.g. discussions, teamwork, new skills) and barriers (e.g. geographical distances and epistemological barriers) are perceived.	What do researchers particularly value about their project? What was perceived as negative, acting as a barrier? Do researchers perceive the project as a success or as a failure? Are these assessments influenced by the aforementioned data categories?
(D) Procedural research design	Assessment of the three main elements of the procedural research framework in INKA BB (e.g. was the phase-based research concept / the tool SWOT analysis / the methodological support useful?).	How useful was the common research design for the researchers involved? What are suggestions for improvements? Do assessments differ between groups of respondents?
(E) Assessment of conclusions; final remarks	Assessment of the four main conclusions drawn from the 2014er SWOT-Synthesis report (Schmid and Knierim 2014), additional "final comments".	What are cross-cutting insights and judgements? (How) Do assessments differ between groups of respondents?

If questions were not open-ended, nominal in nature (such as when inquiring the projects field of action) or demanded a simple yes/no scale (e.g. Have you been working as a PhD-student in your project?), scales were given as five point-rating scales; ranging from 1 = very negative / strongly disagree / zero percent to 5 = very positive / strongly agree / hundred percent. Participants were obliged to answer all questions (except the open ones) in order to avoid the problem of missing values and to somewhat force the respondents to quantitatively evaluate their experiences and the tools used even though a clear judgement is hard to make.

To ease the pressure of quantitative measurement and to gather as many additional insights as possible, respondents were encouraged throughout the questionnaire to provide further explanation or add remarks to their judgements. Furthermore, respondents were in a couple of cases allowed to tick "I cannot judge" instead of providing a clear assessment. This concerns without exceptions questions upon the respondents project (section B) since it was assumed that not every researcher may provide such detailed information upon aspects of the project s/he was participating in.

The target group of the survey was identified using the INKA BB database. At the moment of survey preparation (in summer 2014) the database comprised 172 addresses of scientists currently working or known to have been working in one of the INKA BB projects. From this list, all scientists working in project 1 have been excluded and further 13 addresses proved to be invalid leading to a total number of 155 scientists that received the initial invitation on September 24th, 2014. After two notifications (October 10th and 16th), the questionnaire was started 84 times out of which 22 did only look at the welcoming page without actually starting the survey. From the 62 respondents that proceeded, four dropped out in the middle of the survey and 58 continued until the last page. This corresponds to a response rate of 37.4%.[3] The sample is largely representative with respect to the single characteristic recorded in the original database, i.e. the main domain (agriculture or water management etc.) of the scientists' project.[4]

[3] Note that this response rate represents only a rough indicator. The final response rate might be smaller since we encouraged the respective project leaders to invite further employees to the survey, i.e. staff members of their INKA BB project that did not appear in our database. We cannot tell whether project leaders did so.

[4] More precisely, it is the particular project number that is recorded in the database. To guarantee respondents anonymity, however, we used the respective project domain (which can be deduced from the project number).

2.2 Data analysis and presentation

In this report, the focus is on the analysis of survey sections one to three, and five (cf. table 2-1). Data analysis was conducted using SPSS 19 and aimed, firstly, at the presentation of respondents' answers and assessments to the questions posed in the survey. Thus, we used common descriptive statistics to present the respective variables' distributions, central tendencies and dispersion. Secondly, we used bivariate correlation analysis to detect associations between variables (Spearman's Rho), and non-parametrical group difference tests (Mann-Whitney U in case of two groups and Kruskal-Wallis H in case of more than two groups) to detect differences between groups of respondents.

Both, the tests for associations and for differences, are principally applied as means to better understand the data set but also to infer conclusions upon possible directions of influence. This latter type of interpretation, though necessarily carefully applied, is particularly at focus in chapter 4. In section 4.1, we present the researchers' perception of project outcomes and analyse whether their assessments differ according to their personal and project-related background. In section 4.2, we largely apply the study design of Tress et al. (2005). Here, we understand the respondents' assessments of their INKA BB related experiences as dependent variables and the other variables presented in the preceding chapters as independent ones. Table 2-2 provides an overview of all potentially influencing, variables.

Table 2-2: Variables potentially influencing researchers' INKA BB experiences

No.	Variables	Chapter / section
	Respondents' characteristics	
1	Professional experience in science (years), scale from 1 = <5 to 5 = >20	3.1
2	Disciplinary background (natural sciences, engineering, social sciences, humanities, natural and social sciences	3.1
3	No. of td- projects participated in (years), scale from 1 = 1 project to 6 = 6 and more projects	3.1
4	Role in project (project leader/coordinator, scientist)	3.1
5	Years worked in project (scale from 1 = 1 year to 5 = 5 years)	3.1
6	Academic Career (no, not decided yet, yes)	3.1
7	Appraisal of td-research (scale from 1 = not important at all to 5 = very important	3.2
	Project characteristics – structural	
8	Domain/Field of action (Agriculture, Landscape, Water management, Health management/network development)	3.3.1
9	Innovation focus: technological (no, yes)	3.3.1
10	Innovation focus: organisational (no, yes)	3.3.1
11	Innovation focus: decision supporting products (no, yes)	3.3.1
12	Innovation focus: network development (no, yes)	3.3.1
13	Number of scientific partners (scale from 1 = zero to 4 = >4)	3.3.1
14	Number of practice partners (scale from 1 = zero to 5 = >20)	3.3.1

15	Share of fundamental research (scale from 1 = low to 5 = high)	3.3.1
16	Share of applied research (scale from 1 = low to 5 = high)	3.3.1
17	Share of administration and coordination (scale from 1 = low to 5 = high)	3.3.1
18	Share of communication/consultancy/ advice (scale from 1 = low to 5 = high)	3.3.1
	Project characteristics – procedural	
19	Implementation of SWOT-Workshops (scale from 1 = no to 3 = multiple times)	3.3.2
20	Joint problem perception between partners developed in project (scale from 1 = fully disagree to 5 = fully agree)	3.3.2
21	Objectives regularly discussed with all partners (scale from 1 = fully disagree to 5 = fully agree)	3.3.2
	(Achievement of) project outcomes	
22	Sensitisation of practitioners (scale from 1 = no/very low to 5 = high/hundred percent)	4.1
23	Development of network (scale from 1 = no/very low to 5 = high/hundred percent)	4.1
24	Consolidation of network (scale from 1 = no/very low to 5 = high/hundred percent)	4.1
25	Scientific output (scale from 1 = no/very low to 5 = high/hundred percent)	4.1
26	Development of innovation (scale from 1 = no/very low to 5 = high/hundred percent)	4.1
27	Testing of innovation (scale from 1 = no/very low to 5 = high/hundred percent)	4.1
28	Implementation of innovation (scale from 1 = no/very low to 5 = high/hundred percent)	4.1

3. Description of sample population

3.1 Professional experiences of respondents and role in project

INKA BB scientists who participated in the survey and provided fully answered questionnaires possess varying degrees of professional experience, disciplinary backgrounds, and also differ in their role in the project and the length they have been involved. In sum, however, one can describe the set of respondents as rather well experienced (52% are senior researchers with more than 10 years of work experience), and as having a predominant disciplinary background in natural science. Moreover, a relatively high share of respondents fulfilled the role of project leaders, the majority has been working in his/her project throughout the entire project cycle, and roughly every fifth respondent was a doctoral student in INKA BB (table 3-1).

As can be expected from the outset, the professional experience in science and the experience with td-research is closely associated with each other ($r = 0.755$, $p < 0.001$). Further, project leaders have significantly more professional experience than their colleagues (mean rank of 37.86 compared to 24.39; $U = 212.000$, $z = -3.073$, $p = 0.002$), whereas doctoral students have both, significantly lower professional experience in science (mean

rank of 15.08 compared to 33.26; U = 449.000, z = 3.461, p = 0.001) and also less professional experience with transdisciplinary research projects (mean rank of 17.79 compared to 32.55; U = 416.500, z = 2.795, p = 0.005).

Table 3-1: Description of sample population (n=58)

Variable	Description / Occurrence
Professional experience	36 % of all respondents (n = 21) have more than 20 years of professional experience in science, 22 % (n = 13) less than 5 years.
Disciplinary background	47 % have a background in natural science, 24 % in natural and social science, 15 % in engineering (incl. agriculture), 10 % in social science, and 3 % in the humanities
Transdisciplinary (td) experience	Almost 70 % have had experience with td research before INKA BB. 31 % even worked in more than six td-projects during their professional career
Role in project	38 % management/leadership, 62 % researcher. Out of the latter, roughly 21 % (n=12) were PhD students
Years worked in project	55 % worked for five or more years in his/her respective project
Academic career	45 % yes, 29 % not decided yet, 26 % no

Survey questions nos. 1-8.

While the majority of respondents seek to pursue an academic career (45 %), 26 % will not, and roughly every third is indecisive. As before, groups can be distinguished regarding their professional experience, i.e. indecisive researchers are significantly less experienced (mean rank of 15.00 compared to 35.08 and 36.27; H(2) = 19.313, p < 0.001).

3.2 Respondents' appraisal of transdisciplinary research

The majority of respondents clearly appreciate collaborative, i.e. jointly with practitioners realised, research practices. On a five-point scale ranging from "not important at all" to "very important", td-research is on average rated as "important" (response category 4) to contribute to solve complex societal problems (table 3-2).[5]

[5] In the original German version: „Für wie wichtig halten Sie kooperative, d.h. gemeinsam mit Praxispartnern realisierte, Forschungen zur Lösung komplexer gesellschaftlicher Probleme" (survey question no. 9).

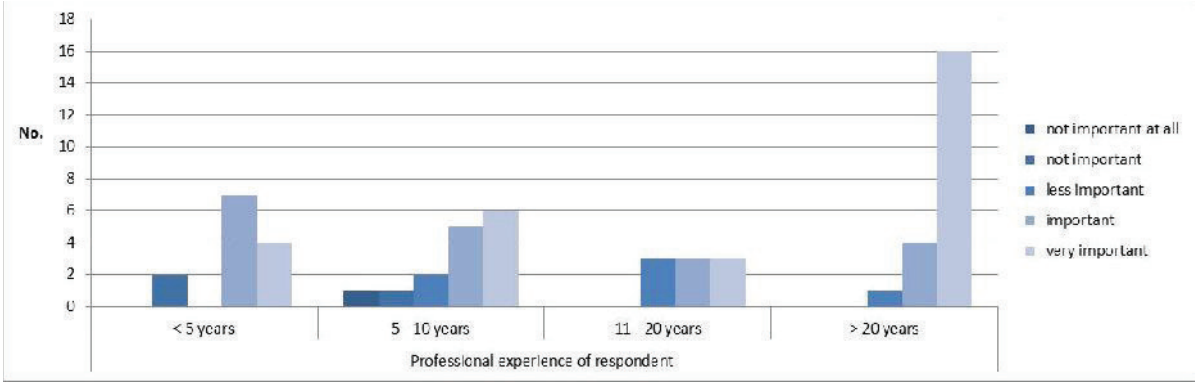
Table 3-2: Importance of td-research to solve complex societal problems

	N	Min	Max	Mean	Std. dev.
Importance of d-research to solve complex societal problems *(scale from 1 = not important at all to 5 = very important)*	58	1	5	4.24	0.961

Survey question no. 9.

These scores are moderately strong and positively associated with the respondents' professional experience (r = 0.343, p = 0.008), i.e. the more experienced (and, thus, older) they are the higher they rate the importance of td-research (figure 3-1).

Figure 3-1: Importance of transdisciplinary research with respect to researchers' professional experience in science



3.3 Types of projects respondents worked in

3.3.1 Structural characteristics

To further characterise the sample, respondents were asked to characterise the projects they were working in according to a number of well-established structural and process-related characteristics. As for structural characteristics, we inquired upon: (i) the project's main domain, i.e. the field of action, (ii) the innovation focus of the project, (iii) number and type of partners, and (iv) the share of basic versus applied research.

The projects' field of action

Table 3-3 depicts the field of action of the respondents' projects. Accordingly, the biggest group of respondents (n = 20) worked in the agricultural INKA BB projects, followed by respondents from projects focusing on water management and on landscape-related topics. The fourth category subsumes all remaining respondents which worked either in project no. 2

on climate change data, in project no. 3 on knowledge management and transfer, or in project no. 5 on health management under climate change conditions.

Table 3-3: Fields of actions of projects' respondents worked in

Field of action of respondents' project	Number of respondents	Share (in %)
Agriculture (projects no. 6-14, 18)	20	34,5
Landscape (projects no. 4, 15-17)	11	19,0
Water management (projects no. 19-24)	18	31,0
Other (projects no. 2, 3, 5)	9	15,5
Sum	58	100

Survey question no. 10.

The projects' innovation focus

As for the innovation focus of projects (multiple answers possible), one notices the predominant focus on technological innovations (such as new crop cultivation methods or seed varieties), and on decision supporting products (such as digital information portals, decision support tools, etc.). While roughly one third of respondents (n = 29) worked in projects with such a focus, only 17 and 16 respondents refer to organizational innovations and the social innovation of network establishment respectively (table 3-4).

Table 3-4: Innovation focus of projects respondents worked in

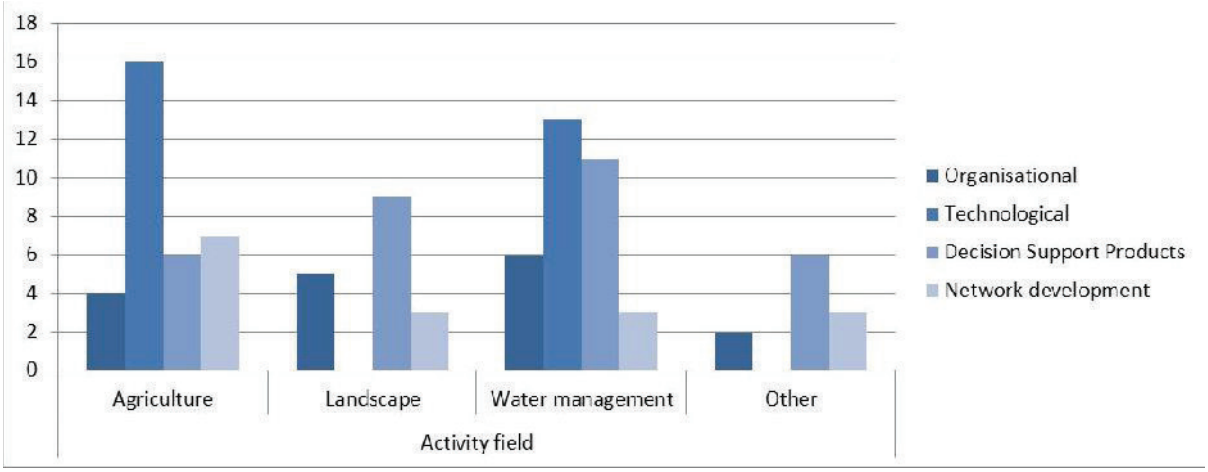
	Responses		Percent of cases
	N	Percent	
Technological innovations	29	28,7%	50,0%
Organisational innovations	17	16,8%	29,3%
Decision supporting products	32	31,7%	55,2%
Network development	16	15,8%	27,6%
Other*	7	6,9%	12,1%
Sum	101	100,0%	174,1%

A total of seven respondents identified other foci such as the development of educational material, climatic assessments, models, etc. See appendix A1 for a full list.

Out of the 58 respondents, 28 classified their project as focusing on more than one type of innovation, while the remaining 30 identified just one. Out of these, the most dominant single focus is on technological innovations, mostly in the agricultural sector. Figure 3-2 illustrates the distribution of responses over the four fields of action. As already indicated, technological innovations are clearly at focus in the agricultural but also in the water management projects – the latter accompanied by an additional focus on decision support products. Respondents from landscape projects and the remaining health and network development projects do not

identify a focus on technological innovations but refer predominantly to decision supporting products and, to a smaller extent, to organizational innovations and the social innovation of network development.

Figure 3-2: Distribution of innovation focus over respondents' field of action

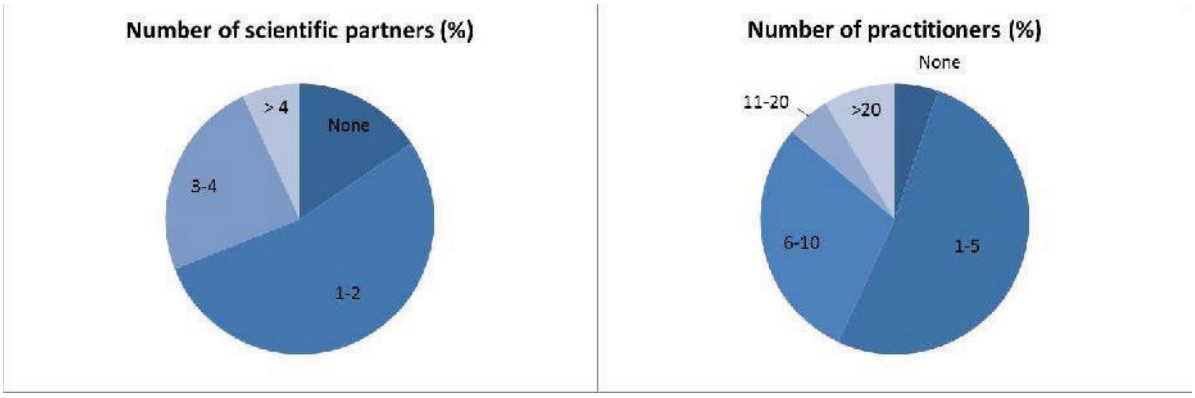


Survey question no. 11, n = 58.

Size and composition of networks

As for the structural characteristic of projects' size and composition, respondents were asked to identify the number and type of partners. Results show that the majority of respondents worked in rather small projects with one to two additional scientific partners, and one to five practice partners (figure 3-3).

Figure 3-3: Number of scientific partners and practitioners in respondents' projects

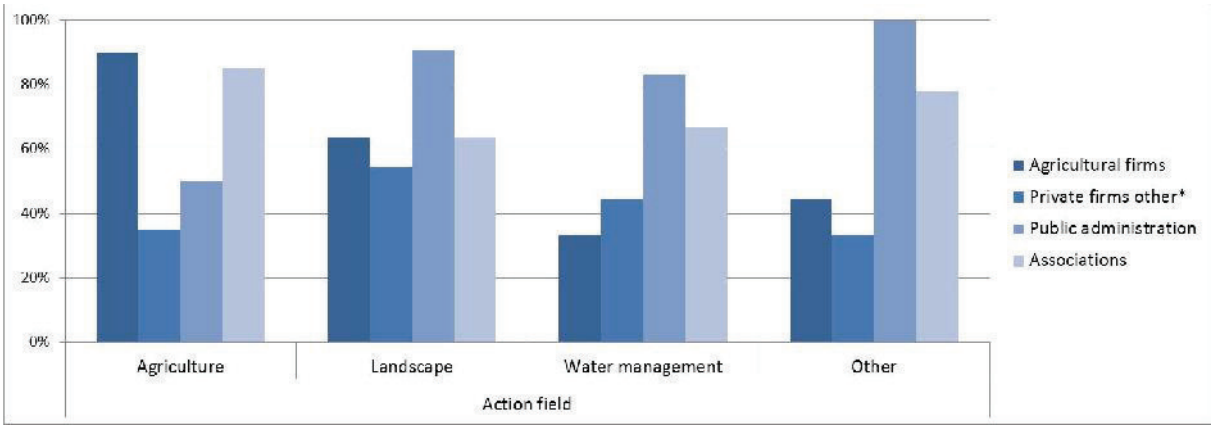


Survey question no. 12 and 13, n = 58.

The huge majority of respondents reported a diverse project composition, i.e. at least two types of partners were participating. Only five respondents identified just one, e.g. agricultural firms as the only type of practice partner in their agricultural projects. While respondents were asked to provide more detailed information on the share of each of the five

partner types theoretically present in each project (i.e. agricultural firms, private enterprises other than agricultural firms, public administration, and associations, interest groups and schools), figure 3-4 depicts a simplified picture summarising only the presence of a particular type as reported by the survey respondents.

Figure 3-4: Presence of types of practice partners as reported by respondents



Survey question no. 14, n = 58, multiple responses possible. Original survey question asked for specifications of shares of practice partner types in respondents' projects. Scales were given as rating scales ranging from 1 = partner type not present in project to 5 = sole partner type present. Original five-point scale transferred to binary variable, i.e. set to unity if respondents chose response 2 to 5 (partner type present). Depicted is the share of these positive responses with respect to the total number of responses per action field.

Accordingly, agricultural firms are the most prominent partner type in agricultural projects, i.e. 90 % of all respondents from the agricultural field of action (18 out 20) identified this partner type. Further 17 respondents from this field of action identified associations, interest groups or schools as project partners. Public administrative authorities are, in contrast, more prominent in the other three action fields.

Share of fundamental and applied research, administration and consultancy in project

To further characterise the respondents' project background, we surveyed the share of fundamental research, applied research, administration and coordination, and communication, consultancy and advice of projects (table 3-5).

Table 3-5: Projects' share of fundamental and applied research, administration, and consultancy and advice

Assessment of projects' share of… (scale from 1 = low to 5 = high)	N	Min	Max	Mean	Std. dev.	Median
Fundamental research	58	1	5	2.41	1.338	2.0
Applied research	57	1	5	3.74	1.027	4,0
Administration and coordination	54	1	5	2.69	1.195	3.0
Communication, consultancy, advice	55	1	5	3.31	1.230	3.0

Survey question no. 15. Note that respondents could choose "I cannot assess" which is then treated as missing observation.

Results show that many projects were largely applied research. 36 respondents (63 %) rate the share of applied research as rather high (response category 4 to 5) compared to other 15 respondents who identify high shares of fundamental research (also response category 4 to 5). Associations between scores seem intuitively logical: the higher the share of fundamental research, the lower the other shares of applied research ($r = -0.298$, $p = 0.024$), of administration ($r = -0.318$, $p = 0.019$) and of communication, consultancy, and advice ($r = -0.295$, $p = 0.029$).

3.3.2 Process characteristics

To gain insights into procedural project characteristics, INKA BB scientists were asked to specify whether (and how often) jointly performed SWOT-analyses have been performed in the course of their project (table 3-6).

Table 3-6: Realisation of jointly with practitioners performed SWOT-Workshops

	N	Share (in %)
1 = No, SWOT-Workshops were not implemented	7	13.0
2 = Yes, but only in the beginning	9	16.7
3 = Yes, several times in the course of the project	38	70.4
Sum	54	100.0

Survey question no. 17. Note that respondents could choose "I cannot assess" which is here treated as a missing observation.

A total of 7 respondents answered here in the negative, while the majority (n = 38) report upon multiple SWOT workshops. Respondents grouped along personal and structural project characteristics do not significantly differ in their assessments. The only exception is the

variable "role in project": project leaders and coordinators (n = 22) report significantly more often than participating researchers (n = 32) about higher numbers of SWOT-Workshops implemented (mean rank of 31.93 compared to 24.45; U = 254.500, z = -2.137, p = 0.033).

Respondents were also asked to evaluate whether a shared problem definition was developed in the course of the project and whether the projects' objectives were discussed regularly between all partners. Table 3-7 summarises the descriptive results.

Table 3-7: Shared problem definition and regularly discussed project objectives

Agreement to…	N	Min	Max	Mean	Std. dev.	Median
A shared problem definition has been developed between all project partners	56	1	5	3,66	1,16	4,00
The projects' objectives and focus were discussed regularly with all partners	57	1	5	3,56	1,21	4,00

Survey question no. 16; scales were given as five-point agreement scales ranging from 1 = fully disagree to 5 = fully agree. Additionally, respondents could choose "I cannot assess" which is in the analysis treated as missing value.

Regarding the shared problem definition, the distribution is as follows: Roughly 35 % (n=20) tend to agree and further 26% (n=15) fully agree, while 19 % (n=11) are indifferent and 17 % (n=10) even disagree to a certain extent (response category 1 and 2). Two respondents stated that they cannot provide an answer to this question. Slightly more negative are the scores regarding the joint discussion of projects' objectives. Here, 23 % disagree while 22 % tend to agree and 30 % fully agree.

Both assessments are statistically significantly associated with a strength of r = 0.622 (p < 0.001). Further, significant associations exist between the other procedural variable, i.e. the implementation of SWOT-workshops: Respondents who report upon more regularly performed workshops also tend to score higher on the agreement question "the project's objectives and focus were discussed regularly with all partners" (r = 0.385, p = 0.004).

As for the question of whether structural project characteristics influence the respondents' scoring on the procedural indicators, we analysed bivariate correlations and ran group difference tests in case of nominal variables. We found significant associations / differences for three of the eleven factors investigated. Firstly, it is the "share of communication, consultancy and advice" that is closely related. Respondents' from projects with higher "consultancy"-shares, tend to score also higher on both, the question of a shared problem definition (r = 0.389, p = 0.003) and of regularly discussed objectives (r = 0.600, p < 0.001). Secondly, respondents from projects that were largely fundamental research tend to score lower on "regularly discussed objectives" (r = -0.280, p = 0.035). Thirdly, respondents from

projects with an innovation focus on decision supporting products (n = 32, mean rank of 24.83) perceive the procedural indicator "joint problem perception" as significantly less fulfilled in their projects than their colleagues from projects without such a focus (n = 24, mean rank of 33.40, U = 266.500, z = -2.022, p = 0.043).

4. Researchers' assessments

4.1 Assessment of project results

From the initial project descriptions of all INKA BB projects and the yearly project reports, we identified seven different types of objectives and/or outcomes the projects were aiming at and/or specified ex-post in their final project reports. Survey question no. 18 asked the respondents on a five-point scale to what degree they perceive these results to be as fulfilled in their projects (table 4-1).[6]

Table 4-1: Achievement of project results

"On a scale from 1 to 5, to what degree did your project achieve the following results…"	N	Min	Max	Mean	Std. dev.	Median
Sensitisation of practice partners	49	1	5	3,50	1,06	4,00
Development of a science-practice network	53	1	5	2,97	1,22	3,00
Consolidation of a science practice-network	51	1	5	2,58	1,22	2,00
Scientific output (e.g. finalised dissertations, peer-reviewed publications)	54	1	5	3,08	1,28	3,00
Development of a particular innovation	53	1	5	2,68	1,14	3,00
Testing of a particular innovation	53	1	5	2,53	1,20	2,00
Implementation of a particular innovation	50	1	5	1,97	0,98	2,00

Survey question no. 18. Note that respondents could choose "I cannot assess" which is here treated as a missing observation.

Table 4-1 shows, firstly, that the sensitisation of practitioners is one of the most important and common outcomes of INKA BB projects; a result that neatly underlines previous studies (cf. Knierim et al. 2014, Schmid and Knierim 2014, Knuth et al. 2014). Secondly, one can detect decreasing levels of outcome achievements regarding both (i) the development of a science practice network and its consolidation, and (ii) throughout the three dimensions of

[6] Four respondents specify additional results achieved in their projects. These are: a "final report", „demonstration of interdependencies and training on decision making with the help of a ‚*Serious Game*', „a public climate change impact cataster' and „guidelines for practitioners".

innovation development, testing, and implementation.[7] Regarding the latter, only six respondents report upon successfully or nearly successfully implemented innovations (response category 4 and 5). Thirdly, the scientific output of projects is, over the entire set of responses the second highest outcome category.

As indicated by tests of associations (Spearman's Rho) and of group differences (Mann-Withney U and Kruskal-Wallis H), respondents assess project outcomes differently against the background of different structural and process-related project characteristics (cf. appendices A3 and A4):

Sensitisation of practitioners, network development and network consolidation

Respondents tend to identify higher sensitisation effects if their project was largely applied research, if they classified their projects as one in which SWOT workshops were implemented more regularly, all partners developed joint problem perceptions and discussed objectives, and if it was characterised by higher shares devoted to communication, consultancy, and advice. The latter scores are also positively associated with the other two outcome categories of network development and network consolidation

Scientific output

Respondents identified significantly higher scientific outputs if the projects they were working in were largely fundamental research, had a focus on technological innovations rather than an organisational one, and did not focus on the social innovation of network development.

Developing, testing, and implementing innovations

None of the structural project characteristics seem to influence the scoring of the outcome category of "innovation development". Scores on the "innovation testing" and "innovation implementation" are, in contrast, significantly higher (on a 5 % level) in largely applied research projects, and lower in projects focussing on organisational innovations. Further, respondents who classified their project as one in which partners developed a shared problem definition also tend to identify higher scores on the outcome category of innovation implementation.

4.2 Assessment of INKA BB-related experiences

In the survey, INKA BB scientists were asked to rate their experiences according a number of often cited potential benefits of transdisciplinary research practices (e.g. networking and discussion) and more traditional criteria such as merit points in academia or possibility to

[7] The different outcomes or, more precisely, the respondents' assessment of these items are closely associated as evidenced by correlation analysis (cf. appendix A2).

publish in peer-reviewed journals. Additionally, we inquired upon the scientists' experiences with aspects unique to INKA BB, i.e. particularly the support functions of the projects no. 1, no. 2 and no. 3. Further, we inquired whether INKA BB scientists perceived their particular project as a failure or success and what the project's career effects had been. From this, a new variable was computed summarising the "overall experience" of INKA BB scientists. Table 4-2 depicts the descriptive statistics over the entire sample.

Table 4-2: Researchers' assessment of INKA BB - related experiences (n=58)

		N	Min	Max	Mean	Std. dev.	Median
	Which of the following aspects did you perceive as positive or negative experiences in the transdisciplinary research practice in INKA BB? (scale from 1 = negative to 5 = positive)						
1	Discussions within my project	58	1	5	4.00	1.06	4.00
2	Discussions with other projects	58	1	5	3.36	1.00	3.50
3	Teamwork within my project	58	1	5	3.78	1.21	4.00
4	Networking with other researchers	58	1	5	3.48	1.13	4.00
5	Networking with practice partners	58	1	5	3.64	1.12	4.00
6	New insights and skills	58	1	5	3.84	1.04	4.00
7	New skills /knowledge on participation	58	1	5	3.17	1.09	3.00
8	Publishing in scientific journals	58	1	5	3.02	1.18	3.00
9	Merit points in academia	58	1	5	2.98	1.07	3.00
10	Project management	58	1	5	3.16	1.21	3.00
11	Support by INKA BB network management	58	1	5	3.34	1.22	3.00
12	Methodological support for participation (TP 1)	58	1	5	3.07	1.12	3.00
13	Information on climate change (TP 2)	58	1	5	3.24	0.90	3.00
14	Support for knowledge transfer (TP 3)	58	1	5	2.97	0.94	3.00
15	"Do you perceive the project as a success or a failure?" (scale from 1 = failure to 5 = success)	58	1	5	3.62	1.16	4.00
16	"Had the project a positive or a negative effect on your career (scale from 1 = negative to 5 = positive"	58	2	5	3.67	0.82	4.00
Overall experience (summarising 1-16)		58	1.75	4.44	3.40	0.66	3.50

Survey questions nos. 20, 21, 26.

Aspects rated highest are discussions and teamwork within the own project, new insights and skills, and networking with both the other scientific partners and practitioners. None of the aspects inquired upon received an average rating below 2.97. The newly computed variable "overall experience" ranges from a minimum of 1.75 to a maximum of 4.44, with a mean of 3.40 and a median of 3.50. Hence, a clear central tendency towards an indifferent

rating (neither negative nor positive, response category 3) exists. However, the overall rating is, on average, slightly positive.

To detect factors influencing the overall experiences of INKA BB researchers, we ran again group difference tests (in case of nominal variables) and correlation analysis using Spearman's Rho (in case of ordinal variables). Table 4-3 depicts the results.

Table 4-3: Factors influencing INKA BB researchers' overall experiences

No.	Tested variables	N	Correlation	Significance
	Respondents' characteristics			
1	Professional experience in science	58	0.129	0.334
2	Disciplinary background	58	-	0.329
3	No. of td- projects participated in	58	0.223	0.092
4	Role in project	58	-	0.008**
5	Years worked in project	58	0.176	0.187
6	Academic career	58	-	0.313
7	Attitude towards td-research	58	0.454	<0.001***
	Project characteristics – structural			
8	Field of action	58	-	0.218
9	Innovation focus: technological	58	-	0.071
10	Innovation focus: organisational	58	-	0.035*
11	Innovation focus: decision supporting products	58	-	0.725
12	Innovation focus: network development	58	-	0.862
13	Number of scientific partners	58	0.107	0.423
14	Number of practice partners	58	0.026	0.845
15	Share of fundamental research	58	0.162	0.224
16	Share of applied research	57	0.220	0.101
17	Share of administration and coordination	54	-0.049	0.724
18	Share of communication, consultancy, advice	55	0.489	<0.001***
	Project characteristics – procedural			
19	Implementation of SWOT-Workshops	54	0.267	0.051
20	Joint problem perception	56	0.471	<0.001***
21	Regularly discussed objectives	56	0.528	<0.001***
	Project outcomes			
22	Sensitisation of practitioners	49	0.381	0.007**
23	Development of network	53	0.474	<0.001***
24	Consolidation of network	51	0.613	<0.001***
25	Scientific output	54	0.362	0.007**
26	Development of innovation	53	0.291	0.035*
27	Testing of innovation	53	0.377	0.005**
28	Implementation of innovation	50	0.525	<0.001***

In case of the nominal variables (var. nos. 2, 4, 6, and 8 to 12), no correlation values are given. Significance in this case indicates that the mean ranks between groups are significantly different. Significances are indicated with * for $p < 0.05$, ** for $p < 0.01$, and *** for $p < 0.001$.

Out of the six factors describing the respondents and their involvement in the project, it is the role in project as well as the attitude towards td-research that seem to influence the overall experience of INKA BB scientists. Project leaders have, in contrast to regular scientists, significantly more overall positive experience. The same holds for respondents who have a more positive general attitude towards td-research compared to their colleagues – as can be deduced from a comparison of mean values for the groups under consideration (table 4-4 and 4-5).

Table 4-4: Overall experience in INKA BB for project leaders and other participating researchers (p = 0.008, sign**)

Overall experience	N	Std.Dev	Mean	Median
Project leaders	22	0.626	3.65	3.75
Participating researchers	36	0.635	3.23	3.28

Table 4-5: Overall experience in INKA BB according to the general attitude of respondents towards td-research (p < 0.001, sign***)

Overall experience	N	Std.Dev	Mean	Median
Negative to indifferent attitude	10	0.489	2.84	2.69
Positive attitude	48	0.633	3.51	3.59

Binary variable set to unity if respondent chose response 4-5 ("important" and "very important").

Among the eleven variables describing the structural background of respondents' projects, it is the organisational innovation focus and the projects share devoted to communication, consultancy and advice which has, or at least seems to exert, a significant influence on respondents' overall experience. As before, this is equally manifested in higher mean values (table 4-6 and 4-7).

Table 4-6: Overall experience in INKA BB according to projects' focus on organizational innovations (p = 0.035, sign***)

Overall experience	N	Std.Dev	Mean	Median
No focus on organisational innovation	41	0.624	2.84	3.50
Focus on organisational innovation	17	0.661	3.51	3.13

Table 4-7: Overall experience in INKA BB according to the projects' share of communication, consultancy and advice ($p < 0.001$, sign***)

Overall experience	N	Std.Dev	Mean	Median
Low to medium share of consultancy and advice	30	0.623	3.19	3.31
High to very high share of consultancy and advice	25	0.622	3.69	3.81

Binary variable set to unity if respondent chose response 4-5 ("high" and "very high").

Last but not least, highly significant and positive associations were found for almost all process-related and for all outcome-related factors (cf. table 4-3, variable nos. 19-27), indicating that well-performing projects do influence the overall experience of scientists involved. The strongest relationships with the newly computed variable "overall experience", however, have the process variable "regularly discussed objectives" ($r = 0.528$***, $p < 0.001$) and the two outcome characteristics that somehow represent the ultimate aim of what INKA BB initially set out for. These are: successfully implemented innovations to tackle a particular real-world problem induced by climate change ($r = 0.525$***, $p < 0.001$), and (2) the successful institutionalisation of science-practice networks ($r = 0.613$***, $p < 0.001$).

4.3 Assessment of conclusions drawn from the SWOT synthesis report

Finally, researchers were asked to rate and comment the conclusions that were drawn as a result of the cross-sectional assessment of the projects' final SWOT reports (Schmid and Knierim 2014). This was done in order to validate the qualitative summaries and to make a next step towards quantification.

Table 4-8: Researchers' assessment of conclusions drawn from the SWOT-synthesis report (n = 58)

No.	Agreement to… *(scale from 1 = fully disagree to 5 = fully agree)*	Min	Max	Mean	Std. dev.	Median
C1	Transdisciplinary research practices are challenging and organisationally demanding. Nevertheless, they allow numerous learning experiences and are the right way, to develop and test practical relevant innovations.	1	5	3,98	0,964	4,00
C2	The topic climate change adaptation has to be included more intensively in political agenda setting and embedded in public administration through communicative instruments and additional human resources.	2	5	4,16	0,894	4,00
C3	Practitioners' perspectives need to be incorporated earlier and more comprehensively from the very beginning of transdisciplinary projects.	2	5	3,97	1,042	4,00
C4	More financial means for practice partners are necessary in the project budget to address the personnel, time and financial constraints of practitioners, which hinder or affect them to test promising adaptation measures.	2	5	4,16	0,875	4,00

Survey question no. 28.

The results show very little differences between the scoring of the four conclusions, - the scientists clearly agreed to each of them. Particularly interesting is the high agreement to the third conclusion (C3) because it implies changes in the classical design and preparation of research projects and has hence the highest practical impact for researchers.

As can be expected, all four conclusions are significantly associated with each other. The strongest relationship exist between C3 and C4 ($r = 0.647$, $p < 0.001$) which seems also ultimately plausible since the quest for incorporating practitioners perspectives more seriously from the very beginning of td-projects (C3) implies that more financial means are necessary to address the particular constraints of practitioners (C4).

Bivariate correlation analysis and group difference tests (in case of nominal variables) reveal further that the scoring is not determined by any of the socio-professional, procedural or structural project characteristics. The only exceptions are, firstly, scientists who show a relatively positive attitude towards td research were more likely to score higher on the first and the third conclusion, i.e. they tend to view td research in the given context as "instructive and appropriate but challenging" (C1) and suggest to incorporate practitioners' perspectives earlier and more comprehensively (C3). Secondly, scientists working in the domain of water management do not agree with the forth conclusion as much as their colleagues from the other domains (mean rank of 18.22 compared to 32.68 in agriculture and 38.36 in landscape, $H(3) = 14.284$, $p = 0.003$) – a difference that was already noticeable in the cross-cutting SWOT analysis.

5. Summary, brief discussion, and conclusions

In the report at hand, we analysed five main questions. These are: Firstly, who are the researchers in INKA BB? Secondly, how do they assess the outcomes of their projects? Thirdly, what are particularly positive and negative experiences in INKA BB? Fourthly, how do respondents assess the conclusions that were drawn in the SWOT-synthesis report? And, lastly, what are the personal or project-related characteristics shaping these assessments? (cf. chapter 1 and table 2-1). In what follows, we will briefly review and discuss the main results regarding these questions.

5.1 Sample description and representativeness

As for the first question, results show that the sample is a broadly mixed group of researchers with varying project backgrounds, professional experiences, acquired practices in transdisciplinary projects and disciplinary backgrounds. As for the socio-professional characteristics, however, the sample is characterised by a relatively large number of

'experienced researchers', the majority has a disciplinary background in the natural sciences, and a considerable share of researchers (38%) had leading responsibilities in their projects. Since no baseline data is available for these characteristics, we cannot infer any conclusions regarding whether these characteristics are representative for the entire group of INKA BB researchers. However, we interpret these facts as indicating that (i) a large group of the respondents has a comprehensive professional knowledge and, hence, a good overview of its own field of expertise, and (ii) that viewpoints and expertise of both, participating researchers and project leaders are well represented in the survey. Further, the 58 respondents seem to reflect the disciplinary diversity of the researchers in INKA BB very well, although it is only possible to infer upon the representativeness of the sample with respect to the projects' field of action (which is the sole criterion known for the all members of the sample). In this regard, a good representation is achieved.

An interesting finding is that more experienced researchers seem to generally attribute a higher importance to td research for the solution of complex societal problems (cf. section 3.2). This may indicate that scientists (and in our case mostly natural scientists) become rather more critical than more confident with disciplinary solutions from their own field in the course of their career.

5.2 Slightly to distinctively positive assessments of project outcomes

With regard to the assessment of project outcomes, respondents generally adopt a careful attitude and seem to not overestimate the results. In line with the findings of the 2nd SWOT analysis evaluation (Schmid und Knierim 2014, Knierim et al. 2014), the successful sensitisation of the practice partners for the challenges of climate change is the highest ranked outcome. Scientific results and the development of science-practice networks have obtained a similar high, second-place valuation. The lowest ranked outcome categories are the institutionalisation of the networks as well as the testing and implementation of innovations. These latter perceptions of project outcomes correspond again with results from the survey of practitioners in INKA BB. While practitioners reported upon manifold learning effects in terms of how 'to do' adaptation and adaptation research, only one fifth clearly feel enabled to implement particular adaptation measures (Schmid et al., forthcoming).

As for factors potentially shaping these assessments, data analysis reveals significant correlations between the degree of practice orientation and participatory procedures in the projects and the perceived successes regarding sensitisation, network development and consolidation on the one side and between a projects' turn towards fundamental research and perceived scientific outputs on the other (cf. section 4.1 and appendix A4). Apparently, there is a clear outcome divide between the different projects that can be traced back to the

structural problem orientation (fundamental or applied) and the procedural design of the projects.

Furthermore, there are findings that back up the idea that the domain of action (agriculture, water management, etc.) also relates to a certain innovation focus (technological, organisational, etc.) (figure 3-2) and corresponds to a certain degree to an either private entrepreneurial or public administration actor constellation (figure 3-4) which again might then lead to consequences for an appropriate procedure of science-practice cooperation. Here, more comparative research is necessary to consistently explain the linkages among these factors.

More evident are correlations between the procedural design of a project and the perceived outcomes: strong linkages can be stated between projects that gave a high attention to communication and exchange and the achieved joint understanding and common objective definitions. It is probable that in these cases scientists paid a high attention to give practitioners occasions for interaction and – by doing so - became aware of the results from such procedures.

5.3 Positive and negative experiences in INKA BB

Regarding researchers' assessment of experiences within INKA BB, the overall results across all groups and items, i.e. what we have termed "overall experience", is slightly positive (mean of 3.4). However, since this "overall experience" is the mean of the sum of all 16 items surveyed, it seems appropriate to discuss individual items separately (cf. table 4-2). We consider four aspects to be worth highlighting and substantiate interpretation with results from subsequent analyses:

Discussions, teamwork and networking as the main media enabling learning

Firstly, the slightly positive overall experience of scientists in INKA BB is mostly related to the experiences made within the 'own' project and varies considerably when regarding cooperation within the larger network of INKA BB in general. Among the highest rated aspects (mean above 3.5) are "discussions within own project", "teamwork within own project", "networking with practice partners", and "new insights and skills". These results are well in line with Tress et al. (2005) who understand in their study about researcher experiences in integrative projects "discussions", "teamwork" and "networking" as the main media that enable learning and, thus, the acquisition of "new insights and skills".

Indeed, in our data set the items capturing interactions between actors involved (i.e. discussions, teamwork, networking) represent not only the most positive experiences, they are also closely related with the aforementioned self-assessment of "new insights and skills"

(cf. appendix A5). In combination with the manifold learning experiences stated in the SWOT analyses reports and the survey of practitioners we interpret these findings as clearly indicating mutual learning processes between the scientific and extra-scientific actors involved – which is one of the core products expected from transdisciplinary research practices (Carew and Wickson 2010).

Subsequent bivariate correlation analysis indicates further that researchers gained more new skills if they participated in projects with large shares of communication, consultancy and advice ($r = 0.429$, $p < 0.001$), and in relatively successful projects, particularly in terms of the outcome categories "sensitisation of practitioners" ($r = 0.536$, $p < 0.001$), "development of innovation" ($r = 0.493$, $p < 0.001$), "testing of innovation" ($r = 0.609$, $p < 0.001$), and "implementation of innovation" ($r = 0.461$, $p = 0.001$). Again, we need to refrain from interpreting these results as strict cause-effect relationship. However, scientists from projects with high communication shares assess their "new skills and insights" as significantly higher, most probably due to this higher level of interaction with practitioners.

Publishing and academic merits among the most negative experiences

Secondly, and in contrast to the aforementioned rather positive experiences, INKA BB scientists perceived the two more traditional evaluation criteria of scientific research (i.e. opportunities to publish in peer-reviewed journals and academic merits) as distinctively more negative (mean of 3.02 and 2.98). Since peer-reviewed publications and the merits resulting from it can be understood as the main "academic currency" (Tress et al. 2005), it is to no surprise that both scorings are in our data set closely associated ($r = 0.675$, $p < 0.001$). Moreover, scientists who report having difficulties to publish results from inter- or transdisciplinary research practices are rather common (cf. Kueffer et al. 2007, Tress et al. 2005, 2006). Possible explanations for this phenomenon are manifold and comprise explanations focussing on the scientists themselves (e.g., td-scholars lacking knowledge on where to target their work) and the particularities of td-projects in combination with the existing publication system (e.g., td-research lacking coherent theories and methods, lack of quality and quality criteria, dearth of practice-oriented journals concerned with methodology and conduct of td research).[8]

Subsequent analysis of our data reveals two factors influencing the experiences with publications and academic merits. These are (i) whether the responding scientist seeks to pursue an academic career and (ii) the projects' share of fundamental research: Scientists with a clear statement towards an academic career have, compared to their colleagues, significantly more positive experiences regarding both, publishing in peer-reviewed journals

[8] See, e.g., Kueffer et al. 2007, Brandt et al. 2013, Tress et al. 2006, 2005, Zscheischler and Rogga 2015.

(H(2) = 9.124, p = 0.010) and academic merit points (H(2) = 10.342, p = 0.006). The same holds for scientists working in projects that were largely fundamental. If they did, they evaluate their publishing experiences (r = 0.268, p = 0.042) as well as the academic merits arising from project participation (r = 0.378, p = 0.003) as more positive.

Perception of successful projects and clearly positive career effects

Given the rather cautious assessment of project results (cf. section 4.1) and the relatively negative experiences regarding "publishing" and "academic merits", it is striking that the majority of respondents does not only perceive their project largely as a success (mean of 3.62, median of 4.0) but also identify clearly positive career effects from participating in INKA BB (mean of 3.76, median of 4.0). While the perception of project success is closely associated with the aforementioned scoring of project outcomes (cf. appendix A6, i.e. the more respondents perceive the initial INKA BB objectives to be achieved in their projects, the more they also perceive their project as a success), no such easy interpretation can be presented for the respondents' assessment of career effects. From the socio-professional, structural and procedural project characteristics it is only the "share of fundamental research" that seems to determine the perception of individual career effects (r = 0.307, p = 0.019).

While researchers from projects that were largely fundamental perceive higher career effects, no significant differences exist between researchers aiming at continuing an academic career and those being indifferent or pursuing a career outside academia. This is somewhat surprising, since one might assume researchers striving for academic merits to perceive less positive career advancements from participating in transdisciplinary project practices (cf. Tress et al. 2005). Apparently, researchers perceived their participation in INKA BB as enriching and positive for their future career (be it in or outside academia) for various reasons, so that respondents seem to have used a broader set of measure categories as in earlier studies. Obviously it can be concluded that positive assessments of career effects from td research are no longer or not only based on classical academic merits.

Critical views on project management and cross-cutting support projects

Last but not least, one needs to acknowledge that researchers rate their experiences regarding their respective project's management and the two cross-cutting methodology projects (variables nos. 10, 12 and 14) among the most negative from the 16 items surveyed. This indicates that management, participation and knowledge dissemination methods have not gained a more than average appreciation by most of the researchers and obviously, crosscutting activities in these fields were not always considered as supportive. Especially in the field of participation methods, this finding is confirmed by the rating of variable 7, which shows that relatively few learning steps and positive experiences have been made.

Qualitative ex-post analysis and reflection of the projects first working phases have shown that a more intensive interaction in terms of personal exchange and hence time resources would have been necessary to offer options to increase methodological learning (Siart and Knierim 2013). Obviously, the questions of how and to what degree methodological skills necessary for successful transdisciplinary research need to be trained and professionally supported, and whether and how the methodological quality can be observed and assessed requires more systematic research.

5.4 Overall INKA BB conclusions and outlook

Besides surveying researchers' experiences with and in INKA BB, we asked respondents to rate the conclusions that we drew from the cross-sectional analysis of the 2013 SWOT reports. As presented in section 4.3, the vast majority of respondents agreed or fully agreed to them with only a few outliers. This is, generally speaking, not surprising since each conclusion represents more or less a frequently established claim in the discourse about transdisciplinary project practices in sustainability science.

What is interesting, however, is the relatively high agreement with conclusion number three (claiming that practitioners' perspectives need to be integrated earlier and more comprehensively in transdisciplinary project practices). Such a systematic integration of practitioners' perspectives and constraints is considered to be one of the main factors influencing the overall success of td-projects (Brandt et al. 2013, Lang et al. 2012, Podesta et al. 2013). The procedural design of INKA BB accounted for this need and established joint partner workshops to be conducted in the beginning, the middle, and in the end of the entire project cycle. Hence, all projects established in 2009 such workshops in which the projects' objectives, challenges, etc. were discussed between all partners. This, however, did not lead in the vast majority of cases to pro-active changes in the overall focus or design of the projects and, thus, many of the challenges and problems described in the 2013er reports were already described in the first SWOT-reports in 2010. Again, there are several possibilities to interpret this 'stability': first, it can be assumed that a five-year period is not so long as to fundamentally or even considerably change a project's orientation, especially in the case where multiple actors are concerned and a common working process has to be established and maintained. Nevertheless, the only project that published on its action-oriented approach, also reports on goal modifications undertaken and supplementary objectives developed (Siart et al. 2013, Bloch et al. 2015). So, a second interpretation could be that no or only little change was more convenient for researchers than a revision and modification of objectives and the corresponding planning. This might have seem very relevant to some, as financial means were initially planned for the whole period of five years

and accordingly allocated so that this distribution could be perceived as posing certain structural hindrances to major changes. In a similar sense, the frequent claim of additional financial means for practice partners (table 4-8, C4) can be understood as a hint for more autonomous activities of practitioners. Generally, we conclude from this that a high attention has to be paid to the initial phase of transdisciplinary, publically funded projects and also to the way, given structural conditions of the partners shape the common outset of the project.

Summarising, the impulses from INKA BB for transdisciplinary research can be identified on three levels:

- **Individually**, (natural science) researchers are relatively positive about their experiences and this the more, they are established researchers. Among these experiences, a number of social skills like networking and practicing teamwork get a high importance; and td research is not (any more) considered a general hindering factor in one's career. Hence there are good reasons for public research, to continue to offer opportunities and to challenge participation of researchers in such projects;

- **Methodologically**, the survey revealed that the structural and procedural design of td research can be operationalised with clearly identifiable indicators and that noticeable differences exist between more fundamental and applied research projects in terms of an 'outcome divide'. Moreover, an interactive methodology as expressed through a high share of communication, consultancy and advice and regularly discussed objectives clearly prepare the bases for successful experiences in td research. With this, we conclude that although it is not yet sufficiently explored how such methodological procedures can be ascertained in any case throughout td projects, their initial establishment, monitoring and evaluation should nevertheless be a condition sine qua non.

- With regard to the **societal dimension** of this type of research, there are some hints that differences exist in the focus of innovation (technological, organisational, etc.) and in the research orientation (fundamental, applied) depending of the project's domain of activity (agriculture, water management, etc). These findings have implications for the way practitioners can be addressed and included in future td projects and hence should be considered when developing calls for new td research. Another aspect of the societal dimension is highlighted by the researchers' high appreciation of networking and collaboration with practice partners. This latter fact is thoroughly supported by the assessments of the practice partners (Schmid et al., forthcoming) and is promising with regard to the possibilities that are offered by a transformative science (Grunwald 2015).

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Appendices

A1: List of additional project' foci identified by respondents (survey question no. 11)

The focus of my project was on…	Projects' field of action
Developing a catalogue of adaptation measures [„Erarbeitung eines Maßnahmenkatalogs zur Anpassung"]	Water management
Scientific foundations/basics [„wissenschftl. Grundlagen"]	Water management
Model linkage [„Modellkopplung"]	Water management
Water protection, water resources management [„Gewässerschutz, Gewässerbewirtschaftung"]	Water management
Development of education and communication measures and projects [„Entwicklung von Bildungs- und Kommunikationsmaßnahmen und -projekten"]	Other
Research [„Forschung"]	Other
Climatologic foundations/basics (data and scenarios) [„klimatologische Grundlagen (Daten und Szenarien)"]	Other

Survey question no. 11.

A2: Project outcome scores – Correlation matrix (Spearman's rho)

		Sensitisation of practice partner	Development of a science-practice network	Consolidation of a science-practice network	Scientific output (e.g. peer-reviewed publications)	Development of a particular innovation	Testing of a particular innovation
Development of a science-practice network	R	0.689***					
	Sig.	< .001					
	N	48					
Consolidation of a science-practice network	R	0.431**	0.490***				
	Sig.	.002	< .001				
	N	47	51				
Scientific output (dissertations, peer reviewed publications)	R	0.270	0.248	0.133			
	Sig.	.067	.079	.356			
	N	47	51	50			
Development of a particular innovation	R	0.212	0.265	0.312*	0.162		
	Sig.	.158	.060	.028	.257		
	N	46	51	50	51		
Testing of a particular innovation	R	0.371*	0.381**	0.380**	-0.001	0.752***	
	Sig.	.011	.006	.006	.995	< .001	
	N	46	51	50	51	52	
Implementation of a particular innovation	R	0.471**	0.557***	0.502***	0.079	0.586***	0.729***
	Sig.	.001	< .001	< .001	.584	< .001	< .001
	N	45	49	49	50	49	49

*p < 0.05, ** p < 0.01, *** p < 0.001 (all two-tailed).

A3: Two-tailed significances of non-parametrical group difference tests (Mann-Whitney U in case of 2 groups, Kruskal-Wallis H in case of > 2 groups) to detect whether respondents from different project types score significantly different on the project outcome categories.

	Project outcomes						
	Sensitisa-tion of practice partners	Develop. science-practice network	Consolidation of science practice-network	Scientific output	Innov. develop ment	Innov. testing	Innov. Implement ation
Tested variables (structural, nominal)							
Action field of respondents' project	.475	.166	.305	.401	.510	.703	.632
Innovation focus: Technological	.379	.494	.127	.022*	.275	.193	.140
Innovation focus: Organisational	.845	.868	.869	.010*	.289	.097	.050*
Innovation focus: Decision supporting products	.687	.608	.860	.185	.773	.696	.618
Innovation focus: Network development	.827	.743	.932	.050*	.959	.648	.761

Significances are indicated with * for $p < 0.05$.

A4: Correlation (Spearman's rho) between project outcome scores and ordinal structural and procedural project characteristics

		Structural project characteristics: Share of…				Procedural project characteristics		
		Funda-mental research	Applied research	Administra-tion	Communi-cation, consultancy & advice	SWOT work-shops	Joint problem perception	Regular discussion of objectives
Sensitisation of practice partners	R	0.170	0.312*	0.142	0.447**	0.322*	0.586***	0.542***
	Sig.	.243	.031	.410	.001	.027	< .001	<.001
	N	49	48	46	48	47	49	48
Development of science-practice network	R	-0.083	0.188	0.119	0.406**	0.360**	0.494***	0.511***
	Sig.	.555	.183	.408	.003	.009	< .001	<.001
	N	53	52	50	52	51	53	52
Consolidation of science-practice network	R	0.040	0.147	0.062	0.386**	0.304*	0.501***	0.441**
	Sig.	.779	.303	.671	.006	.034	< .001	.001
	N	51	51	49	50	49	51	50
Scientific output	R	0.380**	0.063	-0.276	-0.076	0.084	0.388**	0.088
	Sig.	.005	.655	0.050	.592	.562	.004	.532
	N	54	53	51	52	50	53	53
Development of particular innovation	R	-0.015	0.210	-.109	0.036	0.190	0.229	0.146
	Sig.	.915	.131	.448	.801	.187	.099	.302
	N	53	53	51	52	50	53	52
Testing of particular innovation	R	0.029	0.369**	-0.176	0.193	0.248	0.182	0.147
	Sig.	.836	.006	.217	.170	.083	.191	.299
	N	53	53	51	52	50	53	52
Implementation of particular innovation	R	-0.088	0.491***	-.105	0.217	0.183	0.357*	0.253
	Sig.	.543	< .001	.479	.134	.219	.011	.080
	N	50	50	48	48	47	50	49

Significances are indicated with * for p < 0.05, ** for p < 0.01, and *** for p < 0.001.
Note that for reasons of space limitations the outcome categories are displayed in the rows.

A5: Correlation (Spearman's rho) between the item "new insights and skills" and the other items surveyed under "positive and negative experiences" (n = 58)

		new insights and skills
Discussions within my project	R	,352**
	Sig.	,007
Discussions with other projects	R	,160
	Sig.	,229
Teamwork in my project	R	,514**
	Sig.	,000
Networking with other researchers	R	,332*
	Sig.	,011
Networking with practitioners	R	,526**
	Sig.	,000
New skills regarding participation	R	,570**
	Sig.	,000
Publishing in scientific journals	R	,157
	Sig.	,239
Merit points in academia	R	,210
	Sig.	,113
Project management	R	,344**
	Sig.	,008
Support by INKA BB network management	R	,188
	Sig.	,157
Methodological support for participation (TP 1)	R	,147
	Sig.	,271
Information on climate change (TP 2)	R	,071
	Sig.	,598
Support for knowledge transfer (TP 3)	R	,059
	Sig.	,658

A6: Correlation (Spearman's rho) between researchers' perception of project success and the project's outcome

		Researchers' perception of project success
Project outcome variables		
Sensitisation of practice partners	R	,427**
	Sig.	,002
	N	49
Development of science-practice network	R	,504**
	Sig.	,000
	N	53
Consolidation of science-practice network	R	,658**
	Sig.	,000
	N	51
Scientific output	R	,302*
	Sig.	,026
	N	54
Development of particular innovation	R	,364**
	Sig.	,007
	N	53
Testing of particular innovation	R	,509**
	Sig.	,000
	N	53
Implementation of particular innovation	r	,650**
	Sig.	,000
	N	50

A7: Original German questionnaire

Befragung der WissenschaftlerInnen in INKA BB

Sehr geehrte Kolleginnen und Kollegen,

Das Verbundmanagement und Teilprojekt 1 haben zum Abschluss von INKA BB gemeinsam diesen Fragebogen entwickelt. Vielen Dank, dass Sie sich Zeit für die Beantwortung nehmen!

Uns interessiert, wie Sie das Gesamtnetzwerk und die Arbeiten in Ihrem INKA BB Teilprojekt einschätzen, welche positiven und negativen Erfahrungen Sie mitnehmen und was Sie in zukünftigen Projekten verändern würden. Ihre Einschätzungen sind wichtig für die Gesamtevaluierung unserer gemeinsamen Forschungsarbeiten in INKA BB! Hierfür erwarten Sie im Folgenden auf sechs Seiten entsprechende Fragen.

Die Beantwortung dauert ungefähr 15 Minuten. Bitte versuchen Sie jede Frage eindeutig zu beantworten, um so eine möglichst vollständige Auswertung des Fragebogens zu ermöglichen. Ihre Daten werden absolut vertraulich behandelt. Es werden weder Namen & Adressen erhoben noch gespeichert. Die Fragen sind darüber hinaus so gestaltet, dass aus den Antworten keine Rückschlüsse auf Sie als Person zu ziehen sind.

Mit freundlichen Grüßen,

Andrea Knierim & Verena Toussaint

A) Angaben zu Ihrer Person und Ihrer Rolle im Projekt

Zunächst würden wir gerne etwas über Sie als WissenschaftlerIn und Ihre Rolle in INKA BB erfahren. Bitte beantworten Sie hierzu die folgenden Fragen.

1. Wie viele Jahre Berufserfahrung haben Sie im Wissenschaftsbereich? [SD01]

(Bitte geben Sie die Jahre an, die Sie seit Ihrem ersten Hochschulabschluß als WissenschaftlerIn gearbeitet haben.)

- < 5 Jahre
- 5 – 10 Jahre
- 11 – 20 Jahre
- > 20 Jahre

2. Haben Sie bereits vor INKA BB Erfahrungen in Forschungsprojekten sammeln können, die gemeinsam mit Praxispartnern realisiert wurden? [SD02]

- Ja
- Nein

3. In wie vielen solcher Projekte haben Sie bisher mitgearbeitet? [SD03]

(Wenn INKA BB Ihre erste Projekterfahrung mit Praxispartnern war, geben Sie bitte eine 1 ein.)

[Bitte auswählen]

4. Was war Ihre Rolle im INKA BB – Teilprojekt? [SD05]

(Falls Sie in mehr als einem Teilprojekt mitgearbeitet haben, entscheiden Sie sich bitte an dieser Stelle für eines und beantworten alle folgenden Fragen vor diesem Hintergrund.)

- Teilprojektleitung/-koordination
- WissenschaftlerIn

5. Waren Sie als DoktorandIn im Projekt tätig? [SD06]

- Ja
- Nein

6. Wie viele Jahre haben Sie in Ihrem INKA BB Teilprojekt gearbeitet? [SD09]

(Wenn Sie über die gesamte Projektlaufzeit in INKA BB beschäftigt waren geben Sie bitte „5 Jahre“ an.)

[Bitte auswählen]

7. Wie würden Sie am ehesten Ihren disziplinären wissenschaftlichen Hintergrund beschreiben? [SD08]

- Naturwissenschaften, Mathematik, Informatik
- Ingenieurwissenschaften/Planung
- Sozialwissenschaften
- Geistes- und Humanwissenschaften
- Natur-/Ingenieurwissenschaften UND Sozial-/Geisteswissenschaften
- Anders:

8. Streben Sie (weiterhin) eine akademische Karriere an? [SD07]

- Ja
- Noch unentschieden
- Nein

9. Für wie wichtig halten Sie kooperative, d.h. gemeinsam mit Praxispartnern realisierte, Forschungen zur Lösung komplexer gesellschaftlicher Probleme? [SD04]

überhaupt nicht wichtig — sehr wichtig

B) Charakteristika Ihres Teilprojekts und des gemeinsamen Forschungsprozesses

Im Folgenden bitten wir Sie, Ihr Teilprojekt und den durchlaufenen Forschungsprozess zu rekapitulieren. Auch hier sind die Fragen so gestellt, dass keinerlei Rückschlüsse auf Sie als Person möglich sind.

10. Das Teilprojekt (TP), in dem ich gearbeitet habe, gehört zu dem Handlungsfeld: [TP01]

- Landwirtschaft (TP 6-14, 18)
- Landschaft (TP 4, 15-17)
- Wassermanagement (TP 19-24)
- Gesundheit/Netzwerkentwicklung (TP 2, 3, 5)

11. Der Fokus in meinem Teilprojekt lag auf... [TP14] (Mehrfachnennungen möglich)

- technologischen Innovationen
  (bspw. neue Sorten oder Bewirtschaftungsverfahren von Land- und Wasserressourcen)
- organisationalen Innovationen
  (bspw. neue Planungs- und Managementmethoden)
- entscheidungsunterstützenden Produkten
  (bspw. Informationsportale, Leitfäden, Entscheidungshilfetools)
- der Etablierung eines Netzwerks
- Weiterem/Anderem

12. Waren an Ihrem Teilprojekt neben Ihrer eigenen wissenschaftlichen Einrichtung noch andere Wissenschaftspartner beteiligt? Wenn ja, wie viele? [TP02]

(Eine „andere wissenschaftliche Einrichtung“ kann auch ein anderes Fachgebiet an derselben Universität sein; sollte kein anderer wissenschaftlicher Partner beteiligt gewesen sein, wählen Sie bitte die 0 aus.)

[Bitte auswählen]

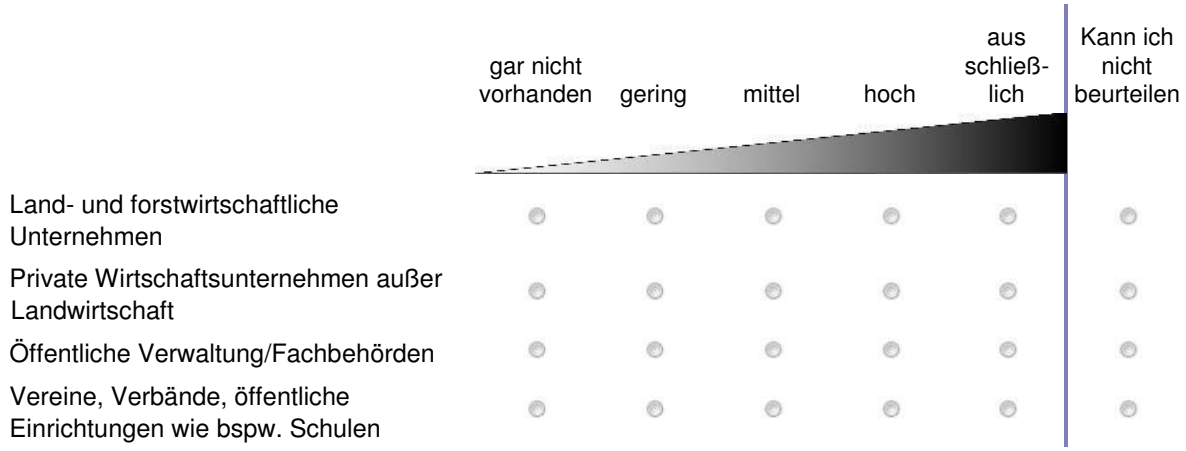
13. Wie viele Praxispartner (= alle Akteure außerhalb der Wissenschaft) waren an Ihrem Teilprojekt beteiligt? [TP03]

(Bitte beachten Sie, dass eine Organisation (bspw. der Bauernverband) nur als 1 Akteur gezählt wird; unabhängig davon, mit wie vielen Personen der jeweiligen Organisation Sie zusammengearbeitet haben.)

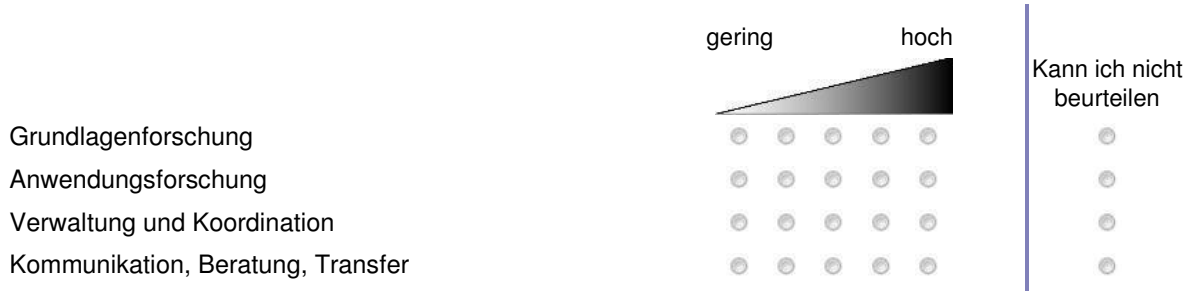
[Bitte auswählen]

14. Wenn Sie alle Praxispartner in Ihrem Teilprojekt betrachten, welchen Anteil hatten dann...

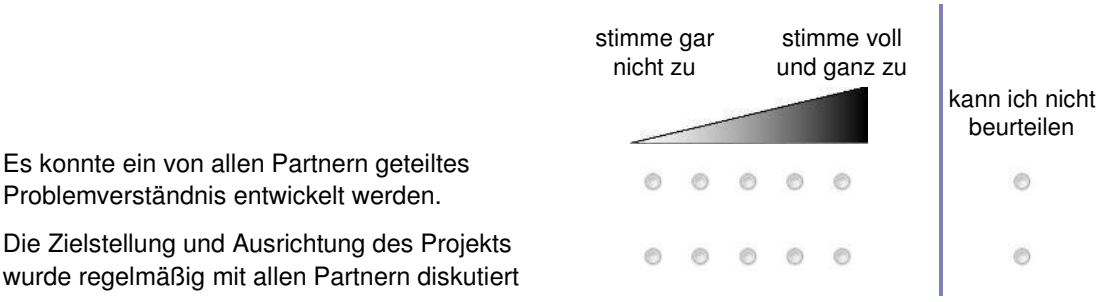
(Sie können sich hier auch eine Prozentskala vorstellen. Ist die Gruppe gar nicht aufgetreten, so entwpricht dies 0%. Die mittlere Ausprägung bedeutet dann, dass die Hälfte aller Praxispartner der jeweiligen Kategorie zuzuordnen sind,
usw.)



15. Wie hoch war nach Ihrer Einschätzung in Ihrem Teilprojekt der Anteil an... [PR01]
(Bitte beachten Sie, dass es uns hier um eine Charakterisierung Ihres Teilprojekts geht und nicht um Ihre spezifischen Tätigkeiten; uns interessiert, wie Sie den Anteil der angegebenen Aufgaben und Arbeiten in Ihrem Teilprojekt einschätzen.)



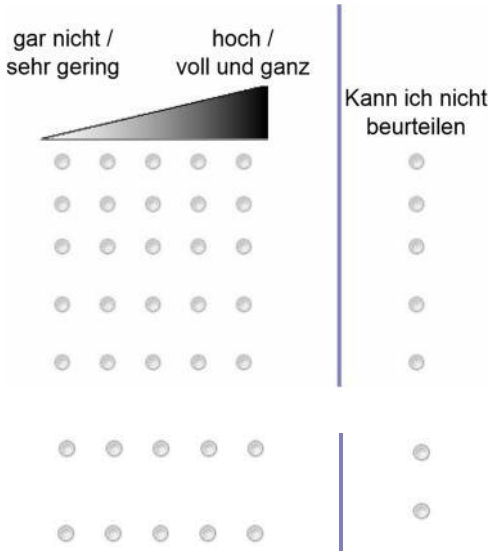
16. Inwiefern stimmen sie den folgenden Aussagen in Bezug auf Ihr Teilprojekt zu/nicht zu? [PR06]



17. Wurden in Ihrem Teilprojekt SWOT-Analysen in Workshops mit Praxispartnern durchgeführt? [PR03]

- Nein, in meinem Projekt wurden keine gemeinsamen SWOT-Analysen durchgeführt
- Ja, aber nur zu Projektbeginn
- Ja, mehrfach innerhalb der Projektlaufzeit
- Kann ich nicht beurteilen

18. Inwieweit hat Ihrer Meinung nach das Teilprojekt die folgenden Ergebnisse erzielt? [ER01]



- Sensibilisierung der Praxispartner
- Bildung eines Wissenschafts-Praxisnetzwerkes
- Verstetigung eines Wissenschafts-Praxisnetzwerkes
- Wissenschaftlicher Output (bspw. Abgeschlossene Promotionen, peer-reviewed Publikationen)
- Entwicklung einer konkreten Innovation
- Erprobung einer konkreten Innovation
- Einführung/Übernahme einer konkreten Innovation in der Praxis

19. Gibt es noch weitere wesentliche Ergebnisse, die in Ihrem Teilprojekt erreicht wurden? [ER02]

C) Ihre Erfahrungen mit der Projektarbeit in INKA BB

20. Welche der folgenden Aspekte in der transdisziplinären Forschungspraxis in INKA BB bewerten Sie eher positiv bzw. negativ? [QU01]

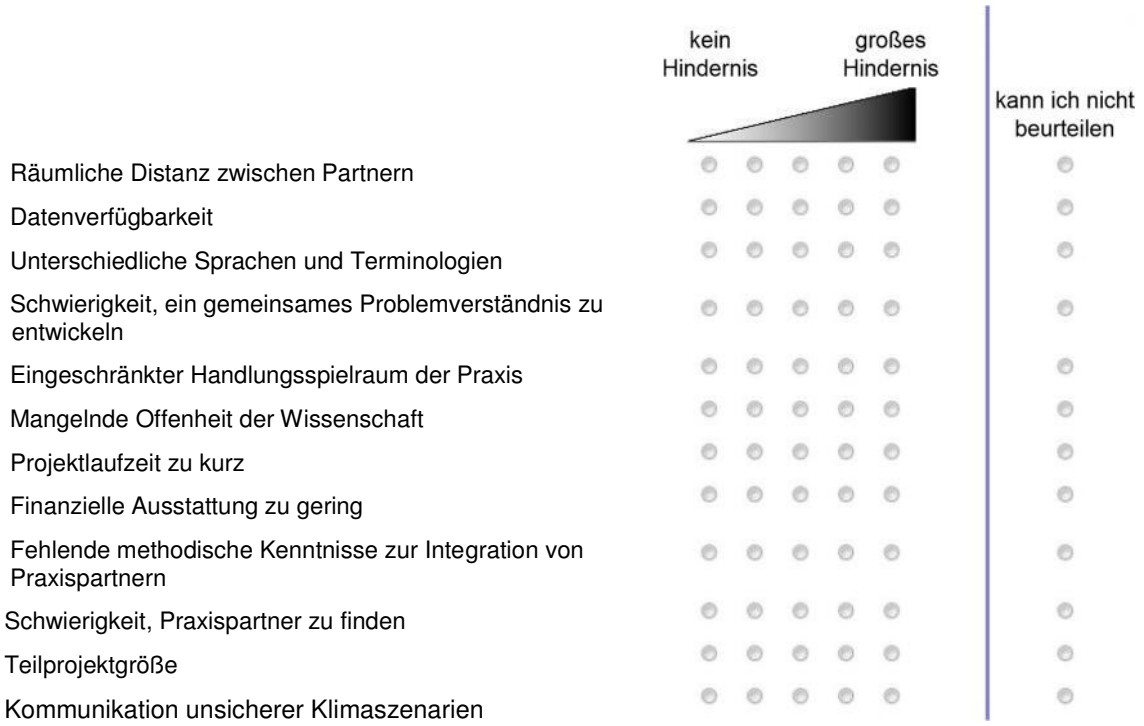
(Wenn Sie keine Erfahrungen mit dem jeweiligen Aspekt gemacht haben bzw. indifferent sind, wählen Sie bitte die mittlere Antwortauswahl.)

	Negativ				positiv
Diskussionen innerhalb meines Teilprojektes	○	○	○	○	○
Diskussionen mit anderen Teilprojekten	○	○	○	○	○
Teamwork im eigenen Teilprojekt	○	○	○	○	○
Vernetzung mit anderen Wissenschaftspartnern	○	○	○	○	○
Vernetzung mit Praxispartnern	○	○	○	○	○
Neue Einsichten und Erkenntnisse	○	○	○	○	○
Neue Kenntnisse im Bereich Partizipation	○	○	○	○	○
Publizieren in wissenschaftlichen Journals	○	○	○	○	○
Anerkennung in der wissenschaftlichen Community	○	○	○	○	○
Teilprojektmanagement	○	○	○	○	○
Unterstützung durch Verbundmanagement	○	○	○	○	○
Methodische Unterstützung Partizipation (Aktivitäten TP 1)	○	○	○	○	○
Informationen zum Klimawandel (Aktivitäten TP 2)	○	○	○	○	○
Unterstützung Transfer (Aktivitäten TP 3)	○	○	○	○	○

21. Schätzen Sie Ihr Teilprojekt vor dem Hintergrund der verfolgten Zielstellung eher als Erfolg oder als Mißerfolg ein? [QU02]

Mißerfolg Erfolg

22. Welche der folgenden Aspekte haben Sie in Ihrem Teilprojekt als Hindernisse für eine erfolgreiche Zusammenarbeit mit den Praxispartnern wahrgenommen? [QU04]



23. Die zuvor genannten Hindernisse wurden aus den SWOT-Berichten extrahiert. Gab es noch andere wesentliche Hindernisse, welche in der vorherigen Frage nicht benannt wurden? [QU05]

D) Ihre Einschätzungen zum prozeduralen Design in INKA BB

Im Folgenden bitten wir Sie, die methodische Unterstützung durch TP 1 sowie einige konkrete methodologische Instrumente zu rekapitulieren; insbesondere das angewendete zyklische Phasenkonzept (bestehend aus Situationsanalyse, Planung, Implementierung und Auswertung) und die SWOT-Analyse. Auch hier sei daran erinnert, dass Ihre Antworten absolut anonym bleiben.

24. Inwiefern stimmen Sie den folgenden Aussagen zu/nicht zu? [ME02]

(Wenn Sie indifferent sind, wählen Sie bitte die mittlere Antwortmöglichkeit.)

	stimme überhaupt nicht zu				stimme voll und ganz zu
Das in INKA BB verankerte zyklische Phasenkonzept war hilfreich für die Strukturierung der teilprojektinternen Forschungsarbeiten.	○	○	○	○	○
Die SWOT-Analyse ist grundsätzlich ein geeignetes Instrument zur Selbstevaluierung von Wissenschafts-Praxisnetzwerken.	○	○	○	○	○
Die Durchführung einer SWOT-Analyse hat in unserem Teilprojekt dazu geführt, systematisch die strategische Ausrichtung zu überprüfen.	○	○	○	○	○
Die Ergebnisse der SWOT-Analyse wurden dazu genutzt, die Ausrichtung des Teilprojekts anzupassen.	○	○	○	○	○
Die SWOT-Analyse ist ein geeignetes Instrument zur systematischen Integration von Praxispartnern.	○	○	○	○	○
Ich habe die SWOT-Analyse als eine von außen vorgegebene Pflichtübung wahrgenommen.	○	○	○	○	○
Es muss mehr methodische Unterstützung angeboten werden.	○	○	○	○	○
Die SWOT-Analyse ist schwierig zu vermitteln.	○	○	○	○	○
Der Aufwand für die SWOT-Analyse entspricht nicht ihrem Nutzen.	○	○	○	○	○

25. Möchten Sie Ihre Einschätzungen zum prozeduralen Design von INKA BB begründen und/oder haben Sie noch weitere Anmerkungen diesbezüglich? [ME01]

E) Zum Abschluss bitten wir Sie noch um Ihre übergreifende Einschätzung und um weitere Bemerkungen und Verbesserungsvorschläge:

26. Hat das Projekt Ihrer Meinung nach eher einen positiven oder eher einen negativen Einfluß auf Ihre Karriere? [QU03]

negativer Einfluß — positiver Einfluß

27. Würden Sie nochmal in einem solchen Projekt mitarbeiten? [AB01]

- Nein
- Möglicherweise
- Ja

28. Wie bewerten Sie die folgenden Schlussfolgerungen aus dem 2013er SWOT-Synthesebericht? [AB06]

	Stimme überhaupt nicht zu				Stimme voll und ganz zu
Transdisziplinäre Forschungspraxen sind zwar herausfordernd und organisatorisch aufwendig, sie bergen jedoch eine Vielzahl an Lernerfahrungen und sind der richtige Weg, um praxisrelevante Innovationen zu entwickeln und zu erproben.					
Das Thema „Anpassung an den Klimawandel“ muss verstärkt auf die politische Agenda gesetzt werden und sollte in der staatlichen Verwaltung mittels kommunikativer Instrumente und zusätzlicher personeller Ausstattung verankert werden.					
Praxisperspektiven sind umfassender als bisher in die Anfangsphasen von transdisziplinären Projekten einzubeziehen.					
Für die Praxispartner sind zusätzliche Projektmittel einzuplanen, wenn deren personelle, zeitliche und finanzielle Restriktionen die Erprobung von vielversprechenden Anpassungsmaßnahmen verhindern oder stark beeinträchtigen.					

29. Möchten Sie Ihre zuvor gemachten Aussagen kommentieren und/oder gibt es abschließend noch weitere wichtige Erkenntnisse, Rückmeldungen und Verbesserungsvorschläge für zukünftige Projekte? [AB02]

Vielen Dank für Ihre Teilnahme!

Wir möchten uns ganz herzlich für Ihre Einschätzungen, Bewertungen und Anmerkungen bedanken!

Ihre Antworten wurden gespeichert und werden nach Ablauf der Befragungsfrist ausgewertet. Die Ergebnisse werden über die jeweiligen TP-LeiterInnen sowie über die INKA BB Webseite allen Interessierten zugänglich gemacht.

Für etwaige Nachfragen können Sie sich jederzeit bei uns melden.

Email: julia.schmid@zalf.de; Telefon: 033432 82 448.

Sie können das Browser-Fenster nun schließen.