



# Scientific policy advice on sustainable development: lessons learned from the Dialogue between Scientific Councils in Germany

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## Abstract

This paper presents an in-depth case study about the Dialogue between Scientific Councils, also referred to as the Beirätedialog, which is a format for cross-sectoral science policy consulting on sustainable development in Germany. Set up to address current trends, it is designed to facilitate deliberation and collective knowledge creation between scientists and policymakers. Based on 4 years of participatory observation, we analyze to what extent this goal can be achieved and present some empirical insights about the main difficulties that occurred. We argue that creating a space for interaction does not guarantee collective knowledge production and identify key learnings that can help design such a process. In support of the growing interest in communication at the intersection of science and policymaking, our research seeks to deepen the understanding of the dynamics of co-creative processes and offer some insights on how to overcome the main challenges.

**Keywords** Sustainability studies · 2030 Agenda · SDGs · Scientific policy advice · Science-policy interface · Germany

## Abbreviations

Science Platform/wpn2030	Science Platform Sustainability 2030
Beirätedialog	Dialogue between Scientific Councils (one of the dialogue formats of the wpn2030)
2030 Agenda	2030 Agenda for Sustainable Development
UN SDGs	United Nations Sustainable Development Goals
NSDS	National Sustainable Development Strategy
GSDR	Global Sustainable Development Report
RQ	Research question

## Introduction

In 2015, the General Assembly of the United Nations (UN) manifested its vision to achieve 17 Sustainable Development Goals—in short SDGs through the resolution “Transforming our world: the 2030 Agenda for Sustainable Development” (henceforth 2030 Agenda). The SDGs are a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030 (Dodds and Roesch 2016; Resolution 2015). What is special about the SDGs is that they aim to be overarching and recognize that action in one area will affect outcomes in others, and that development must balance social, economic, and environmental sustainability. However, according to a recent study, there has been only little real political impact of the SDGs on global, national, and local governance, indicating that more research is needed to understand the entwining processes and their success factors (Biermann et al. 2022).

Science<sup>1</sup> has played an eminent role in informing negotiations around the 2030 Agenda, for instance, by monitoring progress and alignment with existing and newly established political frameworks. In many countries, this input resulted in so-called national sustainable development strategies and in reflections about how far these equally consider the economic, social, and environmental

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<sup>1</sup> We refer to a broad concept of “science,” which includes natural sciences, social sciences, and the humanities.

dimensions, as well as the universal and inclusive nature of sustainable development (Bundesregierung 2016; Deutsche Nachhaltigkeitsstrategie Weiterentwicklung 2021 2021; van der Hel and Biermann 2017).

To this effect, scholars and policymakers see an extended role and responsibility for academic research in informing the implementation of the 2030 Agenda: “while previously science was supposed to deliver thorough analyses, policy options and scenarios, and advising policymakers to come up with solutions, the 2030 Agenda urges scientists to generate knowledge that challenges existing normative tenets of sustainable development and helps to achieve the set-out sustainability vision, so that science will become [...] a driver and enabler of inclusive and people-centered sustainable development” (United Nations Scientific Advisory Board 2016). The broader role and responsibility as envisaged by the 2030 Agenda have also been acknowledged by the scientific community, when the International Science Council published a Guide to SDG Interactions “From Science to Implementation.” At the same time, the InterAcademy Partnership launched its report “Improving Scientific Input to Global Policymaking” with a focus on the SDGs (InterAcademy Partnership 2019). In a similar vein, the Global Sustainable Development Report (GSDR), which was first launched at the UN SDG summit in September 2019, reiterates the importance of researchers’ engagement for a successful implementation of the 2030 Agenda (Beisheim 2019).

In this sense, science platforms in a number of countries were set up to serve as levers for academic research to deliver on its role in the implementation of the SDGs. Many global platforms had already taken up the task of facilitating and coordinating scientific input in certain issue areas and SDGs (see for example, the Future Earth networks or the Global Land Programme (de Bremond et al. 2019; Schneider and Tribaldos 2018). In comparison, national-level science platforms in this field are still an emerging phenomenon; they differ from global platforms, which have mostly been created in specific thematic domains (van der Hel and Biermann 2017). In their initial review of various approaches applied in the implementation of the 2030 Agenda employed by the EU-28 countries, Niestroy et al. (2020) found that many countries acknowledge the important role of academic research to inform sustainable development policies, yet the authors identify only nine countries that include the use of science in their advisory councils on sustainable development, commissions, and other participatory instruments. Germany represents one of those countries and has set up a platform specifically for channeling academic research and advice in this area: the Science Platform Sustainability 2030 (wpn2030) (IASS 2020). The platform is an attempt to shift from the use of insular advice to a more holistic structure that seeks to provide advice to policymakers following the “whole of government” approach of the 2030

Agenda (Cázarez-Grageda 2019). In contrast to scientists providing bilateral advice to individual ministries, parties, or policymakers, such holistic implementation approaches include a broader range of scientific disciplines and other stakeholder groups. The approach requires researchers to participate beyond the delivery of knowledge and take a more active part in forming overarching knowledge-based policy advice by, for example, entering a process of continuous interaction and communication across stakeholder groups, scientific disciplines, policy areas, ministries, and government units (Edenhofer and Kowarsch 2015; Goode 2005; Habermas 1968; Jasanoff 2004a). We refer to this kind of collective knowledge production as *co-creative communication at the science policy interface*, and in the next chapter elaborate on how this term fits into the theoretical discourse. This kind of interactive communication between scientists and policymakers is designed specifically in an interdisciplinary and ideally transdisciplinary manner. Our theorizing includes perspectives from multiple disciplines to address sustainability matters combining environmental, socio-political, economic, and technical studies. Despite the ongoing debate around co-creation at the science-policy interface, linear communication logic between science and policymakers still prevails in many areas (Maas et al. 2022). In this paper, we ask ourselves why this is so and what impedes collective knowledge creation after a space for exchange was established.

We use the concept of an ideal-typical transdisciplinary advisory process in order to analyze the communication between researchers and between researchers and policymakers within the *Beirätedialog*, one of the formats created by the wpn2030. Transdisciplinary advice is seen as a form of co-creative communication on the science-policy interface, advice that is particularly directed to address complex societal challenges such as the sustainable development of our planet. We look at the activities throughout the first years of the *Beirätedialog* with a particular focus on three aspects. We will first identify to what extent the *Beirätedialog* provided the necessary conditions for an ideal-typical process of transdisciplinary exchange (RQ1); then, we look at the main challenges that appear in its setup (RQ2); and finally, we identify a number of steps that may help transform a linear advisory process into a dialogic exchange (RQ3). With the current analysis, we aim to provide a “real-world-check” of contemporary ideas of knowledge co-creation by researchers and policymakers, as they are discussed in the literature. This we consider important in the vein of the idea that co-creative communication processes became increasingly popular in comparison to linear processes. Our study brings insights from practical participatory observations of transdisciplinary advisory processes back to the academic debate, and offers a new, critical perspective for further reflection on interface practice.

## Theoretical background

Here, we define the main concepts used in our paper and show how they are linked. First, we delineate what kind of communication types can be differentiated at science-policy interfaces and how these relate to the *Beirütedia*log.

### The science-policy interface

Knowledge and its capability to identify, produce, process, and transform societal processes are regarded as key resources for human development (Bindé 2005). Academic research is only one source of knowledge and expertise amongst many, and is often criticized for being ill-suited to address societal problems because of its apparent lack of quality and applicability. Despite criticisms, academic research is nevertheless considered to be one of the most trusted sources of knowledge, not because of its objectivity in a positivist understanding where scientific knowledge is free from any subjective interpretations, but rather because of the belief that scientific methods and quality assurance in scientific research are more reliable and independent in comparison to other sources of expertise such as private consultancies (Kropp and Wagner 2010).

Spruijt et al. (2014) identified five thematic clusters that deal with questions of expertise in policymaking processes—post-normal science, science and technology studies, science-policy studies, politics of expertise, and risk governance. These labels represent interdisciplinary research approaches and thematic areas, rather than strict academic clusters. For the purpose of this study, discourse in post-normal science is of particular interest. Publications in this cluster indicate that for complex problems, especially in environmental risk-related policies, linear modes of communication struggle and there needs to be an interactive dialogue that involves an exploration of uncertainty, quality, value-ladenness, and a plurality of perspectives applied to the same body of knowledge (Funtowicz and Ravetz 1993; Petersen et al. 2011). This need to deal with values and multiple perspectives indicates that knowledge is not only discovered but also to a certain extent shaped by stakeholders beyond academia, which bring in their values, methods, and unique perspectives due to their professional background, education, ideologies, and political views. We proceed from a constructivist understanding of knowledge, according to which, the acquisition of knowledge is a social process where new ideas are developed and discussed from different stakeholder viewpoints. Similarly, the science-policy studies examine the role of research in complex and contested policy issues. Mode-2 introduced by Gibbons et al. is an example of a theoretical

concept according to which the nature of knowledge production is transforming into a new more democratic process, it shifts from linear, discipline-based knowledge production to a more collaborative, transdisciplinary, and context-driven approach (Gibbons 1999; Nowotny 2003). Science-policy interactions are also a prominent topic in research fields that deal with societal crises and explore power relationships at the science-policy interface and efficient communication during emergencies (Hisschemöller and Hoppe 2018; Renn 2008).

We define the science-policy interface as the intersection between academic research and policymaking, where social processes, which encompass communication between scholars and other societal actors such as policymakers and public administrators, allow the collective construction of knowledge with the aim of informing and enriching policymaking and implementation (Carpentier and Braun 2020; van den Hove 2007; Lacey et al. 2018; Van Beek et al. 2020).

### Communication at the science-policy interface

Building on the idea of *a more collaborative and context-driven approach to knowledge production instead of linear transfer*, we refer to knowledge-building as “co-productive communication at the science-policy interface.” This is an attempt to capture the most appropriate terms that describe academic knowledge production with the participation of extra-scientific actors, in our case policymakers (Van Der Hel 2016). This form of knowledge production is described in the literature by a variety of terms, e.g., participatory research (Lengwiler 2008), interactive research (Lemos and Morehouse 2005), joint knowledge production (Hegger et al. 2012), dialogic exchange, knowledge integration (Böcher and Krott 2016), and transdisciplinarity. In sustainability studies—the area which our case study focuses on—the term “transdisciplinary research” is one type of co-productive science-policy communication that is particularly oriented towards providing solutions to complex societal problems.

The idea of co-productive communication on the science-policy interface confirms the constructivist approach—there is no clear separation in co-creative communication between the domains of nature, facts, objectivity, reason, and policy from those of culture, values, subjectivity, and emotions. It presumes a symmetrical process of knowledge production between the social dimensions of cognitive commitment and the epistemic correlates of social formations (Jasanoff 2004b). Not only do these models change the role of researchers, but also bring about a number of new functions that are performed throughout this communication. Researchers and policymakers speak different languages and function according to different values and logics, yet their communication can be bridged by additional stakeholders who align these

two communities—knowledge brokers or intermediaries, from here on (Boswell 2018; Gluckman et al. 2021). These actors get to coordinate these interactions and processes and facilitate feedback rounds and learning loops between the different actors involved (Fährnich and Ruser 2019).

The transformation of science-policy communication brings a number of risks with it as was proven during the COVID-19 pandemic; two of which are seen as threats to democratic decision-making and an independent, value-free science. The first risk shows that, when research evidence is brought to debate with policymakers, it can weaken the credibility of the experts involved, and in some cases, it can even weaken science as an institution (Weingart 1999). With the rising number of experts, viewpoints, evaluation perspectives, and a presentation of knowledge gaps and uncertainties, decision-makers struggle to find the single “voice of science” or “truth” they expect to hear from science (Hoppe 1999). At the same time as (Nassehi 2021) points to, knowledge per se cannot provide an opinion-free single truth or be objective, because it is created by people, and the dynamics of scientific day-to-day business lead scientists to constantly reject and create contradictions and pluralistic solutions (Nassehi 2021). This variety of perspectives leads to a second risk in science-policy communication—the risk of knowledge instrumentalization when policymakers cherry-pick selected scientific findings to underpin their political lines of action without taking into account the rest of existing evidence (Novitzky et al. 2020; Reed et al. 2022). In democratic decision-making, furthermore, the rising influence of non-elected experts can be considered a threat (Bogner 2021; Hirschi 2021; Pamuk 2021). The intertwining of science and policymaking, its processes, aims, and values makes the science-policy interface to a very complex, chaotic, and somewhat intransparent area. This is extremely visible in sustainability politics that bring together many different expert domains with the aim to generate solution-oriented research findings in order to address complex problems and integrate them into decision-making (Bergmann et al. 2021; Bernert et al. 2023).

### The science-policy interface in sustainability politics

Sustainable development is regarded as a complex societal problem—a cluster of diverse challenges that occur across multiple scientific disciplines and societal sectors—and includes many mutually related factors which change constantly and can be visualized as a web of problems (Asselt 2000; Rotmans 1998). The many-sidedness of complex societal problems is argued to result in the need for multi-stakeholder and multidisciplinary approaches with a key focus on building a dialogue in order to bring in different perspectives and find synergies among differing solution approaches (Fritzsche and Bäckstrand 2023; Rittel and Webber 1973).

Sustainability combines a myriad of complex problems in the areas of environmental, economic, and social human activity. Hence, multiple success factors, solutions, and pathways are identified and a range of different disciplines are involved in addressing them. Decision-making in this area presumes the integration of knowledge about economic, environmental, and social factors to support the identification of objectives, the development of policies or decision rules, and the evaluation of courses of action (Kelly 1998). According to Walker, science on sustainability issues is about natural systems that are not bound by human-constructed disciplines, it has no theoretical disciplinary boundary, and it is all about trying to understand the complexity of the systems that affect mankind, connecting us and tying us into our natural environment (Walker 2017).

Sustainability studies have a long tradition—both among policymakers and scholars—of debates and developments for new, improved forms of communication on the science-policy interface. They are mostly captured under the term “transdisciplinary research” with a particular accent on the extensive diversity of disciplines, methodological approaches, and political fields that this area of research touches upon. Transdisciplinarity is defined as “a reflexive, integrative, method-driven scientific principle aiming at the solution or transition of societal problems and concurrently of related scientific problems by differentiating and integrating knowledge from various scientific and societal bodies of knowledge” (Lang et al. 2012). In our logic, transdisciplinary research is regarded as a form of co-creative science-policy communication that is directed particularly to addressing complex societal problems. Although to some extent confusing, we consider it necessary to point to this term, because it is very common in the field that our case study comes from, and we use a theoretical framework that builds on this terminology.

### Theoretical framework

The analysis is based on a theoretical concept of the ideal-typical transdisciplinary research process adapted by Lang et al. (Lang et al. 2012 p.28) to sustainability studies, based on previous works by Bergmann et al. (2005), Jahn (2008), Keil (2009), and Bunders et al. (2010). It is based largely on the idea that transdisciplinary research—and particularly research in sustainability politics—is a mixture of “interface practices” between academia and relevant societal groups (in our case, policymakers). In this sense, research questions are directly triggered by societally relevant problems and the outcoming knowledge is presented in a way to address these problems. This interactive response relies heavily on mutual and collective learning processes and continuing interaction (Bunders et al. 2010; Jahn and Tullney 2016; Jahn 2008;

**Table 1** Phases of an ideal-typical transdisciplinary research process adapted to sustainability politics adapted to sustainability politics by Lang et al.

Phase and design principles of a transdisciplinary research process	Modes of scientific engagement with the SDGs
<p>(1) Collaborative problem framing and building a collaborative research team This phase includes building a collaborative research team, creating a shared understanding of the problem, and collaboratively defining specific research questions as well as designing a methodological framework for collaborative knowledge production and integration.</p>	<p>(1) Referring to the 2030 Agenda This mode envisages that science contributes to a better understanding of complex problems and the many dimensions of sustainable development. This is largely done by processing existing knowledge</p>
<p>(2) Co-creation of solution-oriented and transferable knowledge through collaborative research This phase includes assigning and supporting roles for practitioners and researchers as well as applying and adjusting collaborative research methods</p>	<p>(2) Guided by the 2030 Agenda This mode provides for the development of solutions and possible ways, i.e., concrete measures and interventions to achieve the goals</p>
<p>(3) (Re-)integrating and applying the co-created knowledge This phase includes an integration of knowledge into decision-making, generating applicable outputs for all related parties, and facilitating formative evaluation of the outputs.</p>	<p>(3) Conducted in accordance with the 2030 Agenda This mode presumes “evidence-based negotiations” between the scientific community and political and social actors to reach consensus on controversial and poorly understood issues</p>

Lang et al. 2012). The concept of interface practices and the theoretical model of an ideal-typical transdisciplinary knowledge-building give a clear orientation of how an ideal exchange can be designed step by step. Analyzing how interactions on the science-policy interface have been set up according to this framework shows the main gaps and inconsistencies in the communication on the science-policy interface.

The authors highlight three phases of a transdisciplinary research process and define for each phase relevant design principles; these are briefly summarized in Table 1 and resonate with the modes of knowledge production for the information and implementation of the 2030 Agenda described in the Global Sustainable Development Report 2019 that outlines the emergence of “evidence-based deliberations.”

For the purposes of this study, we use the outlined phases and design principles of the ideal-typical transdisciplinary research process to analyze which phase of engagement was reached in the scientific advisory process on the German sustainability strategy. We outline what hindered the process of creating an ideal transdisciplinary research process or, in other words, to reach phase (3) and share a number of observations that could help design transdisciplinary advisory processes more efficiently in future.

## Case description and research interest

Currently, the Science Platform Sustainability 2030 or wpn2030 is positioned as the main mechanism for channeling scientific input to policymakers on sustainable development within the German implementation architecture (Fig. 1). The Beirätedialog is one of its key formats for facilitating such communication. Generally, and “outside” of the implementation architecture on sustainable

development in Germany, there are many scientific advisory councils attached to individual ministries or to more than one ministry or to the federal government, e.g., in the case of the Ethics Council. The scientific councils vary in constitution, disciplinary expertise, mandate, and resources. Some councils consist of scientists while others also involve practitioners; some council members are appointed by the government and others are elected by the councils themselves. Some councils have well-resourced secretariats, while others are self-coordinated by members; some operate rather independently, whereas others are hosted by their ministries. While several of them publish only regular annual reports, others also position themselves on current affairs. All of them aggregate scientific knowledge in their respective field of policy and formulate recommendations to the ministries and/or parliament. Institutionally, the interaction is conceived as mostly bilateral, between the councils and their respective ministries.

Sustainability politics is a very diverse and overarching policy field that relates to different areas of human action—social, environmental, and economic—which at the same time require integrated knowledge from different areas of research and disciplines. This insight became a major motivation for establishing the *Beirätedialog*—to offer a space for the council’s representatives to exchange and explore common ground, synergies, and discrepancies in their work and the advice they provide to policymakers, within the framework of the 2030 Agenda and the implementation of the German Sustainable Development Strategy. The *Beirätedialog* is presented here in-depth. The paper draws upon ample evidence of what worked and what did not work in setting up the co-creative communication. The *Beirätedialog* is a clear attempt to bring together researchers from various fields and disciplines and establish an exchange that would make it possible

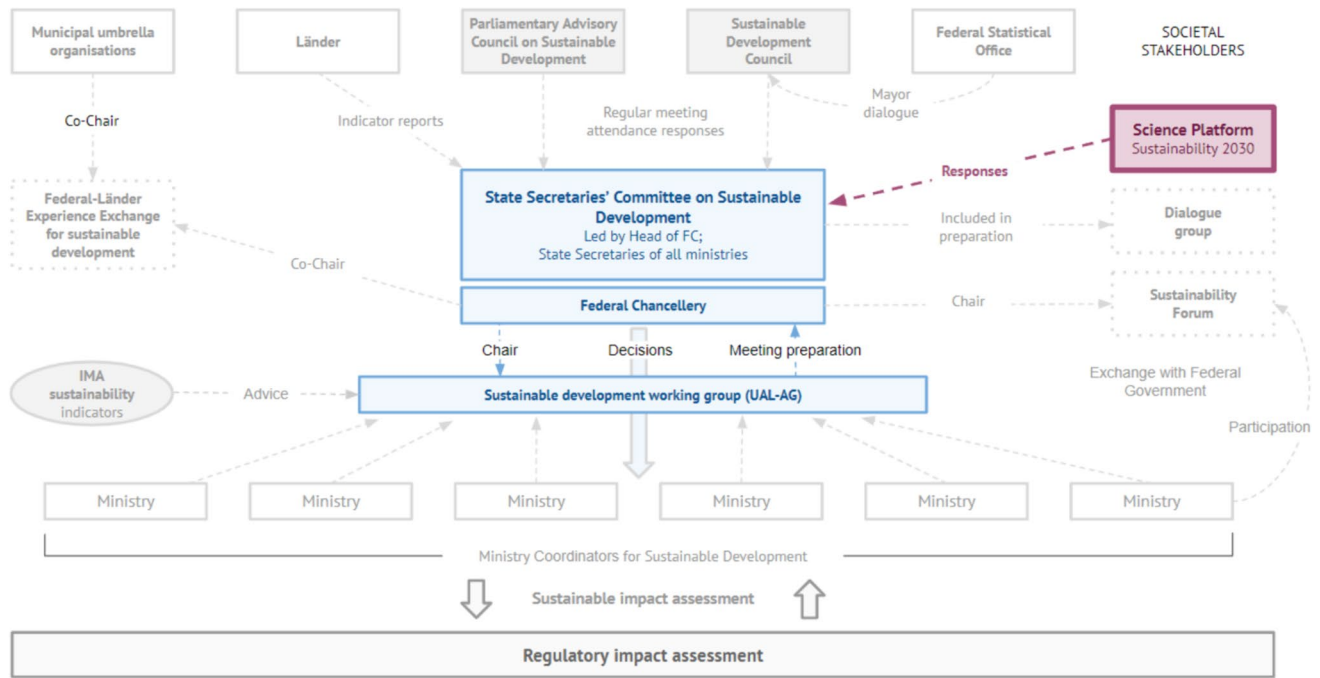


Fig. 1 Adapted from the institutional implementation architecture of the German national sustainable development strategy (Bundesregierung 2016)

to provide integrated knowledge; this way the participating councils represented a multitude of disciplinary backgrounds—e.g., environmental studies through the Advisory Councils on Environment, social policy through representatives of the Network for interdisciplinary social policy research or economic—through the Council on economy and energy.

The modus operandi of the *Beirätedialog* is designed in a recurring manner. Initially, annually and since 2020 biannually participants are invited to join a day-long workshop where topics along two strands are discussed: on the development and implementation of the German sustainability strategy and on current affairs related to sustainability politics, e.g., the impact of the COVID-19 pandemic, and on the role and position of the scientific councils and matters of scientific policy advisory more generally.

Yet in the process of generating recommendations, e.g., for the quadrennial revision of the German Sustainable Development Strategy, these meetings are only the peaks of such processes. For such a generation of impulses, the overall process can be divided into four phases:

- Mapping of the different states of awareness of and relevant existing works of the councils related to the German sustainability strategy
- Laying out the timeline of the revision process as designed by the Federal government and inviting the councils to contribute

- If needed, supporting the coordination among the councils and collecting and consolidating the written content for a joint presentation to the government
- Coordinating the presentation of the report and its main recommendations to the government, in line with the official timelines, consultations, and hearings

The format is innovative, because it creates a space where potentially *all* advisory councils can come together to discuss and collaborate on providing advice for the further development and implementation of the German sustainability strategy and sustainability-related politics more broadly. This is a novelty because previously interactions among such a broad variety of councils were rare, only very few councils were familiar with the strategy, and sustainability politics were seen by many as environmental politics. Also, the setup of recurrent dialogue events provides a space where trustful relationships can be built and potential synergies can be discussed before joint positions are developed and communicated and not only identified at later stages of the advisory process. Furthermore, the meetings give space to make conflicting views visible and the opportunity to seek a consensus together. For this purpose, the dialogue meetings were designed as an onsite meeting where all the participants would be able to discuss their positions openly and under Chatham House rule. Furthermore, the mediation during the workshop and in all other phases was coordinated by the intermediary of the

**Table 2** Methods

Method	Aim	RQ
Document analysis (6 reports, 9 supporting documents)	Identify if interdisciplinary collaborations and co-productive communication practices are in place	RQ1
Participant observation of the Beirät dialog sessions	Identify obstacles to co-creative communication, along with the main motivations and expectations for an ideal process	RQ1 and RQ2
Interview-analysis (93 interviews and statements)	Collect participants' expectations, criticisms, and recommendations for improvement	RQ1 and RQ2

dialogue who brought all strands together throughout the process; they compiled the recommendations, facilitated the face-to-face meetings, and provided feedback loops in between the onsite meetings.

In line with the overall strategic aim of the *Beirät dialog* to bundle expertise on the development and implementation of the German sustainability strategy, the biannual meetings of the *Beirät dialog* focused on the following topics (until 2023):

- Exploring existing links and synergies between the work of the scientific councils and the 2030 Agenda/SDGs and the German national sustainable development strategy (2018)
- Generating recommendations for the revision of the German national sustainable development strategy (2019)
- Sustainability politics in times of crises (2020)
- Finance as a lever of transformation (2021)
- Jurisdiction as a lever of transformation (2021)
- Innovation and strategic foresight as levers of sustainable development (2022)
- Role of science-policy advice as a lever for sustainable transformation (2022)

After outlining the format of the *Beirät dialog* and drawing on the theoretical and conceptual background described above, we particularly deal with the following research questions: (RQ1) To what extent has the *Beirät dialog* facilitated co-creative communication at the science-policy interface? (RQ2) What challenges arise in setting up a co-creative communication format such as the *Beirät dialog*? (RQ3) How can a linear advisory process become co-creative?

In the end, we define three main lessons learned that can be of interest for other countries setting up such dialogue formats. When using the term “lessons learned,” we stick to the OECD definition and understand it as generalizations based on evaluation experience with projects, programs, or policies that arise from specific circumstances and can be, if contextualized, transferred to other situations; these lessons highlight strengths or weaknesses in the preparation, design, and implementation of an intervention or initiative, such as the *Beirät dialog*, that affect its performance, outcome, and impact.

## Data and methods

Given the multifaceted nature of the German scientific advisory system and the novelty of the case at hand, our analysis of the case of the *Beirät dialog* serves as an exploratory case study with the intention to gain a deeper understanding of the constraints of a format for co-creative science-policy communication (Yin 1994). We are interested in understanding how the theoretical ideal plays out in the reality of our studied format.

To achieve this, we use a mixed-methods approach. It is a combination of participant observation, document analysis, and content analysis of written statements and interviews. This combination of methods seemed to be most suitable for addressing our research question; first and foremost, we aimed to determine whether the *Beirät dialog* meets the theoretical requirements of a co-creative communication process at the science-policy interface outlined in our theoretical framework. Further on, we look at how this communication can be improved (Table 2).

Our research is based on a social science approach combining the expertise of two authors who have been studying the science-policy interface, science transfer, and science communication from a social science perspective; we use inductive content analysis to study the documents, our field notes, and the interview. Based on the textual data, we formulated a number of key categories that define challenges and point to the main lessons learned; we elaborate on these in our results. One of the authors adds practical insights and perspectives as she acted as an intermediary in all meetings of the *Beirät dialog* since 2018.

In the first step, two authors analyzed 15 openly accessible and written documents (6 reports, 9 supporting documents such as press-releases, position papers, publicly accessible interviews with participants, and reflection papers) that described the work and the goals of the *Beirät dialog* (a full list of analyzed documents can be found in Attachment 1). We aimed to identify if co-creative communication was in place—whether the recommendations were produced by different advisory councils together, or separately; also, see whether insights from other councils have been referenced. As we outline later, this barely happened, and we look at how difficulties were described in subsequent media statements or position papers after the *Beirät dialog* sessions.

As a second and central step, we studied the setting of the Beirätedialog through participant observation and looked into how actual interactions evolved over the years. In comparison to non-observatory methods such as literature study, interviews, and focus groups, direct observation allowed us “to see what people do, rather than what they say they do” (Morgan et al. 2017). This is an important distinction because in our view, there are multiple formats of science-policy communication that claim to be co-creative but remain linear. Our respondents’ understanding of co-creative communication could differ from ours, e.g., a verbal exchange of viewpoints or the participation in the event could be interpreted as co-creative communication. The role of “observers as participants,” which according to Adler and Adler (Adler and Adler 1994), is a “peripheral membership role” enabling researchers to “observe and interact closely enough with members to establish an insider’s identity without participating in those activities constituting the core group of membership” (Kawulich 2005). The types of data collected with this method were field notes by all participants. For the reason that these meetings were held under Chatham House rule, we are not able to record or to use exact quotes and link them to participants. Our observations helped to follow the live discussions in a very detailed manner and anticipate reactions and challenges that impeded mutual understanding. For example, we would not be able to see that the publication of separate, non-integrated statements was preceded by long discussions on how to produce recommendations together—state that this attempt failed and try to understand why this happened. After each session of the Beirätedialog, the authors held a workshop to compare their notes and observations; as a result, we formulated our key challenges and lessons learned.

Finally, in the third step, apart from document analysis and participatory observation, we analyzed the transcripts of 93 interviews and statements (81 written answers and 12 expert interviews) from researchers of multiple backgrounds who took part in an online consultation held by the Science Platform 2030 on the occasion of the consultations regarding the last revision of the German Sustainable Development Strategy (2019–2021). The consultation was guided by a set of overarching questions developed by the Science Platform 2030. The focus of our analysis was on the submissions to the 7th guiding question that asked: How can science contribute to the German national sustainable development strategy in a better way?<sup>2</sup> The insights from this data helped address RQ3 since many interviews outlined their wishes and proposed strategies for an improved management and cooperation on the science-policy interface.

Since we investigated only a single case in a very specific advisory setting that involves only a selected number of scientific actors providing advice on the German sustainability strategy, there are several limitations to the findings presented here. There are no overarching guidelines or common practices, neither for the development and implementation of German sustainability strategy nor for the science-policy dialogue formats accompanying them. Thus, such formats differ largely among institutional contexts and countries (Niestroy et al. 2020). Although we assume that much can be learned from this single case study, it is not possible to transfer the learnings and experiences presented here directly to other contexts (Stake 2008). Hence, our study should not be understood in concrete terms, but rather as a guidance for actors in other contexts that are in the process of setting up science-policy platforms and co-creative communication.

## Results

In the following part, we present insights gathered throughout the first 4 years of the Science Platform 2030 and the Beirätedialog. In the first section, based on the conceptual framework, we analyze to what extent the sessions of the Beirätedialog could facilitate co-creative communication at the science-policy interface (RQ1). In the second section, we summarize the main problems in setting up such communication (RQ2), and in the third section, we formulate four measures that may aid designing and co-creative communication at the science-policy interface in other contexts (RQ3).

### Communication within the Beirätedialog

We use Lang et al. (2012) conceptual framework of an ideal-typical transdisciplinary research process to identify to what extent the work of the Beirätedialog can be regarded as co-creative (RQ1). These findings are based on an analysis of the reports<sup>3</sup> which show, e.g., when statements were formulated by single councils or by multiple ones as a joint statement. Also, in the final parts of the reports, measures are described that serve to present the results to policymakers and to gather and integrate their feedback and expertise. Additionally, we used field observations to analyze to what extent the council representatives adapted to the positions of others.

The first phase foresees creating a collaborative situation and a unified understanding of the research problem and question. The intermediaries of the Beirätedialog managed to bring together a broad range of different ministerial advisory councils that—in the plurality of councils that met for the Beirätedialog—previously were not used to

<sup>2</sup> Transl: Leitfrage 7: Wie kann die Wissenschaft besser zur Deutschen Nachhaltigkeitsstrategie beitragen?

<sup>3</sup> See Attachment 1



regularly meet or work together. Each session was dedicated to discussing a particular aspect of sustainability politics (the exact topics are listed above), and after each session, a summary report was formulated with key recommendations for policymakers. In this sense, we can state that over the years, the preconditions for collaboration were created to enable the development of a common understanding of the problems discussed. The format of the *Beirät dialog* was created to serve as an intermediary framework. Yet such knowledge production requires continued exchange, ideally between the same group of people. This has been a challenge for the *Beirät dialog*, since only one or two representatives of each council could participate in the sessions and because the chairs and members of the councils regularly rotate. To secure continuity, the intermediary decided, for example, to extend invitations to representatives of the secretariats of the councils too. In this sense, we conclude that the *Beirät dialog* reached Phase 1 (see Table 1) which precludes creating the preconditions for collaborative problem framing and building a collaborative research team.

Looking further, we saw that although in the first 2 years, especially within the in-presence-sessions, a multidisciplinary team of researchers from a broad range of policy fields came together, and very actively and constructively engaged in the debate, we are hesitant to speak of a co-creative communication happening or being induced by the dialogue events Phase 2 (see Table 1). On the one hand, the participating councils reported upon an increasing number of collaborations among them at the dialogue events and many of them also took upon overarching topics in their works, e.g., the Council on Integration and Migration examined the impact of climate change on migration patterns in its 2023 annual report. When the intermediary invited the councils to provide recommendations for the revision of the German sustainability strategy in 2019, however, the final report coming out of this meeting consisted of a collection of commentaries and recommendations by individual councils or members and only one joint statement by two councils.

This then brings us to the third phase of (re-)integrating and applying the co-created knowledge (see Table 1) and the role of the intermediaries and intermediary of the *Beirät dialog*. In this sense, the councils believed that they would receive more public attention and would be able to create political clout if they communicated the collaboration results jointly to decision-makers. Following this, in an open letter, the participants invited the former minister of state to a reciprocal exchange about how to make scientific policy advice more accessible and useful for scientific advisors. In this case, the intermediary of the *Beirät dialog* together with the initiating councils supported the follow-up on and coordination of these initiatives and both letters received a considerable number of signatures that were affiliated to a broad range of councils. Yet in both cases and albeit the

back-up they received, the official reaction remained little and the communication rather one-sided.

Based on this, we conclude that the *Beirät dialog*, although designed as a co-creative format, did not succeed in proceeding further than Phase (1) and partially Phase (2) that foresee a collaborative problem framing, building a collaborative community from different fields and the support of intermediaries. All other aspects, like the co-creation of truly integrated solution-oriented knowledge or the application of these outputs in a recursive manner and integrating the feedback from politicians and the government, may have happened but could not directly be observed during the meetings or in the direct results from the meetings. In the next two parts of this paper, we look in detail at the main challenges that occurred throughout the process of setting up the *Beirät dialog* and deduce some measures that can be applied to improve setting up such formats for transdisciplinary collaboration in the future.

### Key challenges in setting up a dialogic advisory format

In addressing the second research question (RQ2), we identified three key challenges that occur on the science-policy interface when advising on German national sustainable development strategy:

- Challenges in abilities to integrate knowledge and reach consensus
- Challenges in creating incentives for researchers to engage in advisory processes
- Challenges in matching aspirations and reality of engagement with broader society

In the following, we will briefly describe how each of these challenges manifested itself during the setup of the *Beirät dialog*. In each case, we share not only our own observations, but also show how participants anticipated these problems. These findings are based on our document analysis and the participant observations of the bi-annual meetings of the *Beirät dialog*.

### Challenges in abilities to integrate knowledge and reach consensus

In Germany, the adoption of the 2030 Agenda/SDGs and their translation into a national sustainable development strategy led to the development of a rather elaborated institutional implementation architecture (see Fig. 1). Despite these elaborate structures, without a clear mandate given by the German government (see dotted line in Fig. 1), several challenges occurred when setting up the Science Platform and the *Beirät dialog*.

First, since the very first meeting in 2018, almost all participants embraced the space for exchange that the *Beirätedialog* had created. Yet some participants did not see the need for knowledge integration and argued that it was sufficient to draw linkages from the individual councils' works that in some cases already made reference to the 2030 Agenda/SDGs and in most cases already resulted from collaboration among the councils' members. We draw this conclusion after following the discussions during the *Beirätedialog* in 2019 where some participants argued that fruitful scientific debates build on the notion of "agreeing to disagree" and that the consensus reached in such debates may be used by politicians to preclude democratic debate or ex-post to legitimize unpopular decisions. One participant also claimed that too much integration and agreement would make the Agenda 2030/the SDGs and the German national sustainable development strategy "apolitical" in the eyes of politicians, so they would not be inclined to take it on as their own project, in particular, during elections. Others instead argued that joint positioning in areas where there is a great need for action and where common understandings exist may considerably increase the leverage and clout of scientific policy advice. In some cases, the willingness to collaborate was impeded by participants lacking such prior experience and did not feel encouraged to leave their area of expertise and moreover did not have a mandate to provide advice to other ministries. Eventually, some participants argued that truly integrating different expertise and finding consensus was too time-consuming to be worth tuning down individual claims and positions. At times, then it seemed easier for them to engage in the discussion on common issues arising from their role as scientific councils rather than on questions about sustainability politics. When the dialogue meetings focused on a certain topic, experts on these topics participated. For example, in 2021, members of the scientific council to the ministries of finance took a leading role in the meeting on "Finance as a lever of transformation" and in the meeting on "Jurisdiction as a lever of transformation" legal experts within the councils took part.

The potential change from the usual bilateral mode of cooperation between the individual advisory councils and "their" respective ministries to one where several advisory councils consolidate their expertise and collectively provide it to other than "their" respective ministries was met with hesitation by some council representatives. Partly this was because of the principle of departmental responsibility in the German constitution (in German: Ressortprinzip) and resulting limitations of the mandates of the councils. Frequently however, it was also stated that collaboration requires a lot of resources and coordination and would pay off only if there was a demand or mandate given by the government to do so and if there would also be recipient structures for such advice on the side of the government

that could—by their mandate—act upon it. Whereas the willingness on behalf of the participants to collaborate improved and trust was built after the second and third meetings when participants had become more familiar with each other and with the 2030 Agenda/SDGs and the German national sustainable development strategy, some of the obstacles to collaboration remain. Besides the foreword and conclusion of the report from the dialogue meeting in 2019 stating that the *Beirätedialog* should become a format that delivers advice and should "motivate scientific councils to pay attention to the German sustainability strategy and support inter-agency cooperation for necessary change processes," these ambitions have not translated neither into a clear mandate by the government nor a self-defined governance model for the *Beirätedialog* yet.

### **Challenges in creating incentives for researchers to engage in advisory processes**

The challenge of how scientific advice is valued by the political but also by the scientific community itself was one of the core themes of the debates from the very beginning and at the third annual meeting in 2020—this issue was taken on by the intermediary that dedicated one round table to the question about how to improve the conditions co-creative communication. Based on the observation of the discussions during these meetings, we identify two types of incentives: rewards—incentives that could motivate to engage in such communication as reputation credits or financial remuneration—and acknowledgement—which presumes that the value of advice is somehow recognized by policymakers.

Speaking about the first one, in the case of the *Beirätedialog*, most participants shared that they engage in their councils' advisory work pro bono, meaning that their main occupation continues to be teaching and research at their universities and research centers. Their engagement in advisory work was argued to be backed by their individual intrinsic motivation and personal willingness to invest their free time. Only very few of the participants stated that they receive compensation for their advisory work as chairs or members of the councils. Subsequently, this led to a very disparate picture, where some members can and are more incentivized to engage in time-consuming feedback loops or more generally in additional inter-ministerial supervisory and others are not. Moreover, the resources available to support their advisory work are very unequally distributed among the secretariats of the councils: while some of the participating councils have large memberships and well-staffed secretariats, others have less than ten members and down to only one employee in the secretariat working part-time. Also, it was stated that those who engage in scientific policy advice indirectly are being punished, because they have less time for their actual academic work.

Taking up on this discussion, one participant proposed to establish an extraordinary professorship for academics to enable them to focus on advisory work. Other participants called upon universities to grant scholarships to young researchers to incorporate science communication into their careers from early onwards. Regarding their councils, participants proposed to improve the conditions for their secretariats' staff, arguing that continuous knowledge transfer requires long-term contracts and lasting support structures. Adding to this, others highlighted the need to improve the councils' resources and capacities so they not only compile the findings of the research that members conduct for their universities and institutes but can do their own (empirical) research as councils and engage members in co-creative communication.

Another incentive for scientists to engage in advisory activities is the acknowledgement of their contributions to policymaking. Already in the very first meeting, when all councils introduced their mandates and how they interact with and communicate their advice to the government, it became clear that this communication is rarely recursive. Only one of the participating councils stated that the government is obliged to read their report and respond to it. Regarding their potential role in providing advice on the German sustainability strategy, several participants of the third meeting in 2020 voiced their wish to receive feedback from policymakers on what kind of advice works and what does not and how their advice can be developed and strengthened to better feed into the advisory process. By this token, some participants wrote an open letter in which they invited the government to an open exchange about their contribution to sustainability politics (Offener Brief Austausch Beratungsergebnisse 2020) emphasizing the need for recursive dialogue and feedback on their work: "We therefore suggest that, following the evaluation of the consultations, the federal government to discuss the results in a dialogue with the contributors, and provide feedback on how the recommendations were received and processed, how they should (or should not) be incorporated in the outcome, and why. This could provide deeper insights for the scientific community, but also for policymakers themselves, as to where hurdles and obstacles lie, but also as to where prospects and opportunities for a more determined implementation of the necessary key transformations lie."

As an attempt to address the issue of lacking acknowledgement of communication activities in German HEIs, the intermediary of the Beirätedialog brought together the councils with the president of the Association of universities and other higher education institutions in Germany. The acknowledgement of communication with non-academic publics in research is of course a systemic problem that has been discussed over and over in the last decades. The dialogue that has been facilitated within the Beirätedialog can

only create a small impulse for future change, but still, it proved to be valuable for both sides—at least to raise awareness of the described problems. In order to set a start in improving the conditions for co-creative communication in policymaking, the Beirätedialog offered to collect information about the participating councils' resources, needs, and suggestions on how to improve their situation and hand it over to the government in a centralized manner. These issues have been put on the agenda for the second funding period of the Science Platform and the Beirätedialog. Encouragingly, in the coalition agreement of 2021, the German government proposes to strengthen the role of the scientific councils and guarantee their independence. There may be opportunities for the Beirätedialog to follow-up on this agenda and discuss whether and how the government has acted upon this proposal and get participants' opinions on how the counsel could be strengthened from their perspectives.

### **Challenges in matching aspirations and reality of dialogic engagement with broader society**

Beyond direct communication with decision-makers at the science-policy interface as part of a "whole-of-government" approach, the German sustainability strategy also follows a "whole-of-society" approach. Moreover, civil society representatives were not consistently invited to the Beirätedialog meetings and not all councils included members from the fields outside academia; the participation as societal stakeholders was not formalized. This happened to be a problem, because sustainable development is an area that raises strong interest among NGOs and the general public. Holding all meetings under the Chatham Rule and restraining from public communication raised a sentiment of distrust among those societal actors that were not included properly.

Since its first meeting in 2018 on only two occasions, the format facilitated dialogue with civil society representatives: The first time an in-depth discussion between representatives of two councils and practitioners, young scholars, and other scientists on the interrelationship between the environment and health, in a special dialogic format called "Beiräte im Gespräch"<sup>4</sup> that happened online and in between the regular meetings in 2020, at the beginning of the pandemic. A second time a civil society representative was invited to one of the biannual meetings on the topic of "Jurisdiction as a lever of transformation" in 2021, as a spokesperson for the German chapter of the Youth climate-movement Fridays-for-Future, one of the petitioners in the decision of the Federal Constitutional Court on the Federal climate Protection Law 2021. This lack of facilitation of transdisciplinary dialogue through the format, the Beirätedialog, however, was

<sup>4</sup> Conversation among councils.

explained by the fact that within the institutional implementation architecture of the German Sustainable Development Strategy, various other fora and dialogues already put an explicit focus on getting civil society, interest groups, and broader society involved, for example through regular meetings of the so-called Dialogue Group (see Fig. 1) prior to each meeting of the State Secretary Committee on Sustainable Development or through online consultations.

### Lessons learned for setting up a dialogue format at the science-policy interface

Based on our analysis, we highlight three major lessons that could be of interest to others who are seeking to set up a co-creative communication for the development and implementation of German national sustainable development strategy in other countries or strategy-contexts that require a comprehensive, e.g., “whole-of-government,” implementation approach. In this part, we address the third research question (RQ3) and derive recommendations that may help in designing (transdisciplinary) dialogue formats on the science-policy interface. We highlight the following lessons learned:

- Providing clarity continuously matching and adjusting expectations
- Lowering transaction costs while keeping participants engaged
- Strengthening the role of intermediaries in linking science and policy

### Providing clarity, continuously matching and adjusting expectations

The Beirät dialog brought together representatives from different advisory councils at one table. Nevertheless, the range of advisory documents produced was very diverse and there is no clear definition of what constitutes a “policy paper” or “research report,” meaning that each organization is free to define it by itself. During our observation, we found that this diversity can become a problem, because different political contexts require different types of knowledge—in some cases, policymakers wish for a presentation of the current state of knowledge on a topic or a meta-analysis; in other cases, they request very specific and precise recommendations for action. As noted by one participant, the time scope for analysis may also differ: “Furthermore, the scientific debate should not be limited to the existing implementation architecture<sup>5</sup>, solutions, approaches and processes, since an important contribution lies in asking more fundamental questions at the right time.”

<sup>5</sup> For the German Sustainable Development Strategy: see Fig. 1

One lesson learned thus is that there is no common understanding of the types of knowledge that circulate on the science-policy interface. This might hamper communication when in one case, an objective picture of the current state of knowledge on a certain issue is expected, and in another, there is demand for clear normative recommendations. Clarifying what type of expertise or what document is expected can improve mutual understanding between policymakers and researchers and make the communication process more efficient.

In our data, we found five main types of knowledge that were referred to in the reports and meetings (see Table 3). We believe that this is not an exhaustive list but it may serve as an orientation for the overall communication process at the science-policy interface. However, the question of what types or formats of evidence circulate on the science-policy interface is of interest for further research. We can state that even within one country and one case, there are different understandings of advisory content and the document formats—for example, there is no clear understanding of what a policy brief contains, whether it is an overview of the current state of expertise on an issue, or whether the organization and the authors should position themselves in it. This picture gets more diverse on national and international levels where many advisory organizations and teams deliver expertise in different forms. This is why we believe that further inquiry is needed to provide a comprehensive overview of evidence-types and formats of advisory documents that are in place on the science-policy interface.

Although the open letter from the councils to the chancellery received no response, it initiated a discussion on how to better match expectations of the scientific—policymaking co-creation process. After such consultations, a system was established to keep the council representatives in the loop about any movement and progress in the policy process as well as new questions that emerged in this process. The Beirät dialog was able to frame its expertise in a way it was expected from governmental representatives when consultations were held by the government on the revision of the German sustainability strategy. These interlinkages helped to produce very precise recommendations that were then followed-up upon and discussed with policymakers.

### Lowering transaction costs while keeping participants engaged

The creation of a space and a format for co-creative communication at the science-policy interface for the implementation of the NSDS has been an innovation in the German advisory landscape. The Beirät dialog became a recurring event from the exchange between researchers and policymakers with fixed procedures. Our observations and experience show that before each meeting participants were

**Table 3** Advisory knowledge types

Knowledge type	definition	example
State of knowledge overview	Comprehensive representation of the existing scientific knowledge on a certain problem. The distinguishing characteristic of this knowledge type is that it does not contain normative content	“At the same time, the empirical basis for many family law decisions is outdated and there is insufficient research from the German-speaking countries on the consequences of corresponding models and judicial decisions. A just legal system requires equitable solutions that are compatible with the respective living conditions and with empirical findings in order to also enable child-friendly participatory justice” (Advisory Council Dialog 2019 Report, p. 10)
Assessment	Evaluation of current policies or actions	“The Council also does not understand the reference to final energy consumption, because primary energy consumption is ecologically relevant. Against the background described for SDG 13.1.a, however, a concrete, quantitative target oriented towards primary energy consumption appears to be inadequate for the transport sector by 2030 and could even have a counterproductive effect” (Advisory Council Dialog 2019 Report, p. 22)
Risk communication	Communication of dangers that are related to the current state of affairs.	“In the event of a long-term decline in the German population, which cannot be ruled out, a reduction in settlement density would be difficult to avoid. For this to happen, the settlement area would have to decrease at least proportionally to the number of inhabitants, and the residential area per inhabitant should not increase” (Advisory Council Dialog 2019 Report, p. 28)
Call for action	Particular recommendations for addressing a challenge	“Thirdly, transformations towards sustainability are processes in which multiple path dependencies must be overcome. Old technological patterns have to be questioned and broken up, especially from the fossil to the zero-emission economy” (wpn2030 Reflection paper, p. 5)
Solution	Offering a precise solution to an identified problem	“The travel time ratio of public transport travel time / car travel time could be a more suitable indicator for the choice of transport mode. In addition, it would be necessary to reduce the travel time ratio public transport/ car for 85% of the population to less than 1.5 and to offer at least one connection per hour” (wpn2030 Reflection paper, p. 37)

regularly contacted by the intermediaries to provide input on current themes and development in their respective policy fields, sharing information about what topics would generate broader interests amongst many councils. Individual conversations were organized in order to explain the format and overarching theme. In later meetings, this preparation did not have to start from zero as the participants and the intermediaries became familiar with the main procedures, which leads us to the assumption that recurring formats build trust among participants and make the advisory process more efficient and less time-consuming.

However, increasingly low transaction costs alone do not suffice to keep researchers engaged in a format over a longer period of time, and especially not if—as in the case of setting up the Beirätedialog—participation is voluntary and only two times a year without a clear mandate. For this reason, the intermediaries of the format proposed several ideas

for advancing the platform but also the Beirätedialog as a key format with a clear political mandate. One participant of the annual meeting in 2020 emphasized the importance to have a political request and mandate: “Consensus building by the councils on key recommendations regarding the German NSDS as a central strategy seems to some degree be required to get things moving [...], but this also requires that the demand for such integrated advice is made more explicit from the side of the government and that parliamentary and administrative responsibilities are restructured and reformed in a way that the recipients of such advice can also take it into account and act upon it.” One key lesson from the setup and first phase of operation thus is that such formats should offer spaces for participants and intermediaries to continuously reflect on the need to adjust not only the scientific advisory but also the recipient structures for policy-makers and administration to be able to act upon it.

## Strengthening the role of intermediaries in linking science and policy

As described above, the annual meetings present only one step in the advisory process; a lot of the work is being carried out behind the scenes amongst all participants. In practice, this leads to different roles and responsibilities for intermediaries and for digital platforms and tools. The necessary abilities relate mostly to the processes of preparing, integrating, and translating academic knowledge. In the integration phase, these arguments and ideas were exchanged and discussed during the annual meetings and key points were summarized in the reports by the secretariat of the Science Platform 2030 afterwards, without the need for compromising or complementing each other.

We could observe the importance of intermediaries of the *Beirät*dialog as well as the council's secretaries, professional intermediaries, who have an understanding of both the academic and the political side of sustainability politics, and can help connect the dots between scientific expertise and political needs. Skilled intermediaries support science communication as their major task is to brief and inform different actors on the science-policy interface of current political trends in their respective areas, inform about conflicting interests and opinions, and sketch why, where, and when in the process input is needed from both, science and politics. In practical terms, intermediaries continuously guide such dialogues by "tuning in" participants towards a fruitful exchange. In this sense, continuity could be provided by such formats through comprehensive science communication training as part of university curricula or particular education courses focusing on the skills and knowledge necessary to facilitate an advisory process.

## Discussion

In comparison to other countries and institutional contexts, Germany has quite a long tradition of sustainable development politics and a rather established and elaborate institutional architecture designed to coordinate this political area of action. At the same time, Germany has an equally longstanding and elaborate institutional system for communication at the science-policy interface, which widely acknowledges the necessity to implement scientific evidence into political decision-making and set up various institutions to provide such advisory functions. And still, even under such seemingly promising conditions, both systems faced considerable problems in providing coordinated advice on the German national sustainable development strategy.

The answer to our first research question—that is to what extent the *Beirät*dialog can be regarded as a co-creative form of communication at the science-policy interface—is

basically rather negative than positive. Looking at the design principles of the *Beirät*dialog and its dynamics over time, we can say that although it moved closer towards an "ideal" co-creative or transdisciplinary form of communication in the course of its activity, it did not yet succeed in reaching a mode that would truly allow for a co-creation of knowledge and its integration into decision-making yet (Lang et al. 2012).

None of the three key phases could be fully addressed during the work of the *Beirät*dialog. The first phase presumed the creation of a shared understanding of the problem and a collaborative strategy to form solutions largely succeeded because of the intermediaries' preparation. They served as "multipliers" who communicated the 2030 Agenda and the German National Sustainable Development Strategy which appeared to be a new area for most councils. The latter two phases—co-creation of knowledge and reintegration in political solutions in conformity with the 2030 Agenda—had not been reached. Still, we regard the format to be innovative because for the first time, such a number and diversity of advisory councils were brought together with the aim of resolving contradictions and finding synergies on and formulating evidence-based recommendations on the implementation of the German sustainability strategy. Analyzing these interactions gave us valuable "behind the scenes" insights of transdisciplinary exchange and helped to figure out what additional measures are needed apart from just offering a space for dialogue between different disciplines and policymakers.

The need to search for alternative strategies for science-policy advice and the creation of a new format in an existing advisory architecture practically mirrors the criticisms voiced in recent decades by scholars who pointed at the shortcomings of linear models and called for the need for more interactive models instead of the science-policy interface. Co-creative communication at the science-policy interface is not a new phenomenon; the debates around these issues have been going on for decades among academics. Yet linear science-policy advice is still in place, even in formats that are by appearance developed to collectively produce expertise. We see that although researchers from different advisory councils, with different disciplinary backgrounds worked together in a shared space and encountered policymakers, their advice (as our analyzed reports show) remained linear in the absolute majority of cases.

First signs of collective knowledge production became visible in the subsequent process after the intermediary actively engaged and offered training, motivation, and writing support. Based on these insights, the advisory mechanism proposed by the *Beirät*dialog gives a hint of how to address the call for a more interactive science-policy interface that combines and processes multiple and diverse sources of expertise (Funtowicz and Ravetz 1993; Gibbons

1999; Nowotny 2003). It is our impression that academic debates around newer forms of science-policy interactions lack constructive criticism and reflection on whether and in what way they improve “interface practices.” We see that the sole act of providing space for exchange cannot be regarded as a remedy to all the pitfalls of linear science-policy advice that still need to be taken into account. With our analysis, we would like to contribute to a constructive and critical discussion about the added value of co-creation processes and opportunities. We noted that an ideal-typical exchange does not automatically evolve only by bringing all relevant parties together, it needs to be fostered. In this sense, we highlight the main challenges that arise in setting up a trans-disciplinary exchange even when researchers from different disciplines are brought together and the formal connection to policymakers is established (RQ2). According to our data, professionalized “interface practices” might help make this exchange more productive. Based on our learnings, interface practices can improve with (a) a more diverse and unified definition of different knowledge types for communication between researchers and policymakers, (b) a clear understanding of the skill-set for intermediaries who provide and manage such “interface practices,” and (c) concepts for the educational preparation of all parties engaged in the communication on the science-policy interface.

Several of our identified knowledge types—especially Calls for Actions and policy proposals—include an explicit expectation towards researchers to come up with normative statements, beyond an independent presentation of their existing expertise on an issue. If researchers answer this call, they automatically transform from “pure” scientists into “issue advocates” or “honest brokers” (Pielke Jr 2007; Jasanoff 2004b). This arrangement might affect the legitimacy of science-policy advice and weaken the credibility of experts from science because science is expected to be free of any interests and influences. At the same time, based on a constructivist understanding of research, knowledge cannot be objective as it is provided and shaped by people; this is why separating research from non-academic actors is not the way towards objectivity in knowledge and policy proposals. A way to prevent researchers from becoming politicized and transforming into “issue advocates” is bringing together as many perspectives as possible on one issue and presenting them transparently to the public and decision-makers. This does not guarantee that the instrumentalization of knowledge will be fully prevented but marks a first step towards a more diverse and transparent picture of expertise (Nassehi 2021). Formats like the Beirät dialog, forums that bring together many expert perspectives who work on similar issues, can help reveal conflicting findings and contribute to a more comprehensive and objective representation of existing knowledge. Presenting all existing expertise through a single channel (in our case, collective reports and face-to-face

communication between intermediaries and policymakers) made it more difficult to cherry-pick scientific arguments to underpin one’s predefined political line of action. It leveled the playing field for scientific information to reach people equally in a controlled setting. When analyzing the advice gathered via the Beirät dialog, we could not detect any threats of “expertocracy” or democratically questionable influence of experts on decision-making (Bogner 2021; Hirschi 2021). This however was hinted at by the anecdotal evidence of one response by a representative of a ministry seeing the advice provided by one council as being “too scientific” when he saw the strategy in fact as being a political instrument. Apart from this, we did not observe any political influence, which may be the reason for the lack of observable reactions from policymakers.

With this said, we would also like to note that co-creative communication at the science-policy interface is not possible to the same extent in countries with authoritarian regimes as in democratic countries. Academic research acts as a critical voice in its dialogue with policymakers and it is not possible to present and represent academic viewpoints without such basic rights as freedom of speech or scientific autonomy. In Germany, with its rather established institutional architecture, much liberty is given to science to maintain a critical view. Academia has proposed fundamental questions about the German sustainability strategy and how it may in fact avert attention from a multitude of immediate crises and pressing issues that currently challenge the prospects of achieving the 2030 Agenda/SDGs, either globally or in Germany. Science platforms need to adapt to these concerns and sentiments. In countries that are more restrained by the current crises, or where science and broader civil society enjoy much less freedom, science platforms—if they exist at all—face much bigger challenges to preserve academic freedom and present independent scientific advice.

## Conclusion

When addressing complex problems, scientific knowledge is considered an indispensable resource for decision-makers. In this paper, we analyzed the experience of the Beirät dialog, which is an advisory format launched to bring together established scientific advisory councils to ministries and integrate their expertise before transmitting it further to policymakers. Notably, this format was developed in the area of sustainability politics—an area that has a long tradition of interdisciplinary research and where many interactive and co-creative advisory formats have been active over the last years. Our attempt was to look more deeply at the communication process and find out how close it is to a co-creative communication. Our results show that despite bringing together experts with

different disciplinary backgrounds into a shared space, despite ongoing lively consultations among them, their final expertise was not integrated or adapted to each other, and thus, we cannot state that it was developed collectively. While this may indicate that decisions are formulated at a different level, the observed lack of scientific adaptation led us to a closer examination of the obstacles encountered in the setup of such an advisory process. Through continued observations and interviews with the participants of the Beirätedialog, we developed findings that should prove useful for the setup of similar advisory processes in the future.

Our case study emphasized the importance of intermediaries in the process of co-creative communication at the science-policy interface. Apart from bringing together experts from multiple fields, a major effort is the design and continuous redesign of such advisory formats in close exchange with the participants. The Beirätedialog has taken its first steps along this path and in its first funding phase served as a successful example of innovative democracy in its co-facilitating format as a multiplier of the 2030 Agenda and its SDGs. Currently, the whole 2030 Agenda stands with one key recommendation left of the GSDR 2023 agenda which emphasizes stronger capacity-building on both sides—research, science-policy advice, decision-makers, and administrators—in order to bring about transformations in knowledge and policy. The case of the Beirätedialog brings up several directions that are interesting for further research in the context of policy and knowledge transformations. One of which is the question of how communication on the science-policy interface can tackle the two-fold challenge of preserving scientific independence and diversity, while simultaneously creating a shared and transformative understanding of science-based actions that are required to address the 2030 Agenda. The research produces actionable suggestions aimed to formulate transparent and effective communication, clear governing structures for the consolidation of many different viewpoints, and a continuous and flexible adaptation of knowledge structures to the demands of all participants, presented in a format designed for subsequent public review.

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**Data Availability** The interviews and reports referenced in this article are openly available and included as part of the research material. Our field notes from the advisory events that were held under the Chatham House rule are not shared publicly, because the participants did not give written consent for their data to be published.

## Declarations

**Conflict of interest** The authors declare no competing interests.

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