

Workshop Report

Perspectives on Science Communication

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Received: 10 Sep 2024 | Published: 04 Oct 2024

Reviewable

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Citation: Kirschke S, Glahe J, Ahrend C, Brandt M, Hecker S, Krohmer J, Lentz S, Marzinek N, Molthagen-Schnöring S, Stewart M, Voigt-Heucke S (2024) Perspectives on Science Communication. Research Ideas and Outcomes 10: e136750. <https://doi.org/10.3897/rio.10.e136750>

Abstract

Diverse actors within and outside the academic system increasingly call upon scientists to engage with the public through science communication as part of their academic work. This raises the question of how these actors' demands can and should be met in practice. At the conference on "Perspectives on science communication", which took place on 27 May 2024, at the *Museum für Naturkunde in Berlin*, interested scientists and communicators from the Leibniz Association came together to reflect on the strategic development of the field of science communication. The focus was on the exchange of realistic goals, important actions and the actors responsible for the further development of the field and practice of science communication. These three topics were discussed in the context of a keynote speech and a panel discussion, as well as with regard to specific forms of interaction between science and society, including informative, dialogic and participatory formats of science communication. The discussions reveal a diversity of goals scientists can aim for, but also a multitude of action areas that need to be addressed by a number of actors to achieve these goals. Goals particularly hinted at an increasing, yet-to-be-defined quantity of communication, including contents related to informing about facts in societal debates, engaging in democratic dialogue and

encouraging participation of citizens in research to increase innovation in science, but also process-related goals such as building partnerships, communicating transparently or providing support for scientists. Action areas to achieve these goals are diverse and regard strengthening recognition and reputation, supporting and protecting scientists, providing temporal and financial resources for science communication and changing researcher's attitudes. In terms of actors, conference participants hinted at the diverse roles of different actors, focusing the discussion on actors in academia, politics and administration, civil society as well as boundary organisations such as the media as key actors to further advance the topic of science communication. This conference report elaborates the results related to these three topics and, thus, creates the basis for an in-depth discussion of the results in Germany and internationally.

Keywords

knowledge exchange, knowledge transfer, public engagement, public understanding of science, science communication, science-policy

Introduction

Countries across the globe aim for transformations towards more sustainable and resilient societies. In the course of these transformation processes, all countries increasingly face complex problems resulting in social changes and crises. Examples are widespread and encompass issues such as major disease outbreaks, environmental degradation, social conflicts and risks associated with emerging technologies. To address these complex problems, scientific evidence on the respective root causes of these problems and their solutions from the different disciplines in the life sciences, natural sciences, social sciences and engineering sciences, as well as their partners in the public, private and civil society sectors is key. However, it is evident that, particularly in the context of complex problems, different societal actors, including political decision-makers, businesses or civil society actors, do not always attach high value to scientific evidence since they operate in different fields with their own logics. In part, societal actors also do not necessarily trust scientific evidence or do not share a joint understanding of valid methods and processes of knowledge generation. Conversely, societal actors do not necessarily participate in research activities, therefore reducing potential benefits that can arise from participation for open innovation.

Against this background, scientists and their institutions are increasingly called upon to engage publicly through the means of science communication as part of their academic work. Examples are widespread and include calls for action in a number of countries such as the UK, Australia or South Africa. In Germany, this is also a political will as recently demonstrated by the adoption of the proposal of the coalition of three parliamentary groups of the German Bundestag – the Social Democratic Party of Germany (SPD), the Green Party (BÜNDNIS 90/DIE GRÜNEN) and the Free Democratic Party of Germany (FDP) – on systematically and comprehensively strengthening science

communication in Germany (Deutscher Bundestag 2024). It is also a practical reality in Germany since surveys have shown that more than two thirds of the researchers in Germany find that science communication is part of their jobs (WID et al. 2021).

Such demands and actions do not only include calls for a unilateral sharing of evidence, but also a request to communicate on an equal footing and to develop and deliver research with members of society. Examples are the call to regularly share information via traditional and emerging media, to communicate with lay people at workshops, in supermarkets or on marketplaces and to implement joint research using participatory research approaches such as citizen science, community-led research or patient participatory approaches. As a result, information on scientific evidence and processes would not just be shared, but also discussed and jointly developed, which may strengthen society's understanding of scientific processes (Bonney et al. 2016) and increase trust in scientific outcomes just as well as innovation in science (Stilgoe et al. 2014).

However, researchers and communicators continuously discuss how this call for science communication can be implemented in practice given the existing societal developments and framework conditions for academia. On the one hand, liberal democracies have increasingly been challenged by autocratic tendencies, jeopardising free scientific research and evidence-informed societal problem-solving. An example is the development in Hungary as a recent report of the European Parliament on the 'State of play of academic freedom in the EU Member States' suggests structural violations of academic freedom including violations of freedom to research, to teach and of academic expression (EPRS (European Parliamentary Research Service) - Scientific Foresight Unit (STOA) 2023). On the other hand, science communication as a potential entry point for addressing this issue may face boundaries and path dependencies in the German research system including bureaucratic hurdles, a lack of institutional support and entrenched academic traditions that prioritise scientific publications over science communication activities. Against this background, there is an urgent call for further reflection on goals, actions and actors to advance science communication as a tool for evidence-based societal change. Which goals can realistically be pursued? Which support is needed? And who needs to act to advance science communication practices of researchers? Answers to these questions are key in order to further connect normative goals related to science communication with practical implementation of specific approaches in Germany and internationally.

At the conference "Perspectives on Science Communication", which took place on 27 May 2024 at the Museum für Naturkunde in Berlin, researchers and science communication professionals jointly reflected on the strategic development of the field and practice of science communication, putting at the centre the following three guiding questions:

1. What can we want? What are both desirable and realistic goals for the exchange between science and society?

2. What do we need to do? What adjustments need to be made in order to achieve these goals for the exchange between science and society?
3. Who needs to act? Who is needed to implement changes at the interface between science and society?

Being aware that science communication can be subject to conceptual stretching, this conference clearly defined science communication in its keynote. Science communication was here understood as the communication of scientific content and processes between the scientific community, on the one hand, and actors outside the scientific community, on the other hand. This includes a bi-directional communication of scientific content and processes and, thus, includes different types of interactions between science and society such as informative, dialogic and participatory formats of science communication (Metcalf 2019 page 46ff., BMBF (Bundesministerium für Bildung und Forschung) 2021 p. 55). It also includes various target and interaction groups, such as different publics in society, politics and businesses (Schäfer et al. (2015). It excludes, though, communication of contents and processes within the academic system, such as the publication of research results in academic journals and their presentation at scientific conferences (see, for example, Schäfer et al. (2015):13). This specification goes in line with current trends in the understanding of science communication within larger research entities and their networks in Germany and takes into account the key challenges scientists face with regards to its trust relationships and acceptance in society.

Funded by the Strategy Fund of the Leibniz Association, the conference focused on the community of researchers and communication professionals of the Leibniz Association. The Leibniz Association is one of the major research associations in Germany, including about 11,500 research employees in the life sciences, natural sciences, social sciences and engineering sciences, employed at 95 research institutes across Germany (Leibniz Association 2024). This interest of the Leibniz Association in engaging in this practice of science communication particularly goes back to the Leibniz Association's maxim *theoria cum praxi*, hinting at the need to pursue research topics and questions that are relevant to society. In the past, this maxim has been translated into an advanced concept of knowledge transfer, understanding transfer as a conglomerate of diverse forms of interaction with society, including informative, dialogic and participatory modes of interaction (Leibniz Association 2019, Altinalana 2023). Given the maxim of *theoria cum praxi*, this concept of knowledge transfer shall be adapted continuously to future needs and framework conditions. Accordingly, discussions about the state and future of science communication are continuously relevant (Leibniz Association 2019).

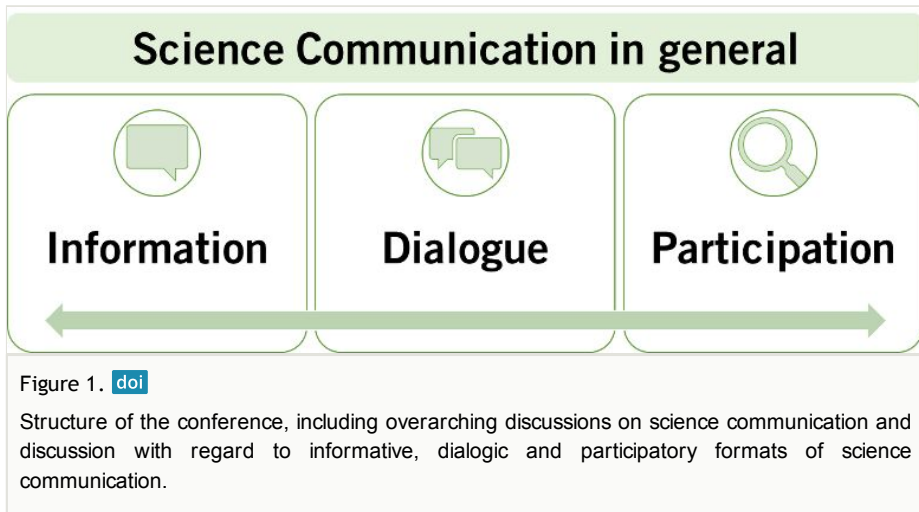
At the conference at the Museum für Naturkunde Berlin, multiple perspectives were brought together, ensuring that diverse ideas on the future development of science communication are considered. First, the conference aimed at including diverse institutions of the Leibniz Association, particularly, but also invited external experts on science communication for an in-depth exchange. At the conference, a total number of 118 participants from 58 entities discussed future perspectives on science communication. A total of 97 out of these 118 participants were affiliated with 44 entities from Leibniz entities and 21 participants were affiliated with 12 guest institutions, such as

the Federal Ministry of Education and Research, the National Institute for Science Communication and partner universities. Second, the conference organisers invited both science communication professionals and researchers to discuss perspectives on science communication, assuming different understandings of potential goals and challenges associated with science communication within these two groups of participants. Third, the conference discussed science communication perspectives, based on both experiences of the participants and a survey amongst Leibniz Institutes which preceded the actual conference.

In terms of structure, the conference used a funnel approach, starting with more general perspectives on the three guiding questions and continuing with more specific discussions of the guiding questions with regard to different formats of interaction with society (see Suppl. material 1). The general discussions were guided by a keynote speech by Prof. Stefanie Molthagen-Schnöring, introducing key insights from science and practice with regard to the goals, challenges and relevant actors for science communication. This keynote was followed by a panel discussion with Prof. Dr.-Ing. Christine Ahrend, Prof. Sebastian Lentz, Prof. Stefanie Molthagen-Schnöring and Dr. Roland Philippi - thus including members from academia and public administration, representing knowledge from both the Leibniz Association and beyond, as well as knowledge on different types of science communication and different disciplinary backgrounds. Based on these more overarching discussions, the guiding questions were further interrogated in three separate working groups on three interaction formats between science and society. According to three acknowledged models of science communication (Metcalf 2019: Table 1, page 46ff.), these working groups referred to informative, dialogic and participatory formats of science communication. These three formats generally represent different degrees of involvement - from low levels of involvement focusing on unilateral sharing of scientific knowledge with the public, via middle degrees of involvement focusing on bi-directional information sharing, to high levels of involvement including joint research. They can further be combined in various ways, hinting at a multitude of communication models in practice. A final reporting back session then served to share key insights of the working groups discussion in the plenum to identify both similar and diverging insights across interaction formats.

Fig. 1 below identifies the structure of the Conference.

In the following, we present the conference results with regards to the three guiding questions, including both overarching answers, as well as specific answers related to the three communication formats. These results are based on an in-depth analysis of the presentations of the conference, recordings and respective transcripts and double codings of all plenary sessions by the first two authors of this report, notes from the participants in the working groups and from the working group leaders, as well as observations from the authors in the different breakout groups of the conference.



Question 1. What can we want? What are both desirable and realistic goals for the exchange between science and society?

Science communication can have a multitude of goals, of which sparking interest in science and research is probably one of the most common. At the conference, we were curious about goals that are not just desirable, but also realistic when it comes to the exchange between science and society. The keynote speaker highlighted here three key goals which were confirmed and expanded upon in the course of the conference.

The **keynote speaker** emphasised three main goals, including fostering understanding, increasing trust and promoting a democratic dialogue. The first goal, **fostering understanding**, hints at creating a better understanding of scientific processes, in particular. Non-scientists are often not very familiar with scientific processes, i.e. the functioning of science. This may go back to a lack of transparent and accessible information and communication on the part of scientists on scientific processes. Therefore, scientists are encouraged to be more transparent about their work by sharing more information with the public. The second goal is about **increasing trust**. While trust in science is (still) relatively high in Germany (WID 2023), some studies also suggest decreasing levels of trust in certain regions and milieux (Reiser et al. 2024). Additionally, a recent European study suggests that various indicators of trust such as competency, integrity, openness and transparency in science score differently: while the public assesses scientists in part as being competent and of integrity, scientists are not necessarily perceived as being open and transparent (Mede and Cologna 2024). Therefore, more open communication about science and scientific processes is a desirable, but also realistic goal for science communication. This is particularly relevant in milieux associated with rather low levels of trust and associated factors such as rather low levels of education and income, with a fear of losing status and in right-wing political ideologies (Mede and Cologna 2024, Reiser et al. 2024). A third goal refers to **promoting**

a democratic dialogue. It is a common understanding in Germany that science needs democracy just as well as democracy needs science. It is, thus, not surprising that most scientists assume that science communication is particularly relevant to promoting open discourses in society (WID et al. 2021). Therefore, promoting a democratic dialogue through the means of science communication is key.

In the **panel discussion**, these goals were further discussed and complemented. The discussion revolved around two types of goals: the quantity of communication effort and the qualitative contents of communication. In terms of **quantity of communication**, there are diverging perspectives between two extremes. On the one hand, some researchers state that the efforts for science communication should be increased significantly, for example, by allocating 20% of working time to science communication in its various forms, which should also be associated with funding for this endeavour. Such an approach is also backed up by an increasing number of scientists who wish to take more responsibility for transformation in times of crisis. On the other hand, others state that there should not be strict, financially incentivised quantitative goals such as a rule of allocating 20% of every scientist's working time to science communication. This would also be in line with current framework conditions in the German research system and its focus on excellence and associated time restraints. This approach goes back to varying interests in science communication in Germany. Various research societies and entities in Germany such as Leibniz, Max-Planck and Fraunhofer may, for instance, put different emphasis on science communication, with the Leibniz Society being particularly interested in communicating with society. Further, qualitative assessments of science communication would be preferable compared to clear-cut quantitative metrics.

Content-wise, the panellists picked up the keynote speakers' call to **foster understanding**. It is an important problem that scientific processes are not necessarily understood by society, specifically by marginalised target groups. Therefore, it is key to foster understanding by the means of transparent communication. This encompasses different aspects including communicating about scientific processes and methods, as well as sharing principles of scientific work, such as the importance of an error culture and the willingness to experiment and to try out new things – all aspects which are key to fields outside academia as well. Such transparent communication would enable positive outcomes towards trust in science, also in situations of conflict – as long as the role of science as the provider of evidence (instead of the role as a decision-maker) is made clear. Closely related to the goal of fostering understanding, the panel mentioned and discussed the goal to **objectify debates**. Diverse actors observe increasingly non-scientific and emotion-led discussions in society. In such contexts, research can contribute to an objectification of discussions by providing and discussing clear evidence regarding the issues at hand. This also includes quick and clear reactions to potential miscommunication and misinterpretation of scientific evidence in society. At the same time, the emotional approach to discussing problems should be accepted and taken seriously by researchers as well, as it is just a given fact that emotions play an important part in current societal and political debates. While these content-related aspects hint at a deficit model of science communication, the panel participants also hint at the **need for**

critical self-reflection. This includes both being more open to new insights regarding their own research questions based on the conversation with the public and the actual role of providing evidence, rather than deciding upon societal questions and respective translations in policy design and implementation.

The **working groups** then discussed the desired and realistic goals for science communication further, taking here the perspective of one specific approach to science communication, including informative, dialogic and participatory formats of science communication. In terms of goals, the three working groups acknowledged that a **diversity of goals** had been discussed, making it difficult to point to a specific set of goals related to any specific science communication method or format. Still, all working groups came up with some key goals using means such as voting for the most important goals. The resulting goals related in different degrees to the goals mentioned in the keynote and in the panel discussion, with the **goals of reputation, fostering understanding and sparking interests** being more relevant for informative formats and goals related to **participation and democratic dialogue** naturally being more relevant in the working groups on dialogic and participatory formats.

More specifically, **working group one on informative formats** identified a large number of **diverse goals** related to different target groups of informative science communication – from brand building and reputation to the sharing of knowledge affecting different parts of society. One recurrent theme was here to **recruit young talents** and the question of how to communicate to get young people interested in science. In addition, highly ranked goals were the **development of comprehensible formats** as well as using **emotions** as a tool for information sharing in science.

The **second working group on dialogic formats** raised questions about **honesty and having a culture of listening and inclusion**, in particular. A first key goal was **productive irritation**, hinting at the goals of breaking out of the science bubble and involving multiple knowledge bases in order to improve the scientific processes and, therefore, also enable more innovative research. A second key goal was to **broaden perspectives on methods of science communication by providing professional support** and sharing firm knowledge on methodologies regarding dialogical engagement. Third, the goal of **evidence-based decision-making**, based on stakeholder involvement was discussed, which should include a mutual understanding of goals and activities based on a democratic dialogue. This is closely related to the goals mentioned above, including fostering understanding, objectifying discussions, as well as participation and democratic dialogue. **Working group three on participatory science communication** has, just as the other groups, **many different goals**, but emphasised, in particular, the goal of **creating experimental spaces**, which is closely related to the goals of participation and democratic dialogue mentioned in the keynote and the panel discussion. This goal of creating experimental spaces included a number of sub-goals, amongst them **creating real spaces for interaction, discovering space outside and experimenting with new spaces of thought**. To this end, there is a need for smart and creative **partnerships**, focusing here on established partners in regions such as schools, kindergartens and civil society organisations that already practise participation.

Question 2. What do we need to do? What adjustments need to be made in order to achieve these goals for the exchange between science and society?

Just as there are multitudes of goals of science communication, there are also multiple actions that should be undertaken in order to achieve these goals. The keynote speaker highlighted here again three key action areas that were confirmed and expanded upon in the course of the conference.

While recognising multiple potential action areas, the **keynote speaker** emphasised three main action areas: strengthening recognition and reputation, supporting and protecting scientists and encouraging the active involvement of citizens through participatory means of science communication. The action area of **strengthening recognition and reputation** hints at the question of how the importance of science communication can be increased within the academic system. The network “Factory Wisskomm”, a science communication network led by the German Federal Ministry of Education and Research, has come up with suggestions for individuals, institutions and organisations related to five fields to increase reputation and recognition of science communication within academia. These fields include the promotion of a science communication-friendly culture (e.g. by appreciating science communication, providing personalised support measures or anchoring science communication at management levels), personnel recruitment and career (e.g. by considering science communication in appointment procedures), personnel development and enabling (e.g. by institutionalising communication experts), governance (e.g. by showing commitment to science communication in mission statements) and resources (by providing time and financial resources, establishing science communication as a performance indicator). Second, the keynote speaker emphasised the **support and protection of scientists**. In terms of support, it is key that all those interested in pursuing science communication activities are supported as best as possible, in particular through further education and training for Pre- and Post-docs. In terms of the protection of scientists, Germany has recently introduced [SciComm support](#), a central contact point for researchers who have experienced hostility towards science including condescending remarks, inappropriate reactions and personal attacks. A third action area addresses the topic of **participation** and, thus, the implementation of diverse forms of participatory science communication (Bessert-Nettelbeck et al. 2023, Gantenberg et al. 2024). Researchers still tend to communicate in a unidirectional manner, hinting at a discrepancy between the interest in and the actual implementation of dialogic and participatory forms of science communication. Participatory science communication is, however, also very important, for example, when it comes to understanding scientific processes to build trust in science and scientific results. Experiencing scientific processes is, in fact, judged as being particularly effective in communicating scientific processes as compared with sharing information about such processes only (Bonney et al. 2016, Suldovsky 2016). Approaching and institutionalising participatory science communication in the existing academic system is, however, challenging and needs to address various bottlenecks, including reaching the various

target groups, addressing power relationships, becoming more inclusive and diverse and finding the relevant resources including time.

The **panel discussion** revolved around similar areas of actions and thereby both affirmed and further developed the arguments provided in the keynote. One key aspect regarded the need to **strengthen recognition and reputation**. It was stated that, within the existing system of excellence, science communication is not highly relevant and can even be considered negative for scientific careers. Therefore, young researchers, especially, rarely follow up upon their interests in communicating with the public. The panellists suggested diverse activities to address this issue. On a European level, revising performance indicators as part of the CoARA initiative was identified. At the national state level, changing guiding papers of overarching bodies such as the *Allianz der Wissenschaftsorganisationen* and accepting diversity in research systems and entities on the part of research evaluators was suggested. At the level of institutions, changing development plans for human resources at institutes was key, encouraging a broad spectrum of activities including science communication. Turning to leading personnel, the discussions called for including and implementing science communication in appointment committees, as well as for encouragement and support by professors and leading scientists to embrace communication, for example, initiating special issues in leading journals in the field or acting as a role model.

Next to this key aspect of strengthening recognition and reputation, the **support and protection of scientists** was also further developed. It was highlighted that scientists not only need to be protected, but also need support with regards to capacities, including access to advanced training and education on how to break down information, regarding relevant science communication formats and their implementation, on how to deal with feedback by the public and how to evaluate science communication activities. Existing offers are provided nationwide (e.g. via *Wissenschaft im Dialog*, *Nationales Institut für Wissenschaftskommunikation (NaWik) gGmbH* or the *Berlin School of Public Engagement and Impact*), but also within the respective entities.

Further, the topic of **resources** was discussed intensively, including temporal and financial resources for science communication in general and for specific formats of science communication. Especially with respect to participatory formats of science communication, there seems to be a significant discrepancy between the appreciation of such activities, on the one hand and their actual implementation, on the other hand, going back to a lack of resources for these resource-intensive formats of science communication. There were various ideas to address this. Generally, there should be more research on the actual impact of specific, resource-intensive formats of science communication, as an additional incentive to implement these activities in the future. In terms of funding, there are already a number of important activities focusing on setting incentives for science communication, such as the recent anchoring of science communication in all funding initiatives of the Federal Ministry of Education and Research (BMBF). In addition to these activities, the German *Pakt für Forschung und Innovation* may implement further their general call for science communication in Germany. In terms of temporal resources, understanding science communication as a

cross-cutting activity, i.e. as part of the daily job routines in research and teaching may be helpful, focusing here on how science communication can provide an added value to these daily activities.

The **working groups** discussed these issues further, thereby specifying the fields of activities mentioned in the keynote and in the panel discussion and complementing these, hinting at additional format-specific fields of action.

In the **working group on informative formats of science communication**, the participants first highlighted the **need for support**, including here two target groups: professional communicators at Leibniz Institutes and the individual researchers, specifically in the field of media competency. A second action area focuses on respective target groups and formats. Researchers and professional communicators implementing informative formats of science communication need to better **consider the needs of the diverse, fragmented target groups** and adapt their respective science communication formats accordingly. A third field of action regards the **attitudes of researchers**. The researcher's **openness** to try out new things is key here. At the same time, researchers and communicators also have to **break down complexity** when communicating about science.

The working group on **dialogic forms of science communication** also hinted at various action areas in order to reach format-specific goals. A first action area emphasised the need to change **research culture**, meaning that science communication needs to be anchored in the self-image of a researcher and a research institute. There are various means to support this, for example, through raising awareness and initiating self-reflection on values and needs in academia. Second, **support for researchers** to develop knowledge is key, which does not only include communications training, but also training on how to plan for generating societal impact of research, how to evaluate science communication activities and how to engage with policy-makers, for example. Third, there is a clear need for **resources** for professional support in the form of expert personnel and to develop, deliver and evaluate respective science communication activities. One concrete idea from this group was to provide resources by ring-fencing one to two percent of third-party research income for centralised professional support in science communication. Additionally, when it comes to implementing science communication activities, prioritisation is key, i.e. knowing with whom to engage and what these people's priorities are. Finally, recognition based on institutional and funder incentives is important.

The working group on **participatory formats of science communication** emphasised a **lack of temporal and financial resources**, in particular. This goes back to the high amount of time required to implement participatory science communication activities in practice. To address this issue of lacking resources, the working group first suggested **increasing the transparency regarding knowledge and skills** within the Leibniz Association. It is key to know who does what within Leibniz so that the different institutes and researchers can profit from each other's knowledge and not re-invent the wheel. Second, to implement science communication activities as well as time- and resource-

intense communication formats, more particularly, it is important to consider respective positions in the **human resource plans** of the Leibniz Institutes. The goal of increasing the personnel budget by 20 percent is important, but likely not enough when it comes to highly participative communications formats.

Question 3. Who needs to act? Who is needed to implement changes at the interface between science and society?

The conference further discussed relevant actors and asked who would be key to implementing changes in the field of science communication. The discussions considered diverse actors in academia, politics and administration, civil society, as well as boundary organisations such as the broadcast and social media.

The **keynote speaker** focused on three key groups of politics/administration, media and academia. In terms of **politics and administration**, both the federal and state level are important in Germany. At the federal level, key initiatives have been initiated by the Federal Ministry of Education and Research and the mentioned network activity “Factory Wisscomm” as a means to advance science communication in Germany. In terms of politics, several initiatives have been established in the past, including the mentioned adoption of the proposal submitted by three parliamentary groups of the German Bundestag – the Social Democratic Party of Germany (SPD), the Green Party (BÜNDNIS 90/DIE GRÜNEN) and the Free Democratic Party of Germany (FDP) – on systematically and comprehensively strengthening science communication in Germany (Deutscher Bundestag 2024). At the state level, science communication is part of several higher education acts, such as the Bavarian Higher Education Innovation Act. Science communication has also played a role in university agreements, although specific goals and incentives are in part lacking. In addition to politics and administration, the role of the **media** is key in the field of science communication. An important area is science journalism, which contextualises information and provides an outside perspective and, therefore, also needs to be strengthened further. Another important area is the acceleration and amplification of information through media and social media in particular, which in part can discourage scientists to use these media due to hostility and negative exposure. Last but not least, the **academic system** itself needs to act. The keynote speaker observed here an important discrepancy between expressed goals and wishes on the one hand and actual actions on the other. At the level of individual researchers, for instance, they do understand science communication as being part of their job, but rarely approach science communication proactively. Senior scientists, who are relatively active in some areas of science communication are still sceptical and in part discourage early career researchers to pursue science communication activities. On an institutional and organisation level, existing commitments to science communication such as the Push Memorandum from 1999 and the ten-point plan for science communication from 2020 have not resulted in a significant change in performance indicators or the reputation mechanisms in the academic system.

In the **panel discussion**, two of the three groups, politics and administration and the academic system were discussed further. In terms of **politics**, the use of evidence-based science communication should be more transparent, particularly when it comes to evidence that was generated in a participatory manner. If such feedback on the use of evidence does not take place, there is a risk of reducing trust at the interface of science, society and politics. Further, some scientists ask politicians to be more respectful in their communication with scientists and, specifically, to minimise personal attacks on scientists for political reasons in polarised political debates. This, again, is key for generating trust in scientific evidence in society. Turning to **administration**, the former discussion on key action areas has already shown the important role of the Federal Ministry of Education and Research and respective science-related entities at the federal state level. The BMBF should continue its efforts in advancing science communication through various means including, providing a platform for networking within the Factory Wisskomm, further means for capacity development in the field of science communication, funding for research on effective science communication and incentivising its actual implementation in BMBF-funded scientific projects. The State should also enable society to science communication by engaging in science communication already in the educational system, creating a baseline to spark interest in scientific processes and outcomes. In the **academic system**, diverse approaches from the EU level (CoARA), the National State level (*Allianz der Wissenschaftsorganisationen*), institutional leaders (e.g. Directors of Leibniz entities), leading scientists (e.g. professors), individual (young) researchers of different disciplinary backgrounds (as communicators and reviewers), as well as specific groups such as appointment committees need to act. While questions of reputation need to be addressed at the leadership level, the actual communication, as well as questions of how scientific processes and outcomes can be best communicated with the public and with which specific target group, is a key task of the individual researcher. Researchers need to communicate here more creatively about their respective research, supported by their institutions. Additionally, scientists may have to develop a passion for science communication in order to drive this topic forward, as discussions with the audience have shown.

The short discussion of the panel with the audience emphasised the role of society itself and asked about the actual interest of society in science and science communication. Research has shown here that the interest in science and participatory interaction with scientists is rather high in society with regard to pressing or daily problems and issues such as nutrition or climate change. The panel welcomes the interest of societal actors in science and science communication for evidence-informed decision-making. Such interest and competency in collecting and co-producing scientific evidence is, however, not necessarily a given and should be encouraged through the means of science education at schools, amongst other things.

The **working groups** further deepened the discussions on actors to enable change. The working groups mentioned here those types of actors that were mentioned in the keynote and in the panel discussion as well.

The *working group on informative formats of science communication* emphasised the role of two groups: academia and politics/administration. In terms of **academia**, leading actors such as the directors of scientific entities have to enable science communication for the researchers. Additionally, researchers whose research topic is of societal or practical relevance, are encouraged to further engage in science communication. Here, the given societal and practical relevance should be accentuated further, for example, by connecting the respective research to pressing issues of our time. Further, in terms of **politics and administration**, those entities that provide the financial means for science communication at State and Federal level have to support science communication accordingly.

The *working group on dialogic formats of science communication* emphasised that everyone connected to the matter has to be engaged, but for specific reasons and in different ways. In **academia**, the researchers obviously need to act to gain knowledge, competence and confidence in undertaking science communication, while institutions have to provide the means for the respective professional support. **Politics and administration** as important funders need to make institutions and researchers more accountable for the engagement undertaken, its quality and its impact. Finally, **different types of actors in society**, such as educational entities or boundary organisations such as community or patient groups and the media, as well as policy-makers and senior managers in academia, need to act to change the research culture towards a more communicative and dialogic interaction, recognising and making visible the benefit of all stakeholders in and out of academia.

Finally, the *working group on participatory formats in science communication* mentioned also that different types of actors are important to advance these types of formats in science communication. The group focused, though, on actors that play a major role in igniting change, hinting here at the actual **funders within academia and on the side of politics and administration**. In terms of **academia**, the respective institutes are responsible for distributing financial means within the respective entities and, therefore, also for providing the financial means to implement more particularly resource-intensive participatory formats of science communication. In terms of **politics and administrations** as funders, these are responsible for making funding guidelines more flexible with regard to participatory formats, allowing for longer timeframes as well as the possibility for trial and error in such experimental approaches.

Key lessons learned from the conference

A summarised view of the conference questions shows a diversity of goals we can aim for, but also a multitude of action areas that need to be addressed by a number of actors in order to achieve these goals (see Suppl. material 2).

In terms of the *desirable and realistic goals* for mutually beneficial exchange between science and society, the conference participants emphasised that there are different goals for different target groups, making it challenging to point out a specific set of goals

for science communication. They still highlighted the important role of quantity-, content- and process-related goals.

In terms of **quantity**, conference participants generally hinted at an increasing quantity of communication, while there also existed diverging perspectives on how much science communication is actually necessary and possible.

Content-wise, the participants first emphasised goals related to the deficit model of science communication, such as the objectification of debates by providing evidence in times of emotion-led societal debates and fostering understanding of scientific principles and processes. The participants further emphasised goals more related to a dialogic and participatory model of science communication, including the goal of promoting a democratic dialogue, understanding science communication as a means to promote democracy and to advance evidence-based decisions based on democratic dialogue. Another goal related to this dialogic and participatory model of science communication refers to critical self-reflection, i.e. having a culture of listening and inclusion, being more open to new insights regarding their own research questions, based on the conversation with the public and embracing “productive irritation” for innovation in science. Science communication should also aim at sparking interest to recruit young talents for science and increasing trust specifically in milieux sceptical about science.

Process-related goals are close to action areas mentioned below and have also been mentioned as a goal in itself. These goals include an open and transparent communication, developing comprehensible formats, creating experimental spaces for interaction, building smart and creative partnerships for participation, providing support for scientists and clarifying the actual role of scientists in providing evidence rather than deciding upon political and societal questions.

The conference participants further emphasised diverse **adjustments which need to be made in order to achieve these goals** for the exchange between science and society, including strengthening recognition and reputation, the support and protection of scientists, temporal and financial resources for science communication, as well as the actual attitudes of researchers.

As a general starting point for the discussion, participants addressed both explicitly and implicitly the need to change the research culture in a way that science communication is anchored in the self-image of researchers. While there are many ways this can be done, **strengthening recognition and reputation** is a priority in order to increase the importance of science communication within the academic system. This first entails changing the environment by showing commitment to science communication in mission statements, encouraging diversity in research systems and entities, anchoring science communication at management levels and establishing science communication as a performance indicator. This further entails changing leadership, referring here to personnel recruitment by including and implementing science communication in appointment procedures, but also reaches to existing sector leaders, who should act as role models and embrace science communication proactively. Thirdly, it is important to

change resources and capacities, such as providing time and financial resources, for example, by changing development plans for human resources at institutes, as well as by establishing supporting and enabling structures at research entities.

This last point hints at a second action area, the **support and protection of scientists**. This includes access to advanced training and education of both professional communicators at Leibniz Institutes and individual researchers, to learn how to engage with diverse, fragmented target groups, to train in the design, implementation and evaluation of diverse science communication formats, including aspects such as how to break down information, media competency and dialogic and participatory formats. This further entails the protection of scientists, for example, by continuing the recently established *SciComm support*, as a central contact point for researchers.

A third action area then regards **temporal and financial resources** for science communication in general and for specific formats of science communication, specifically dialogue and participation. This includes more research on the actual impact of specific, resource-intensive formats of science communication, as an additional incentive to fund and implement these activities in the future. In terms of funding, specific ideas have come up such as the funding of science communication in third-party funded projects (see here BMBF as a role model), provision of resources by ring-fencing one to two percent of third-party research income for professional support in science communication, as well as considering respective positions in the human resource plans of the Leibniz Institutes (20% and more of working time spent to science communication). In terms of temporal resources, next to prioritising activities, key suggestions are to embed science communication in research and teaching activities instead of an add-on and to increase the transparency regarding knowledge and skills within the Leibniz Association so that the different institutes and researchers can profit from each other's knowledge.

In terms of **attitudes**, encouraging researchers to be open to trying out new things, to break down complexity, to be willing to change power relationships when interacting with the public and to become more inclusive and diverse is key.

Finally, the conference participants discussed **who would have to act** to implement changes at the interface between science and society. The conference participants mentioned here that everyone connected to the matter has to be engaged, but for specific reasons and in different ways. The participants focused, though, on the actors in academia, politics and administration, civil society as well as boundary organisations, such as the media as key actors to further advance the topic of science communication.

In **academia**, networks at diverse levels, such as the EU (CoARA) and the National State level (*Allianz der Wissenschaftsorganisationen*) are key to addressing mission statements as well as questions of reputation and recognition. Further, the academic entities have to enable science communication for the researchers, are responsible for distributing financial means within the respective entities, for the provision of professional support and the actual researchers implementing science communication. In terms of individual scientists, leading scientists have to act as role models, while all scientists

have to connect research to real world problems, gain knowledge for science communication, decide for themselves which contents should be communicated with whom, when and how, then approach science communication proactively, communicate creatively about their own research and develop passion for science communication.

In terms of **politics and administration**, both Federal and State level have to strengthen systematically and comprehensively science communication in Germany, educational systems have to prepare society for science communication and spark interest in scientific processes and outcomes. Those entities that provide the financial means for science communication have to support science communication accordingly and should make research entities accountable for the actual implementation in the respective evaluations. The Federal Ministry of Education and Research is a key actor and is asked to continue its funding for science communication, research on science communication and networking and supporting structures. Further, funding guidelines should become more flexible with regard to participatory formats, allowing for longer timeframes, as well as a trial-and-error culture that is key for such experimental approaches. Politicians also have to act, by further implementing science communication in higher education acts and in university agreements at State level, as well as by clarifying the role of evidence in policy processes, specifically if based on participatory science and by communicating respectfully with scientists.

Next to these two key groups of actors, **society** has been mentioned as well, referring here to the importance of societal interest in science and potentially also respective science communication formats. Finally, boundary organisations such as the media have been emphasised, including here science journalists which contextualises information and provides an outside perspective, as well as providers of social media platforms to secure respectful communication on social media as well.

In the next step, lessons learnt from the conference and further research in science communication shall be shared with the Leibniz Association and its partners and networks in order to continue the discussion on how to advance science communication further in times of dynamic changes in society. While these lessons learnt refer to Germany and the context of the Leibniz Society, we assume that they can be informative and, in part, also valid for other contexts in and outside Germany. There are, still, different levels and habits of science communication in different political and cultural settings, calling upon different priorities to advance science communication in these different contexts to address complex problems arising in the respective transformation processes.

Acknowledgements

The authors wish to thank Dr Tim Urban, Angelina Tittmann and Johannes Graupner for providing comments to earlier drafts of this conference report. The authors also thank Lea Schmidtke for conference support on site, all the participants and supporters of the conference for their contributions as well as the Leibniz Association for funding.

Funding program

Strategy Fund of the Leibniz Association

Grant title

Vernetzung im Rahmen der Begleitstudie zum Wissenschaftsjahr 2022 – Nachgefragt!
(Reference: Strategiefonds-2023-MfN-Vernetzung-WJ22)

Hosting institution

Museum für Naturkunde – Leibniz Institute for Evolution and Biodiversity Science

Conflicts of interest

The authors have declared that no competing interests exist.

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Supplementary materials

Suppl. material 1: Conference Programme

Authors: Sabrina Kirschke

Data type: PDF

Brief description: Programme of the Conference (in German only).

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Suppl. material 2: Conference Summary [doi](#)

Authors: Sabrina Kirschke

Data type: PDF

Brief description: A summarised view of the goals, areas of action and actors to address the conference questions.

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