



Research

## The self in the mirror: fostering researchers' reflexivity in transdisciplinary and transformative studies at the science-policy interface

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**ABSTRACT.** Reflexivity is a key expectation that researchers in transdisciplinary and transformative research for sustainable development need to meet. Its aim is to enable researchers to deal with normativity, to contribute to identifying and balancing different actors' interests in processes of knowledge production, and to strengthen a pluralistic view of implicit assumptions. When designing and realizing transdisciplinary and transformative studies, researchers face a central question: How can we develop reflexive practices and live up to the demands of such work? Considering the important role that reflexivity plays in transdisciplinary approaches, it is surprising that only few approaches have explored the specific characteristics of reflexive practices empirically and analyzed how these practices are cultivated when doing transdisciplinary and transformative research. In this article we address this research gap by presenting and discussing a case in which researchers attempted to professionalize their reflexive practices at the science-policy interface (SPI). As part of the national Monitoring of Education for Sustainable Development in Germany, we used the method of collaborative autoethnography to systematically reflect on our own thinking and actions as researchers at the SPI over a period of 11 months. Based on an analysis of 66 situations in which we took field notes, we synthesized core topics of reflection and challenges encountered throughout the process (roles, relationship patterns, and normativity) in six collaborative interpretation sessions and analyzed them to understand our own practices of engagement within the field. Grounded in this analysis of our own selves as researchers looking in the mirror, we develop hypotheses about how our specific methodological approach helped us on a practical level to foster different kinds of reflexivity. With this two-fold approach, we aim to contribute to a better understanding of possible topics, challenges, and pathways of (increased) reflexivity among researchers working at the SPI.

**Key Words:** *collaborative autoethnography; Education for Sustainable Development; reflexivity; science-policy interface; transdisciplinary and transformative research*

### INTRODUCTION: THE NEED FOR REFLEXIVITY IN TRANSDISCIPLINARY AND TRANSFORMATIVE RESEARCH

Cooperation between researchers and non-university partners is a key feature of transdisciplinary research (Lang et al. 2012). Transdisciplinary research aims to lead to “socially robust knowledge” (Nowotny 1999) and to generate scientific insights as well as practical innovations and developments to contribute to solving “super wicked” sustainability problems (Levin et al. 2012). Transdisciplinary research integrates knowledge from different scientific disciplines and from fields of practice outside of academia (i.e., Jahn et al. 2012).

Transformative research projects, such as real-world labs (Schäpke et al. 2018, Bergmann et al. 2021), are even more solution-oriented variations of transdisciplinary research that intervene in and actively catalyze sustainability transitions.<sup>[1]</sup> Faced with the complexity, uncertainty, and dilemmas that are inherent to wicked sustainability challenges, transdisciplinary and transformative research offer responsible and adequate scientific approaches to global challenges that are based on the co-production of knowledge between researchers and practitioners (e.g., Schneider et al. 2019). Such interwoven forms of research bear a number of important advantages: strong cooperation between scientists and practitioners leads to a deeper and more contextualized understanding of what is going on in the field (Verwoerd et al. 2020) and makes this knowledge more relevant to society. Additionally, the knowledge generated is more likely to reach policy makers and practitioners, and therefore contributes directly to change processes (e.g., Oliver et al. 2014).

However, this type of research bears several challenges for researchers because it forces them to leave the realm of “positivist,” “objective,” or purely descriptive forms of knowledge production. As a result, researchers oscillate between distanced analysis and support for transformation processes (e.g., Verwoerd et al. 2020); expectations of non-scientific actors (a)rise (Singer-Brodowski et al. 2019); and additional tensions related to project aims and time resources emerge.

In monitoring projects (Ioannidou 2010), challenges especially evolve when attempting to find a balance between documenting or evaluating political implementation processes independently and providing advice to policy makers or practitioners. When researchers contribute evidence to improving governance and policy processes, e.g., in the field of education or sustainability, they are on a tightrope between “critical detachment and constructive involvement” (Læssøe et al. 2013:233). Additionally, researchers have to deal with normative issues that are part of every sustainability debate and an important aspect in researching social problems in general: “We are not neutral agents when we deal with social problems. Whether we recognize it or not, there is always a moral positioning in the objects we choose, the place we occupy in the field, the way we interpret facts, [and] the form of writing we elaborate” (Fassin 2012:5).

Reflexivity is one way of coping with these challenges in transdisciplinary and transformative research (i.e., Wittmayer and Hölscher 2017, Spangenberg 2021). It involves the capacity of actors to distance themselves from their current (implicit) assumptions about the world and themselves and observe the

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influence of their own thinking about the way they construe reality and produce knowledge about it (Sol et al. 2018). Although reflexivity is defined here as the capacity of an individual to be reflexive and self-reflexive, it can also refer to the process that is continuously enacted by cultivating this capacity, in which case we rather tend to use the term “reflexive practice.”<sup>[2]</sup> In the context of transdisciplinary and transformative research, reflexivity can lead to reflections on different social phenomena influencing sustainability in research projects. A self-reflexive emphasis entails the capacity to turn these reflections to a researcher’s own assumptions, thereby highlighting that such assumptions are embedded in and influenced by social phenomena.

Self-reflexive work has rarely been investigated to construe how transdisciplinary and transformative research procedures affect individual researchers or collaborative research teams, “how scholars make sense of these processes” (Knaggård et al. 2018), and how they can achieve a higher degree of reflexivity. Moreover, few systematic suggestions for practice based on the insights of such an analysis exist to help researchers implement the reflexive practices that are communicated as essential for transdisciplinary and transformative research (e.g., Reed et al. 2020): How do researchers develop and cultivate these reflexive practices? What kind of training, exercises, and attitudes do they need to remain reflexive when faced with the challenges of transdisciplinary and transformative research processes?

This article contributes to addressing these questions: exploring data from a transformative study within the policy area of the implementation of education for sustainable development (ESD) in Germany, we<sup>[3]</sup> shed light on core topics researchers may reflect upon when pursuing transformative research and develop an approach to and an analytic hypothesis about how they can professionalize (self-)reflexivity while planning, conducting, evaluating, and communicating their research. In the present study, we aim at two objectives: As part of the mandate of the working group of the scientific advisor for ESD at the science-policy interface (SPI) in Germany, we aim to improve the reflexive capacities of different actors. As part of our own professionalization, we also seek a deeper and more reflexive understanding of our own assumptions and practices while working at the SPI. In this context, SPI is understood as entailing all “social processes which encompass relations between scientists and other actors in the policy process, and which allow for exchanges, coevolution, and joint construction of knowledge with the aim of enriching decision-making” (van den Hove 2007:815).

## REFLEXIVITY IN TRANSFORMATIVE RESEARCH PROJECTS

The call for researchers to be reflexive in their methodological practice has largely been developed by (social) anthropology and sociology. These disciplines look back on a detailed discussion of proximity between the researcher and the researched, the usability of subjectivity in the research field, and their delimitation and reflection in scientific products (Geimer 2011). Geertz (2015), for example, proposes a “reflexive anthropology,” which assumes that researchers as subjects are themselves enmeshed in webs of cultural meaning. Foucault’s examination of the relationship between subjectivity and power in the scientific context (Foucault and Defert 1999) also contributes to an understanding of our own subjectivity as researchers. Foucault conceptualized subjectivity

less as individual and normative than as a construct embedded in a historical context and thus argued that specific historical events should be viewed as highly contextualized because they shaped the norms of scientific quality criteria (Foucault and Defert 1999).

A number of scientists are currently debating how much subjectivity is legitimate in scientific research and how to highlight that our understanding of reality has been historically constructed by scientists themselves (Ortner 2006, Reed-Danahay 2009). Some argue against objectifying scientific subjects, as is commonly done in the (natural) sciences and underline the fact that scientists themselves are subjects (with their respective intentions) and for this reason plead for reflexivity: “Rather than pretending that the self is not involved in empirical execution, reflexivity calls for the investigator to acknowledge the role of the self at each stage” (Prasad 2019:3).

Acknowledging this kind of subjectivity in science, reflexivity illuminates and enlightens the collective unconscious of the research community. The call for reflexive practice encourages the scientist to “direct the weapons of science against oneself” (Bourdieu 1993:372, authors’ translation). Following the same rigorous procedures of deconstruction and reconstruction in producing knowledge about the specific social phenomena under observation, Bourdieu challenges us as researchers to make the implicit dynamics of the scientific field itself a subject of analysis (Bourdieu 1993). These procedures enable reflexivity to function as a kind of protection: collective reflexive practices protect researchers both from being instrumentalized by political and economic actors and from being unknowingly subjected to the dynamics, norms, and habits that result from the inner logic of the scientific field itself (Rieger-Ladich et al. 2006, in their argument based on Bourdieu 1997).

What has already been discussed in sociology and anthropology as well as in other disciplines in past decades takes on new significance in the context of transdisciplinary and transformative sustainability research and its respective challenges. Knowledge integration in these research projects is challenging because of “the different culturally shaped epistemologies and ontologies within and between different groups of scholars and stakeholders” (Spangenberg 2021:81). For this reason, scholars “should be questioning their own routines and habits, rethinking their potentially diverging worldviews and becoming open to new approaches” (Spangenberg 2021:81.) from the very beginning. One main question they will have to address in the process is what political influence scientific work has and what kind of knowledge and thus interests are represented. Furthermore, researchers need to acknowledge that normative issues impact sustainability research projects (Scholz 2017), as they often follow an inherent interest to contribute to sustainable solutions in different contexts. This is an additional argument for reflexive practice, as it enables researchers to knowingly work with norms and be aware of how this can influence different perspectives.

Looking specifically at the literature conceptualizing transdisciplinary and transformative research, we suggest distinguishing three different functions of reflexivity:

1. In transdisciplinary research, where the perspectives of non-university partners should systematically be integrated in research procedures, reflexivity serves as an epistemological quality

criterion and success factor for research processes (Bergmann et al. 2021). Miller et al. (2011) argue that reflexivity should support a pluralistic view on the implicit assumptions of researchers, thus fostering a kind of epistemological pluralism. Processes of self-reflection not only reveal differences between different actors' knowledge systems, they also mirror how individual barriers and contexts within these knowledge systems are understood, especially since science is seen as "part of the social system holding one of many bodies of legitimate knowledge" (Spangenberg 2021:82). Following Beck et al. (2014), reflexivity in transdisciplinary research at the SPI also aims to clarify researchers' own points of view in expert networks and to give space to other voices, which can enable multiple new perspectives on ownership in policy debates. Particularly in the context of sustainability research, scientific results and political recommendations overlap in the work of expert networks. Beck et al. (2014) argue that turning toward self-reflexivity will lead to new, experimental forms of collaboration taking place in political bodies and to more voices being heard that have been neglected or systematically marginalized in the past.

2. In the broader discourse on sustainability transitions, local networks and learning, and in publications on transformative research (with its focus on multiple tensions and forms of cooperation), reflexivity is largely seen as a coping strategy for dealing with complexity and ambiguity. Here, reflexive processes are generally understood to lead to a better understanding of the typical problems, interests, and communication pathways of the different actors involved in multi-actor processes for sustainability transitions, and to increased competence to deal with the accompanying complexity (Sol et al. 2018). Reflection on one's own positioning can increase tolerance of ambiguity (Mezirow 2000), make it possible to recognize one's own scope of action and act upon it, as well as expand intersectoral understanding of other actors in the sense of fostering relational agency (Olk and Schmachtel 2017, Schmachtel-Maxfield 2013). Reflexivity is also acknowledged as a strategy for coping with many challenges that arise within transdisciplinary and transformative research processes (Wittmayer and Hölscher 2017). It is discussed as a capability enabling researchers to contribute to identifying and balancing different stakeholder interests in processes of knowledge co-production and dealing with the normativity that is inherent in sustainability issues (Mielke et al. 2016). Dealing with normativity represents the strongest ambition of sustainability research and leads to the most difficult tensions and frictions (e.g., Schneider et al. 2019) because it entails a critique of conventional scientific standards and self-descriptions: "In its transformative mode, reflexivity calls for building a shared normative vision which can challenge dominant assumptions and power structures, and guide social change" (Popa et al. 2015:54).

3. The last function of reflexivity identified within the literature is clarifying the institutional dynamics of scientific organizations and networks. Miller et al. (2011) argue that researchers should reflect on the basic assumptions within the scientific system that form the preconditions of researchers' daily work: "Reflexivity involves the understanding that the institution itself is part of the dynamics of the system that it seeks to change, thus it continually reexamines and reevaluates the foundational assumptions of its work by 'opening up' its boundaries to multiple representations

and discourses outside the institution" (Miller et al. 2011:178). Although this function of reflexivity is also discussed within broader sociological and ethnographic discourses, it is given a very specific meaning within transdisciplinary and transformative research, as institutional scientific dynamics often hinder close cooperation with partners outside universities and the acknowledgment of different epistemologies: "In its descriptive-analytical mode, reflexivity calls for a critical acknowledgement of the values, assumptions, as well as institutional and power structures that shape the current epistemological model and the organization of science" (Popa et al. 2015:54).

Despite the acknowledged importance of reflexive practice for transdisciplinary and transformative research, empirical research on the multifaceted functions of reflexivity discussed within the literature is rare. Many authors refer to ideal-typical aims in applying reflexivity, without providing an evidence base showing what functions are developed and which are not. For this reason, we provide an empirical exploration of self-reflexive practices of researchers in a transdisciplinary and transformative research project at the SPI. We ask whether and how these ideal-typical functions of reflexivity occurred within our daily work, what topics were reflected upon, and how we can strengthen the different functions of reflexivity through collaborative autoethnography.

#### **REFLEXIVELY MONITORING GERMAN ESD IN ACTION**

For our empirical analysis, we focused on a study from the context of the national monitoring of education for sustainable development (ESD) in Germany. ESD is a globally defined educational concept to enable all individuals to recognize and understand the current dynamics of the world they live in, and to empower them to (co-)shape a sustainable future. In other words, ESD calls for education at all levels to provide current and future generations with competencies, knowledge, and values to collaboratively respond to the manifold global and local ecological, social, and economic challenges of our time (UNESCO 2020). Under the umbrella of UNESCO, programs are being developed worldwide to introduce ESD into the structure of educational systems. In Germany, ESD is being implemented through a multi-actor process organized by the Federal Ministry of Education and Research (BMBF). Within this process, the National Platform on ESD serves as the central coordination body, and several ESD bodies (expert forums, partner networks) work to promote the integration of ESD. The members of the individual bodies come from different sectors and organizations, such as administration, academia, civil society, educational practice, and politics. Particular emphasis is put on youth participation, which is institutionalized through a youth panel.

The policy process is accompanied by independent monitoring conducted at the office of the scientific advisor of the National Platform. As part of this monitoring, we carry out different empirical studies on the extent and process of national ESD implementation (e.g., Grund and Brock 2020, Holst et al. 2020, Singer-Brodowski et al. 2020). We thus hold a special position in the multi-actor process (for further reflections on this see Singer-Brodowski et al. 2021): we are present in the ESD committees as representatives of the monitoring and scientific advisory activities

and are occasionally also appointed members of the bodies. Furthermore, we are included in administrative and political exchange meetings as well as decision-making processes. Through contributions at central events, especially in the non-academic sector, we come into contact with many different ESD actors, the general ESD community in Germany, ESD committee members, and people with administrative and political responsibility for structuring the multi-actor process. At the same time, an essential aspect of our monitoring is its aims to actively support the ESD implementation process (Holst et al. 2020). In the concrete case focused on in this article, we are implementing a reflexive monitoring in action (RMA) project (van Mierlo et al. 2010) with members of the national ESD bodies. The goal of this RMA project is to catalyze and understand learning and reflection processes among the actors involved in the national implementation of ESD.

As part of the RMA, we thus approach reflexivity on two levels: first, we try to foster reflexive practice among all actors, including ourselves. This is done on the side of the actors through workshops, meetings, and other activities, and on our side through team colloquia and collaborative autoethnographic work (Chang et al. 2013). Second, to contribute to the debate on the role of self-reflexivity in transdisciplinary and transformative science, we analyze what we are reflecting on as researchers, also using autoethnography. These two levels relate to different transformative scientific endeavors, but they are also intertwined. The supposed tension between strengthening reflexivity in the RMA process and investigating its role in the research, scientific advisory, and communication processes, and the resulting possibility of conflicting standpoints that need to be dealt with, are thus to be understood as exemplary of our entire interaction in the research field, not as a methodological limitation.

Our approach to RMA is thus an example of a doubly transformative research endeavor at the SPI: we deliberately attempt to foster and analyze reflexivity both among involved actors (“the case”) and within our own research team (“the case within the case”); the latter approach is the focus of the present paper. To achieve a better understanding of the case within the case, we need to provide key details about the case itself. As the findings of our previous research on the governance of ESD in Germany show, knowledge-based implementation of ESD is both shaped by the different structures of the educational areas and by boundary work (Gieryn 1983), different legitimations, structural backgrounds, and forms of agency of the different actors (Singer-Brodowski et al. 2020, von Seggern and Singer-Brodowski 2020). Given this complexity, we have suggested that reflexivity among the involved actors may serve as a key to the successful implementation of ESD (Singer-Brodowski et al. 2020, von Seggern and Singer-Brodowski 2020), which is in line with van Mierlo et al. (2010), who approach actors’ reflection as an important quality of projects that aim for systemic change and innovation (also Moore et al. 2018). Especially in systems with high inertia, a shift is necessary for systemic changes, and this in turn requires high reflexivity about the structural embeddedness of problem situations (Arkesteijn et al. 2015). This is not to be understood as a simple call for behavioral change, but as a recognition of the fact that evaluators of policy processes are part of powerful science-policy contexts and therefore cannot remove themselves from the context. They shape these structures and are

shaped by them. Influenced by these insights, we went beyond solely descriptive research approaches: in conducting RMA, our goal was to help stimulate ambitions as well as learning and reflection processes among the actors who structurally implement ESD in Germany.

Explicitly developed for monitoring projects that aim to contribute to sustainable development through system innovations (van Mierlo et al. 2010), the RMA approach assumes that achieving sustainable development requires fundamental changes to previous practices, habits, interactions, and structures (van Mierlo et al. 2010). Yet, because these innovations are so fundamentally novel, such innovation projects (e.g., ESD implementation) are highly demanding and complex tasks for which no blueprints exist. Here, the developers of RMA suppose that projects that explicitly encourage reflexive practice among project participants have a better chance of allowing and reinforcing new ideas and changes from within. Therefore, the central focus of our RMA research at the SPI of ESD in Germany is to support empowerment of actors through interactive workshops within different educational areas.

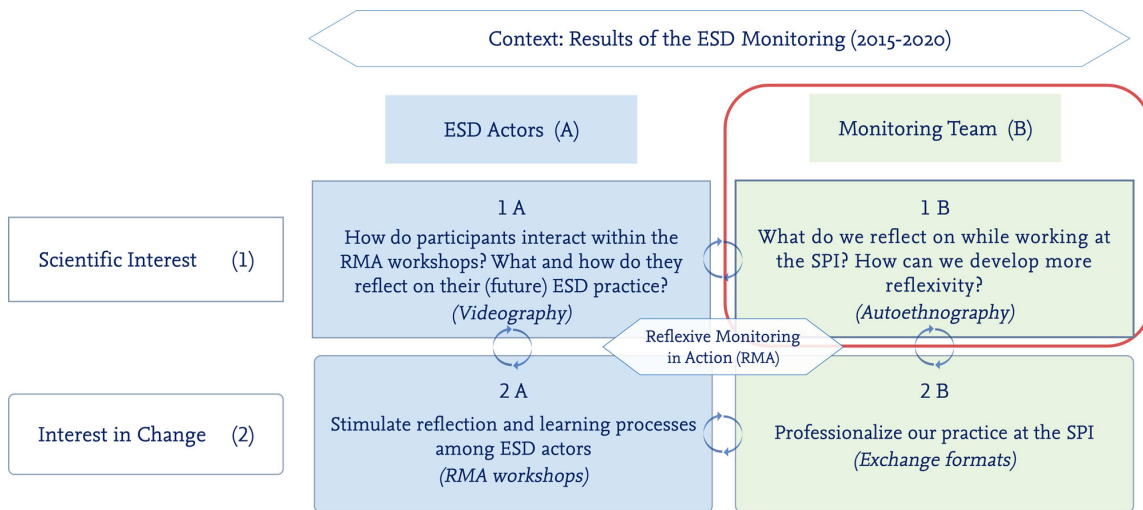
We conducted a series of digital workshops with different RMA tools over a period of nine months (in digital form because of Covid-19 restrictions). Given the transformative aspiration of our research (to stimulate learning and reflection processes, enable new perspectives on old challenges, and to support actors in readjusting their project goals), as researchers we also faced the challenge of critically assessing (the implications of) our own interventions within the field. Our guiding question was: What are key topics researchers encounter when systematically tracing their own roles, habits, and actions at the SPI, and how can reflexivity be cultivated within transdisciplinary and transformative research projects?

#### **UNDERSTANDING AND FOSTERING REFLEXIVITY AT THE SPI: A METHODOLOGICAL APPROACH BASED ON ANALYTIC AND COLLABORATIVE AUTOETHNOGRAPHY**

Although RMA traditionally aims to stimulate learning and reflection processes among actors in the field (in our case ESD actors), in our current study we add a self-reflexive perspective: we look into the mirror at our own (scientific) selves, using both analytic (Anderson 2006) and collaborative autoethnography (Chang et al. 2013) to systematically trace our own role(s) and actions at the SPI. Because our transformative study took us on untrodden paths, it seemed necessary to reflect on our own involvement more strongly and to make it more explicitly the subject of research than it had been before. We thus placed ourselves at the center of the research in a different way and no longer saw ourselves exclusively as observing researchers, but as participants with their own “stake” in the process, namely the claim to support and help shape transformation processes.

In our overall study, we distinguish between intertwined scientific interests and an interest in change (see Fig. 1). The scientific interest (1) aims at understanding how the participants of the RMA workshops interacted with each other (1A) and how close cooperation with actors at the SPI influenced our own reflections (1B). The interest in change (2) aims at professionalizing the ESD actors’ (2A) actions and our own (2B) actions at the Science-Policy Interface by stimulating learning and reflection as scientists.

**Fig. 1.** Reflexive monitoring in action (RMA) case with regard to the aim of the present paper: positioning of the purposes of scientific interest with regard to the researchers involved; ESD = education for sustainable development, SPI = science-policy interface.



For this article, we are interested in understanding how our scientific actions as a research team changed because of our strongly interventionist attitude in the implementation of RMA and to the reflexive dialogue formats we used; we therefore focused on 1B (highlighted in Fig. 1). We investigated this process using the method of autoethnography. Although we singled it out, this particular focus was deeply connected with the other activities: as researchers we implement RMA with a supportive approach in the spirit of transformative research. A specific professionalization of our scientific practice took place through training related to RMA and through interactive colloquia as well as evaluation sessions in which, among other things, we tried to practice analytical reflexivity.

The autoethnographic approach (1B) is characterized in particular by the harnessing of our own subjective interaction with the field: here, we assume that knowledge generation also takes place through our own experiences and learning in and from the field (Tuma et al. 2013). Autoethnography is a research approach to describe personal experience (auto) and analyze it systematically (graphy) in order to understand cultural experience (ethno; Holman Jones 2005). The approach challenges classic, patterned practices of conducting and presenting research and treats it as a political and social act (Holman Jones 2005). It opens up the possibility of criticizing given cultural patterns and questioning these in order to adopt new habits of mind.

The specific methodological approach was based on both analytic autoethnography and collaborative autoethnography. Whereas Anderson's (2006) criteria for analytic autoethnography<sup>[4]</sup> applied to our overall ambition, the process of collaborative autoethnography (Chang et al. 2013) applied to our methodological approach in the process. We specifically chose these two types of autoethnography because they most clearly took into account our transdisciplinary involvement and helped us understand its profounder impact on the process of the RMA. The analytical focus also set certain conditions and demands on

us as scientists in dealing with our own data, which served as an important basis of legitimacy for our research in the context of the work at the SPI.<sup>[5]</sup> Our data collection was primarily concerned with the self-observational data type based on field notes (adapted from Struthers 2012, Chang et al. 2013). These data also included self-reflexive and self-analytical data in the form of memos and comments. In the context of colloquia, self-reflexive data and data from others (Anderson 2006, Struthers 2012) were also collected with participants' informed consent, and the interaction was audio-visually recorded, so that conversational and interactive data were also available (Anderson 2006, Chang et al. 2013).

The present article is mainly based on field note data, a crucial component of collaborative autoethnography (Chang et al 2013). Data generation was accomplished by all three authors, who kept autoethnographic template-based field notes from November 2020 to September 2021.<sup>[6]</sup> The data generated were then reviewed, classified, and categorized in a collaborative analysis process as follows: (1) A macro review was conducted by summarizing the data and attempting to answer the question, what is happening in my material? The goal was to capture the contours of the data from a bird's-eye view (Chang et al. 2013). We recorded this individually in writing and presented it to the other research members of the group. (2) We then pursued a micro review. For this, we segmented, coded, categorized, and recoded the data in order to "construct a preliminary list of topics emerging from the data" (Chang et al. 2013:104) throughout a small-scale summary of our data. These inductive micro codes formed a basis for generating categories, which were then combined in the next step to form superordinate inductively generated categories (Chang et al. 2013). We did not use deductive category systems or theories per se, neither in the process of micro and macro coding nor in the search for superordinate categories. The process of clustering and categorization can thus be understood as a strongly inductive process, which in our case was nevertheless influenced by our respective and partly diverging professional backgrounds and perspectives.

The nature of collaborative analysis in our approach was mainly shaped by sequential collaboration (“Sequential Model”; Chang et al. 2013:90). Thus, while step 1 of data collection and analysis was completed individually, the results were further discussed in six sessions and a joint analysis of thematically overlapping segments was conducted. Based on steps (1) and (2), we exchanged ideas about possible main categories throughout the process of defining key sequences of the material at hand. These sequences were then interpreted. In writing up the interpretations, we consulted academic literature to situate our interpretations within recent scholarly debates about reflexivity in transdisciplinary and transformative research processes. We then tried to answer the question how contextual, social, economic, political, organizational, and interpersonal factors influenced the findings (Chang et al. 2013).

### LOOKING INTO THE MIRROR: INSIGHTS FROM THE ANALYSIS

We briefly summarize each of the three inductively generated categories—(1) growing into new roles and challenging professional role expectations; (2) working on and through relationships; and (3) normative assessments of the field—and highlight examples from the data. The category system was inductively developed from all field notes and was thus compiled and reflected upon by all of us, as explained above. In the spirit of a grounded theory methodology approach, we entered the research with some theoretical sensitivity (e.g., Hoare et al. 2012), but did not apply a theoretical framework to the data or even seek to prove or disprove it. Our theoretical sensitivity can be traced via our theoretical introduction, even if it was only fragmentary and in the background at the time of data collection.

#### 1. Growing into new roles and challenging professional role expectations

In reviewing our field notes, we frequently found descriptions of our own (professional) role(s), including adjectives that characterize and evaluate these roles. Aside from references to institutional affiliations (e.g., monitoring team/academia) and what these personally meant for us, this category also included descriptions of ways in which we grew into the roles as partly emerging (transformative) researchers and scientific consultants, how these roles were developed or maintained (sometimes with frictions), and which values were embedded in these processes.

*With this invitation [for a keynote] as a scientist from the monitoring [team], I positioned myself at a different place than participation in a previous role (NGO) would have allowed me to; this attribution of competence / prior confidence in the role and, above all, the independence (no representation of an institution) made it possible, in my perception, to give a presentation that had a greater influence on the course and events of the workshop (7-11)*<sup>[7]</sup>.

In this kind of observation, we described reflections on tasks and implicit inner and outer expectations and hypothesized about their possible impact. Routine practices were also described (e.g., as [in]appropriate) and attachments to actor groups were reflected upon. As concrete examples, we found the recurring use of “I” and “We” as well as “We” and “You” narratives in which we implicitly referred to or took up specific roles, thereby defining

and redefining boundaries between the scientific and non-scientific worlds. In discussing the field notes, we were also able to identify prominent aspects concerning how we understood our scientific role: on the one hand we reflected on ourselves in the role of a more conventional researcher, and on the other hand, we focused on ourselves in the role of a transformative researcher. The adoption of, and in particular the switching between, the different roles contained uncertainty.

We repeatedly referred to ourselves as “conventional researchers” strongly adhering to established quality criteria, such as validity, comprehensibility and transparency in terms of the quality of methodologically guided knowledge production. For instance, we outlined a self-expectation to make our specific methodological approaches transparent; they would then be judged by their scientific quality, and not by, e.g., in the case of RMA workshops, how many actors engaged with them (for example, line 26-29). In terms of our scientific advisory work, we sometimes described our role as a “scientific consultant ... with a focus on empirically based, descriptive participation” (19-20).

At the same time, we found that our understanding of tasks also transcended classical modes of descriptive science and knowledge production (12-18). We additionally took up the role of a transformative researcher and scientific advisor, i.e., one who is influencing and co-designing the process of ESD implementation by mobilizing system, target, and process knowledge: “Here [in working group XY] I am a member, not a descriptive observer, I am a reflexive supporter, I think about where scientific findings dock. This gives me the energy to bring in ideas, I hold back less! I ask: ‘Who else can we bring in? What actors are missing?’” (23-25). This mode of support and transformative ambition was frequently found and reflected upon, but did not result in a role that was purely devoted to activism. As described within this field note, the researcher aimed at asking different questions and looked for other supporters of the process. It was not about leaving behind all scientific findings and standards, as described below, but about gaining a new perspective and taking a different approach to what scientific tasks could consist of. We categorize this description as working on and pushing the limits of our scientific roles in the monitoring process; these roles were constituted by us, but also partly by others.

In our context, training with the developer of the RMA methodology was also decisive in the process of growing into the role of transformative researchers: “I realized that new things really only become possible when you orient yourself to new possibilities and not toward old obstacles that limit you” (52-53). This person was more directly focusing on what positive work results meant within the specific contexts addressed in the workshops (instead of scientific results), and how to continue to work with these systematically as promising anchor points for future activities. Although we reflected on practices that were technically not scientific activities of knowledge generation (e.g., moderating workshops), we cultivated an attitude and used methods influenced by research; we acknowledged the uncertainty of the knowledge base and critically questioned assumptions. Thus, we cultivated practices that, by virtue of their mandate and training, scientists can implement more easily, but that are not defined as scientific practices of rule-based, systematic knowledge production. This process can be

understood as a blurring of roles, our own as well as those of other people, in the process of accompanying ESD bodies, such as administrative actors.

Growing into the role of a transformative researcher and advisor was not perceived as an easy task: it was described as full of emotional struggles and uncertainties. Growing into different or even new roles was also expressed in individual field notes as emotionally upsetting. For example, one researcher expressed concern, remorse, and anxiety when a (political) process was initiated and was worried about its consequences. The researcher puts this as a question of “what will be done with our statements” (43-53):

*Now I regret that I had previously put forward as a suggestion that interested people could be invited to the workshop, even if they were not part of the [project group]. ... Does [person X] now think that we will accompany the [project group] for the next few years? ... Because of the possible long-term involvement and what might be made of my own statements and workshops, I have the feeling that I, as a small person, am standing in front of a large barrel that we have been trying to get rolling for a year (implementing RMA workshops). Now this barrel is rolling, but it is no longer controllable. It might roll over everything in front of it and we can't steer or stop it for the time being. What does it potentially roll over? The [project group], our research intentions, our highly sensitive agreements with the other [project groups]?*

In this quote, the experience of the scientist's loss of control becomes clear. The suggestion to involve interested people in the workshop was context- and time-specific and was not intended as a general statement, but rather as one embedded within a specific methodological approach. At the same time, while the statements were intentionally made to create and support an inclusive and dynamic process, they were then taken out of context and used in an inappropriate way by another actor. This triggered mixed feelings with the scientists: they were worried that they could not support a productive process in which the actors developed a kind of ownership, and were anxious that the consequences of their actions could potentially overrun him/her, or even the process in general.<sup>[8]</sup> What was at stake was not only our own research intentions and agreement with other actors, but also the project structures in which we were active; they could potentially go beyond our sphere of influence. This reflects not only a fear of loss of procedural control, but also a fear of changes that would potentially be detrimental to the actors, as well as to the researcher. Interestingly, in this case, the emotional experience did not lead the scientist to change strategy, since for them, the benefits seemed larger than the potential adverse consequences, which is why they did not want to usurp the process. However, this description points out how (emotionally) challenging our processes of taking on and implementing differently involved roles were at times.

Additionally, one of the researchers described a situation in which they asked themselves whether staying in a meeting of an ESD body after giving an invited presentation was appropriate or intrusive (34-36). The field notes described these and other passages as an uncertainty regarding how to act (4-6). The

researcher noted that the uneasy feeling came from the fact that they would normally not participate in the meeting because they were not an officially appointed member of this ESD body. The participation was only “allowed” because they were invited for the specific presentation. Even though the members did not express whether they felt disturbed, the researcher felt that they potentially had access to a space and exchange that was denied to them at other times and that they might inappropriately take advantage of the invitation to this space, because of the fact that they were in the special role of being part of the monitoring team. The researcher's participation beyond the presentation was legitimized, or at least not criticized by the members of the ESD body because of their role in the national monitoring and was very helpful for getting to know the field.

## 2. Working on and through relationships

In reviewing and analyzing our field notes, we frequently came across descriptions questioning and reflecting on the relationships between us and specific people in the field, among different groups of actors involved in the multi-actor process, and between us and other team members. We clustered them into a category that we called “working on and through relationships.” This category did not only pertain to interpersonal actions, but also to our own feelings about them and led to descriptions of closeness and distance to individuals/groups within the field and of a sense of comfort or discomfort in different contexts. In our field notes, we described questioning or unsettling situations in which relationships seemed too friendly or “close” to us, and we also made positive remarks about when trust was built between us and other actors, making new collaboration possible (107-115). We inductively clustered different types of relationships into five main patterns (critical, supportive, impartial, bridge-building, instrumentalization) of how we related to other actors in the field.

In the first pattern, we found that we acted critically in relation to other actors. In these situations, we tried to establish dissent that we hoped would be productive and would be based on an underlying critique that ESD was not being implemented quickly and sufficiently enough (118-121). “My feeling toward this meeting: the involved actors are not lacking ambitions but concrete plans and ideas about their own role and task. They are implicated in conflicting aims, wishes, and expectations and they have no strategy to strengthen ESD” (70-72). This critical attitude was deeply interwoven with our own normative assessments of our field, which is closely linked to normative assumptions; it is therefore important to understand it as one of the bases upon which we work on and through relationships.

In other situations, we took on a supportive attitude. “I see myself partly in the role of ‘encourager’ or ‘optimist,’ illuminating positive developments in light of much frustration among actors” (73-74). This was often characterized by a more informal exchange as well as a common goal in the collaboration, e.g., participation in a working group. Here, we explicitly supported those individual actors in shaping the content of the process whom we perceived as key players because of their expertise and engagement. This pattern can therefore also be described as working on relationships because in both of these relationship patterns the intention in shaping the connection comes only from our side. We therefore adopt a certain attitude and thus personally act upon a specific relationship.

Additionally, we tried to shape personal and professional relationships against the aspiration of staying impartial. As part of our role, we frequently found in our notes that we deliberately attempted to pursue an attitude of impartiality to all the actors involved in the process of implementing ESD (93-97). This meant that we aimed at considering the perspectives not only of those actors with whom we had longer cooperation experience, for example the state actors (68-69), but equally considered the views of other actors who are just as important for the process of ESD implementation, such as civil society organizations or educational practitioners. For example, we recurrently reflected upon situations in which we attempted to mediate or influence actors or groups and also evaluated the formats through which we did so (e.g., how we phrased questions). We found that our attempt to remain impartial was not practiced lightly because it was built on relationships of trust that sometimes excluded or at least to some degree contradicted our aim of impartiality. This, too, can be characterized as an intentional pattern of how we tried to shape relationships, as the previous remarks make clear.

Another relationship pattern we perceived was how we interacted with actors in an appeasing or bridge-building way. This was also expressed as an aim “to create understanding” for the perspectives and actions of the different actors within their different sectors and with their own professional cultures and routines:

*In the meeting I report last on the individual modules of the monitoring with special emphasis on the RMA and its presentation in the ESD body [X]. Those people who were present at the presentation questioned individual perceptions of the members of the ESD body regarding our presentation of the RMA approach. ...<sup>[9]</sup> I try to create understanding [for the perceptions of others] and feel like I am defending the actors against each other (93-97).*

We characterized this pattern as expressing criticism appreciatively and responding positively and confirming actor ambitions. We also highlighted in the field notes that we felt a duty to maintain a similar closeness to the different administrative actors as well as to the members of the ESD bodies (84-88). One of our team members regularly expressed the sorrow that they did not control their non-verbal reactions to the statements of powerful actors within digital meetings (89-92). This was interpreted by the same person as risking the close relationship through thoughtless communication. At the same time, we aimed at positioning ourselves independently in terms of content to remain true to our claim to be independent researchers. The bridge-building pattern aims to bring a certain issue closer to different (more than one and potentially opposite) actors and thus create a connection between them. It is thus relational, more than personal, and aims at a purpose. In this context, the boundary to instrumentalization (the last pattern) can be understood as fluid because in the multi-actor process all actors are permanently trying to make each other “useful” (in terms of effective cooperation, as the example of the “work-you” personal pronoun provided below illustrates).

A last pattern we found in the data concerned “making use of each other” in the sense of a sometimes positively and sometimes negatively assessed instrumentalization. We instrumentalized other actors or group contexts when we suggested specific

strategies of cooperation in order to reach a specific goal (e.g., by communicating our scientific results or fostering ambitious working goals). This became especially evident when we made use of the so-called “*Arbeits-Du*” (“work-you” personal pronoun). In the course of our collaboration with various working groups, we experienced that a more informal, trusting, and thus more effective relationship was possible if the participants did not address each other with a formal “*Sie*” as they usually do in the German working context, but instead used the form “*Du*” when saying “you.” We therefore suggested using the “work-you” when we worked in our moderation roles within the RMA workshops, asking the members to address each other as “*Du*” in the context of this specific group work, even if they mainly address each other formally in other contexts as “*Sie*.”

Last but not least, concerns on how arguments were acted upon and regrets regarding former statements were expressed (98-106). In one case, during a meeting with members of one ESD body, one of us suggested that other central actors be invited to the RMA workshops for a more effective outcome. As mentioned above in the context of our uncertainties, this argument was used by another member to exemplify why the respective body could be considered open toward other actors, given that there were “plans” to proactively invite other actors. Although we found that we did not criticize the use of statements for external purposes per se, on an emotional level, such statements also sparked fear of potentially harmful instrumentalization. In this context, feelings of being instrumentalized came up, leading one author to ask whether earlier scientific work/actions were used and carried forward by the actors, yet at the same time also used in other, new contexts to support a different argument than intended. Here, control over the use (and consequences) of one’s own argument no longer exists, especially over longer periods of time (135-140). In another case of a strategic meeting, a powerful actor expressed that they were glad that a member of the monitoring team participated in a newly created group, because then the researcher would strengthen a particular position favored by the powerful actor. Here, the close relationship that we tried to build up and maintain in order to catalyze changes based on our results was attempted to be used to support a particular political position without our consent (75-80).

Looking at the different patterns of relationships from a bird’s-eye view, we found ourselves working on and through relationships: we were strongly part of the relationship constellations in which we stood with others and which others created with us, in general, which meant that we almost always worked within relationships. The characteristics of existing relationships thereby constitute conditions for our work at the SPI. At the same time, we also intentionally worked on relationships, for instance, when we deliberately attempted to follow certain intentions while interacting with stakeholders (e.g., critical, supportive or impartial). Occasionally, we also found ourselves working through relationships purposefully, in order to achieve specific goals (e.g., bridge-building or instrumental).

### 3. (Normative) assessments of the field

We also coded text segments that were characterized by a normative evaluation of individual situations, activities, or people in the research field (e.g., in committee meetings, phone conferences, etc.) and clustered them in a category called



“normative assessments of the field.” Within these parts of our field notes, we found anticipated expectations, questions to ourselves and others, as well as theory-based and empirically based analytical reflections. In addition, we noted analytical contextualization as well as further questions with regard to events and individual situations described in the field notes.

We identified several normative assessments in relation to feeling responsible for sustainability and expecting ambitious outcomes within the policy process (happening in a short time frame). In terms of responsibility, worry was expressed about how the process to limit multiple environmental crises was handled or secured: “I ... worry at the same time about the level of ambition, which from my point of view is too low” (160). The word “worry” described an implicit sense of responsibility to contribute to more sustainability in light of the scientific consensus regarding cascading environmental and social challenges for humanity. The choice of words also suggests that the researchers were emotionally involved: there is no purely objective discussion of process goals, but rather an emotional involvement in which the scientist characterizes themselves as an actor with responsibility (based on, e.g., the evidence from environmental and earth system sciences). If we perceived processes as not matching the seemingly necessary speed and ambition of social-ecological transformations, we also expressed frustrations. There were frequent references to a temporal urgency and criticism of actors for slowing down or dragging out processes (162-164). “Everything ripples along a bit, dragging. Long reflections on who designs an abstract” (156). Here, too, the choice of words revealed a clear assessment of the work processes that were found to be too slow and taking up too much space, presented as “dragging” in the quote above. This was partly linked to a normative claim on our part and to an assumption that the process should be moving forward more carefully and reliably. We found that powerful actors were sometimes criticized for pursuing strategies that did not fully adhere to democratic processes, too. However, while we sometimes criticized them when they failed to meet outputs and demands that were understood as normatively correct (“I think this procedure is wrong,” 161), we also found field notes in which we were less critical when, staying with the example, less participative processes led to ambitious outcomes that adhered to aspired regime changes. Altogether, an emotional involvement as well as the claim of responsibility for oneself can also be classified as a potential for (emotional) overload, especially in applied research projects where practitioners are expected to use research immediately.

Moreover, we found that we frequently noted content related to an analytical (and partially theory-based) understanding of the communicative actions of the actors. For example, after describing a situation we tried to understand the communicative actions of the other actors by adding questions to the description we recorded in the field notes. We asked ourselves why specific actors pushed certain points of discussion and withheld from proposing others. However, we did this in a questioning as well as in an analytical and interpretive way; this led to an overlap of the analytical assessment of a situation with a subjective and normative evaluation (and action): “I could relate to that [target group-oriented perspective of person X], and as it was, I advocated for a dual strategy in which a greater level of ambition and targeted communication is pursued” (154-155). In this quote,

the scientist notes that they can follow the other person’s opinion and considers it important in terms of content. At the same time, they distance themselves from this opinion and instead present an opinion that, in their eyes, accelerates the process because two goals are pursued simultaneously in different communicative settings. Whereas at the beginning of the field notes, our descriptions were more judgmental, toward the end of the 11 months the field notes showed a stronger understanding of the actors and the attempt to grasp their options for action more empathetically. For example, one of us argued that their “[u]nderstanding of the tensions within the field of [X] is becoming more and more clear” (157-158). However, this did not lead the researcher to act more affirmatively (or less ambitiously), but rather to reconsider how to direct communicative actions more specifically while maintaining a critical perspective: “Am I myself too harsh in my criticism?” (159). It is uncertain, though, to what degree this development over time can be explained by what causes: stronger exchange with the actors themselves, examination of the field notes, or the collaborative interpretation sessions.

In summary, we found that the field notes and interpretation sessions helped us to better identify normative attitudes, which were sometimes intertwined with our processes to understand the field analytically, and to approach them more intentionally. The normative attitude was characterized especially by our own emotional involvement, which is connected to a sense of responsibility, and the demand on us as well as other actors to speed up the process.

## DISCUSSION OF THE RESULTS

In transdisciplinary and transformative sustainability research it is expected that researchers should act reflexively regarding their own assumptions, roles, and (non-)actions. In this study, we asked what researchers encounter in practice when attempting to systematically trace their own roles, habits, and actions at the SPI, and how these reflexive practices may be cultivated within transdisciplinary and transformative research projects. Overall, the reflective exploration of a plurality of verbal and non-verbal communicative interactions partially led to a more conscious use of them and sensitization to unintended consequences of particular communicative actions. The reflection about certain thoughts, relationships, and communicative interactions within the field notes as well as the joint discussion of it generated a productive disruption for us researchers that evolved as a side-effect of increasing reflexivity.

### Discussing reflexive practices

Our analysis of the first core category showed that we explored the development of our own professional roles, the connected understanding of our scientific selves, and the perception of our roles’ (un)intended consequences. We define a social role as following a rule of conduct in which the expectations regarding behavior are relatively independent of the individual perspective but collectively predefined and changed by certain communities (Dahrendorf 1964). The expectations embedded in certain roles are binding to the extent that individuals cannot easily escape from them without fearing sanctions (Dahrendorf 1964). For us as researchers, implicit role expectations were deeply connected with the scientific system as a whole and less with our concrete research organization. This made the implicit expectations less

visible, but also more effective. In our field notes, we found that disclosing and collaboratively discussing potentially conflicting roles (Pohl et al. 2010, Bulten et al. 2021, Hilger et al. 2021) was a recurrent critical foundation to developing a self-reflexive perspective on our own work, especially regarding the frictions between conventional independent research and engaged participation in transformative research. We described the more conventional scientific self-conceptions, where we expected ourselves to follow well-established scientific quality criteria such as to adhere to transparency throughout the research process. Here, we referred to our own scientific socialization, which was more strongly oriented toward criteria of traditional knowledge production. However, this had more of an implicit, value-oriented character and showed up primarily within our joint discussions. In our field notes, we found only few sections in which we explicitly reflected on the possible sanctions of our scientific community if we violated these role expectations for some reason or pushed the boundaries by trying to broaden quality criteria through integrating different forms of knowledge, such as system, target, and process knowledge (ProClim/Cass 1997). We reflected on a transformative research mode in bringing forward changes in practice and activities based on a self-understanding as sustainability researchers. We experienced uncertainty on how to act within this role, while at the same time adhering to the aspiration of conducting high-quality research that is perceived as such. On this tightrope walk, we tried to keep our balance between scientifically informed problem-solving and critical reflection (Mahmoud et al. 2018) as well as between critical detachment and constructive involvement (Mathiesen 1982, as cited in Læssøe et al. 2013). This process was full of tensions, accompanied by worries and even fears of being “misunderstood” or of not satisfying classical claims of knowledge production. Considering that reflexivity itself is discussed as a quality criterion and success factor for transdisciplinary and transformative research (see Bergmann et al. 2021), it is surprising to see how little the tensions connected to role expectations for researchers are dealt with systematically in the context of a professional understanding of their transformative roles, especially when the boundaries of conventional research are crossed or even violated (Wittmayer and Schöpke 2014, Felt et al. 2016, Hilger et al. 2021). In expanding their own understanding of their role, emotional facets also come into play for researchers (Sellberg et al. 2021). In our case, we interpreted our insecurities and emotionally upsetting experiences as moments of disruption in which a rift between different work claims and role expectations became clear. Ultimately, however, it was precisely the joint mirroring of and reflection on these instances of disruption that helped us to develop a better understanding of conflicting role expectations. Based on this, we were able to take up positions that seemed to us to be more in line with our own ethical and professional standards and role descriptions as transformative researchers despite our concerns or insecurities. But this can also lead to additional challenges: first, looking into the mirror of one’s own actions might force a pause or even paralyze research. For us, speaking about these feelings in joint sessions was critical to dealing with reflexivity constructively. Second, and connected to this, more reflexivity may potentially go hand in hand with more knowledge about opportunities for influence. Combined with a normative goal of transformative research, this can be understood as a highly effective connection. At the same time, it places a much

greater demand on scientists to act with ethical care. The perplexity that sometimes occurred regarding our roles pointed to an increased sensitivity for our communicative actions as well as to the potential power of our input and positioning that go along with growing into or leaving different roles. This new form of uncertainty and how researchers cope with it is not commonly discussed or well researched within the literature about transdisciplinary and transformative research, but it could be a useful starting point to more deeply analyze the learning processes interwoven with disorienting dilemmas and disruption in transdisciplinary and transformative research (Singer-Brodowski 2023).

Within the second category, relationships, we saw different patterns of interactions and noted how we, as researchers, tried to make sense of and consciously shape them. The category of relational work thus included personal aspects of relationships that were understood as intentionally emanating from us (working on relationships), and interpersonal aspects of relationships that were understood as responsive patterns (working through relationships) formed in interaction with the people.<sup>[10]</sup> While we worked within the relationships, we faced tensions stemming from the continuous boundary work at the SPI (Gieryn 1983, Singer-Brodowski et al. 2020). By “boundary work” we mean the permanent demarcation of researchers from other actors, with the aim of maintaining reputation and resources for science (Gieryn 1983). This perspective can also be applied to other groups of actors in the context of the governance of multi-actor processes, if it is assumed that the different groups of actors, such as civil society, each pursue their own goals and cultivate certain practices to achieve these goals, which all have an impact on interaction with other groups of actors (Singer-Brodowski et al. 2020). For the category of relationships, we have now been able to show that researchers shape them with personal/intentional patterns. For example, the pattern of criticality can be interpreted as dynamics of demarcation, in which we as scientists used our specific reputation to point out neglected or insufficiently considered aspects (such as the temporal urgency of sustainability transformation). The supportive dimension can be interpreted as a pattern of boundary crossing from science to practice in which we as researchers left our actual task of systematic knowledge generation, supported actors outside of academia, and thus cooperated to achieve a common goal: the implementation of ESD. We crossed these boundaries, although cooperation that is too close can be a risk for our scientific reputation and independence. This pattern of boundary crossing also serves the enhanced transfer of results into the policy-context, because trustful working relationships are discussed in the literature as an essential basis for the uptake of scientific research within policy making (Oliver et al. 2014). In the scientific context of governance research, the relevant studies or theoretical concepts on interpersonal relationships are almost exclusively defined as productive and supportive partnerships or forms of cooperation (e.g., Måsse et al. 2008). However, our results show that in a multi-actor process the various ways of shaping relationships sometimes contradict each other (e.g., when a relationship too close to policy actors makes the proximity to civil society actors untrustworthy). The claim of complete impartiality was also relevant on the personal/intentional level of shaping relationships, also in order to meet the claim of inclusion of all

voices at the SPI (Beck et al. 2014). This ambition made it necessary for us to move between critique and support, and it highlighted the need for scientists to repeatedly engage in metacommunication about their advocacy of the entire process with all actors. Altogether, following a transformative research approach meant actively engaging in a tightrope walk. For this reason, our insights prove that a perspective on only productive or positive relationships is too limited because the relationships at the SPI are more multi-faceted.

Furthermore, the relational pattern of describing our interactions with others focused on the fact that relationship-building always happens from both sides (e.g., by making sense and use of each other) and unforeseen events can have an impact on the relationship. Thus, the bridge-building pattern naturally depended on the willingness of the actors to want to be part of trust-building relationships with other actors in which one collaborates with and benefits from each other. Engaging with the other using the “work-you” personal pronoun (and also partially rejecting it) indicated a certain level of trust that the actors placed in us. Here, as transformative researchers, we tried to work on relationships to advance an ambitious ESD agenda. What was relatively unpredictable were moments of instrumentalization of scientific statements or findings: the risk of scientific evidence or arguments being instrumentalized for other means than intended by the researchers is the subject of long debates (i.e., Weiss 1979), but it can be minimized by carefully anticipating possible uses and balancing one’s own positions and communicative actions critically. In the context of the case presented here, we increasingly tried to account for this by anticipating potential instrumentalizations.

The above-mentioned function of reflexivity as a strategy to cope with ambiguity and complexity (Mezirow 2000, Sol et al. 2018) is deeply embedded in relationships and enacted through them. Indeed, the different forms of relationships are focal points where the necessity to deal with ambiguity and complexity gains meaning for researchers. Quite fundamentally, it seems fruitful to empirically investigate the role and significance of relational work further in transdisciplinary and transformative research cooperation. Although in our case, relational work was not always successful and had many challenges, we learned throughout the process to shape relationships with additional awareness of their possible implications and used our field notes to individually trace the emotions that came up in different situations. Our group interpretation sessions in particular helped us to make sense of our relational experiences and discuss the genesis and purpose of relationships, thus reassuring ourselves of our approach. Also, power relations were (critically) discussed in several field notes, given that they are an important feature of the interactions at the SPI. At the same time, our impressions were that informal exchange as well as the (lunch) breaks and after-work talks should be given much more importance than we have been able to examine through our field notes so far. Last but not least, we want to note that relationships need time, and this can lead to conflicts, especially because the time for encompassing outreach activities is usually not given in research projects that are funded for a short time.<sup>[11]</sup>

In the third category, analytical and normative assessments, we found an inherent need for us to understand the field more broadly and deeply and to reflect on how we are normatively situated

within it. Importantly, we considered ourselves not as neutral within the field but also as engaged researchers with a normative grounding and at times a purpose, which we justify with a systemic necessity and responsibility (and self-expectation) to contribute to the development of solutions to the current unsustainability crises (Scholz 2017, Schneider et al. 2019, also on the impossibility and undesirability of value-free research: Vogt and Weber 2020). Our normativity clearly influenced how (goal oriented) we acted not only in situations described in the field notes but within our scientific work in general.

Though this kind of normativity and how researchers can deal with it was not always directly reflected upon within the field notes, it was a core pillar of our team discussions of them. For example, we discussed what risks can go along with normative positioning and how to mediate them (e.g., on biases in interpretations) and what potential harms or benefits there might be with conducting research in the context of unsustainability and its urgency. Although these reflections mostly did not lead to changes in the identified binding to the normative concept of sustainability, they helped us to identify underlying assumptions (e.g., in order to be more transparent about them), to clarify different knowledge bases and thereby consider an epistemological pluralism (Miller et al. 2011), and to make more deliberate decisions on the extent to which normativity influences our actions.

Our reflection on specific roles and embedding of actors as well as on our own normative assumptions enabled us to develop more purposeful, differentiated, and precise communication practices. From our point of view, this additionally strengthens the argument for reflexivity as a quality criterion and success factor (e.g., Bergmann et al. 2021) for transdisciplinary and transformative research. But it also points to the notion that reflexivity alone does not guarantee ethically sound research within the inherently normative field of sustainability sciences (Scholz 2017). This is further supported by a critique of self-reflection as often normatively bound within preexisting conditions: for instance, Boström et al. (2017) argue that reflexivity may be seen as a collective dynamic of subjectivation that leads to ignoring the embeddedness of the reflexive individual in structures that are path dependent and entail inertia and transformation blockades (Boström et al. 2017). Further, the unreflected focus on “more reflexivity” implicitly poses the risk that the engaged reflexive individual unintentionally supports neoliberal dynamics of individualizing responsibility (Boström et al. 2017). Even though our involvement and dependencies within the higher education system were not completely hidden from us, we nevertheless recognized tendencies within our discussions that reduced systemic problems to individual responsibility instead of systemic change as expressed within the category of normatively assessing the field. This example illustrates the potential of Bourdieu’s claim to turn “the weapons of science against oneself” (Bourdieu 1993:372, authors’ translation). For us, this means analyzing our normative assumptions even more closely, in terms of their origins and intentions, and examining what ethical task they go hand in hand with.

#### **Cultivating reflexive practices: hypotheses for potential pathways**

Although the aforementioned insights predominantly focused on what was addressed within the field notes and discussions, here we further reflect upon potential pathways toward adequate

reflexive practices based on our collected experience. In a meta-reflection on the empirical results, we developed hypotheses about what helped us to cultivate reflexivity in our attempt to better deal with the challenges of transdisciplinary and transformative research.

First, we found that the writing and collaborative evaluation of the field notes functioned as an additional source of knowledge: it enabled us to make implicit field assumptions visible and accessible, and, as an archive of our own thoughts and feelings, helped us to allow for and embrace greater complexity. For instance, the notes that were kept over a considerable timespan allowed for comparative self-observations, allowing us to gain deeper insight into the relationships we were involved in, how they changed over time, what actions we attributed to certain actors in a particular situation, when we acted in specific ways (and sometimes also why), how we felt in different situations, and what roles we took on in which contexts. The reflections within our field notes thus served as a foundation for us to speak about these questions, supporting us in the attempt to distinguish between, for example, self-attributions and attributions made by others. An uncertainty about how to act was also further emphasized and catalyzed through the reflections involved in writing and discussing the field notes. When we discussed the passages collaboratively, we started to understand them as possibilities that might allow us to become more sensitive to our communicative actions. Additionally, writing down, e.g., takeaways, enabled us not only to eventually make reflections, but also to consciously take these into subsequent situations in order to translate them into future (communicative) action, which directly linked reflection to action. Moreover, the fact that we evaluated the field notes cooperatively allowed us to deal with multifaceted tensions and challenges and at the same time reflect on them. According to our experience, fostering a kind of reflexivity that can lead to action therefore seems considerably easier when conducted in a team, and if this is not possible, when researchers join in reflecting with other researchers working in related fields. In the process, we view trustful relationships among those involved as likely to form an essential basis for sharing personal reflections, which would otherwise be likely to remain undisclosed. For this reason, we suggest that flat hierarchies within teams support honest exchange processes, because they can enable trust. Therefore, we conclude that lower dependency structures can create free (and safer) spaces for exchange. So far, it has at least been pointed out that the so-called SPI is fruitful when spaces for open exchange prevail in which organizational interests as well as personal positioning also find a place (Edwards 2021). However, further research should be initiated on this. This is particularly true because our field notes (analytical autoethnography) were only one part of our approach, and it was the collaborative discussions that additionally led to deep insights and further reflections on assumptions, implicit normative positionings, and (non-)actions. Apart from the processes within our own team, other external workshops, meetings, and colloquia, our deliberate engagement with literature on questions that arose during our reflections, etc., led to more reflexive engagement with our assumptions: as a form of external mirroring, these activities helped us to identify our own blind spots. Moreover, in our specific case, the underlying attitudes of the RMA approach (e.g., thinking in possibilities) contributed to continuously reflecting on our assumptions and

thus influenced our abilities to rethink our actions. Aside from writing and discussing field notes, we also used structured self-reflection along reflexive questions, e.g., based on the questions posed by Anderson (2006). This process may help to develop analytic reflexivity and offer a straightforward pathway either as an addition to a team reflection process or when time is limited. Regarding the interplay of reflexivity with the scientific quality criterion of transparency, we found that for us, increased reflexivity on assumptions and unconscious (non-)actions enabled us to be more transparent at times about our research, e.g., in our communication with other researchers or actors in the field. On the other hand, actively adhering to transparency also motivated us further to develop a more reflexive perspective on our research. At the same time, this can only be noted as a potential for more transparency: as we have also discussed above, gaining more knowledge about reflexivity leads to being more assertive in situations or relationships, and thus in a sense creates power asymmetries (Fritz and Meinherz 2020). To transform this gain into transparency and not instrumentalize it according to one's own normative sense is, in turn, an additional ethical task for scientists.

Although the above-mentioned strategies may, in an ideal setting, help to foster reflexivity, it is important to point out that writing and discussing the field notes through the collaborative debriefing of experiences required a great deal of time. This could be one of the reasons why self-reflective practices often get more attention only when "other activities were not appropriate in a certain situation" (Hilger et al. 2018:142). Yet, we nevertheless view them as promising potential pathways toward fostering reflexivity on implicit assumptions, role attributions, embeddedness in relationships, etc., and thus also to professionalizing transdisciplinary and transformative research at the SPI.

## CONCLUSION

Reflexivity is a key issue within the transdisciplinary community and calls for self-reflectivity in transdisciplinary and transformative research have recently become louder (Schneider et al. 2019, Bergmann et al. 2021). Nevertheless, hardly any empirical studies exist about what exactly researchers (should) reflect on or on how reflexivity could be cultivated and trained. In this article, we have addressed this gap based on a study from the national monitoring of ESD in Germany.

We asked how reflexivity, as an important feature of scientific work in general and of transdisciplinary and transformative research in particular, could be more systematically analyzed and promoted. In our own research, we decided to use the method of autoethnography to generate more awareness and reflexivity, not only by keeping field notes and holding joint sessions to discuss and analyze them (collaborative autoethnography), but also by interpreting these notes. We summarize the fruits that our autoethnographic engagement has borne as follows: we were able to explain practical gains in reflexivity, especially through the possibilities emerging from re-reading field notes as well as from exchanging and providing reassurance about work strategies in the team on the basis of the field notes. We were also able to gain the following insights into the processes, contents, and areas of tension of our reflections: (1) We now better understand which (role) demands are made on us by the different actors and how challenging it is to get out of fixed role expectations. We take on

different roles, some of which are difficult to reconcile with each other. (2) We design and co-create relationships with different actors on a regular basis. These are not only characterized by cooperative work typical in transdisciplinary research contexts, but also involve actual relational work. This is particularly clear when compromise or cooperation is not possible and aspects of instrumentalization become evident. We argue for such a level of relational work to be analyzed more strongly or systematically in transformative research. (3) We have gained a better understanding of how our work practices are normatively influenced. This was mainly expressed in a perceived pressure of responsibility and time in the sustainability context. Here, it remains to be further explored what impact this has on scientific work practice, for example, in the prioritization of tasks. This article not only provides an example of how reflexivity can be methodologically strengthened in transdisciplinary research contexts, but also adds knowledge about the specifics of such processes of reflection and the challenges that characterize them.

Our results are of course based solely on our systematized collective experience, and this can be considered a limitation. At the same time, this shared experience is exactly what allowed for the depth to which we were able to focus on the potential of reflexivity as well as the pathways to fostering it. In fact, we suggest such use of field notes and reflexive team discussions about them as a tool for other researchers in transdisciplinary and transformative research projects who would like to gain a deeper understanding of their own work. Yet, it must also be noted that we certainly maintained specific group biases within the intersubjective discussions, which is why external mirroring can be of considerable benefit to pluralize perspectives in the process. As another important point, the field notes as our source of data for the article did not cover all the aspects that contributed to our individual learning with regard to reflexivity throughout the period of the study. Indeed, this often happened in our exchanges with others beyond our team. Because reflexivity is a deeply subject-bound pattern of perception and action that remains partly implicit and pre-conscious, and because many reflections were not fully verbalized in field notes, it is obvious that the data basis ultimately always remains incomplete.

At the same time, these limitations point to the potential of our specific approach and to when it is useful to apply it in other contexts. Especially when first engaging with a highly complex field or carrying out interventions after having changed research modes (from more traditional to more transformative ones), the approach may help to clarify roles, communication patterns, relationships, and assessments. Autoethnography is itself a transformative research method (Custer 2014) and can support the initial process of diving into a specific field. In this situation, the approach helps to cultivate reflexive practices, to collect challenging situations and tricky experiences, and to reflect on them in a more distanced situation together with colleagues. This can lead to more self-confident, enlightened, and professional performance in future situations. Through our research, we gained a more informed understanding of our own transformation and learning processes in transformative research, which in turn strengthens the thesis that systematic and methodologically supported reflection processes enable researchers to act more professionally. In our case, the process

helped us to recognize our own positions and limitations as well as to make more conscious decisions on a common argumentative basis and consequently to create a new understanding of ourselves as scientists involved in solving super wicked problems without the unreliable help of blueprints.

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[1] We refer to both research types because our analysis pertains to both forms of research. We therefore systematically speak of “transdisciplinary and transformative research.”

[2] The Oxford English Dictionary defines “reflexive” and “reflexivity” in the following way (only relevant meanings are cited):

REFLEXIVE: 2a. Chiefly Philosophy and Psychology. Of a mental action, process, etc.: turned or directed back upon the mind itself; involving intelligent self-awareness or self-examination; introspective. 2c. Originally Social Sciences. Of a method, theory, etc.: that takes account of itself or esp. of the effect of the personality or presence of the researcher on what is being investigated. [first recorded in 1904 in the American Journal of Sociology].

REFLEXIVITY: The quality or condition of being reflexive; reflexiveness.

[3] Following Anderson's demand that the researcher be made visible in the text (Anderson 2006), we use the pronouns “we” and “us” throughout this article whenever appropriate.

[4] Analytic autoethnography differs from narrative and emotive ethnography and focuses methodologically on the following five factors: complete member researcher (CMR) status; analytic reflexivity; narrative visibility of the researcher's self; dialog with informants beyond the self; and commitment to theoretical analysis (Anderson 2006). Each of these factors apply to our work here.

[5] This was also the reason why we explicitly chose not to conduct narrative and emotive autoethnography (Ellis et al. 2010, Akehurst and Scott 2021). The reader's first impression of ethnographic writing may therefore be very analytical. Nevertheless, we also refer to emotional aspects in our field notes.

[6] Field notes were taken in German and analytical discussions were conducted in German as well. We translated the quotations into English after selecting them for the present paper.

[7] In the present analysis of data, the line numbers in parentheses refer to a document in which we clustered selected examples of text segments from our data (based on the macro- and micro-reviews) in superordinate themes within a shared category system.

[8] To avoid disclosure of specific research participants in the results section, sometimes they/they are used as gendered pronouns.

[9] In order not to make the different actors and politically sensitive working contexts recognizable and not to create friction between the actors by making confidential agreements public, we refrain from providing further details from our field notes at this (but also at other) points in time. To maintain our position in the process, we do not want to go into detail here about our own obligations toward other actors and the feelings that go with them.

[10] We would like to add that such complex relationships are characteristic of our scientific context.

[11] As researchers, we have been involved in the field for several years. This has made it possible to build trustful relations with various actors.

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### Author Contributions:

*J.v.S. and M.S.B. contributed to the design of the research. All authors contributed to the implementation of the research, to the analysis of the results, and to the writing of the manuscript. M.S. B. supervised the process and was responsible for the theoretical background concerning this manuscript as well as the discussion of the results. J.v.S. was responsible for the contextual and methodical implementation. J.H. was responsible for the description of the results. All authors contributed to the discussion of the results and the conclusion.*

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### Data Availability:

*A subset of the data supporting the findings of this study are available on request from the corresponding author (J.v.S.). However, as the data contains information that could compromise the privacy of the research participants' (in this case, the researchers themselves) partners, only limited data can be made public.*

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