

Basic and beyond: Next steps on the path to effective and meaningful science communication (Abridged)

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The unabridged report can be found [here](#).

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Introduction

In 2022, leaders of the Science-Public Engagement Partnership (SciPEP) published [Charting a Path for Public Engagement in Basic Science: A Prospectus](#). This prospectus, together with a set of landscape reports commissioned by SciPEP, revealed that little is known about effective science communication and engagement *specifically on basic science topics*. The prospectus articulated a number of high-level questions, which we build on in this phase of work by exploring how researchers, practitioners, and others in the field of science communication and engagement might approach those open questions, sparking new ideas and initiatives. Rather than focusing extensively on key ideas—already articulated in the prospectus—we engaged with the details of *why* and *how* these ideas could be actioned, and what challenges exist that might make realizing these goals difficult. To this end, we interviewed basic scientists, practitioners, and social science researchers to understand individual and collective field-wide priorities and potential approaches. These interviews yielded the following key insights. More details are available in the full-length report.

Insights

Practitioners and researchers alike see a need for detailed and context-specific approaches over general and large-scale approaches

When interviewees described the kinds of questions and insights they felt would enable effective communication and engagement, they described a desire for deep, comprehensive, and context-specific information that cannot be inferred from broad data collection aimed at producing generalizable results. They noted that while surveys of U.S.-based and international publics can provide a general sense of public opinion, it is challenging to know what a set of statistics (e.g., the level of agreement with a range of statements about science) means for their specific efforts to engage a particular community on a particular topic in a particular way. Consistent with the questions included in the prospectus, many interviewees

emphasized that the future of effective basic science communication and engagement relies on the ability to understand perceptions of basic science, what various publics' needs and goals are, and why science is (or isn't) important to them; crucially, however, these questions must be asked and answered at the level of individual contexts and communities. Understanding individual communities' unique and diverse responses to these questions, interviewees noted, will facilitate effective communication and engagement.

Interviewees were unsure about whether and when “basic science” is a helpful focal point

All interviewees provided definitions of “basic science” that were consistent with the definition included in the prospectus. However, after defining the term, many participants expressed uncertainty or skepticism about a distinction between basic and applied sciences, both in distinguishing different types of research and types of communication or engagement.

Many interviewees described struggling with the distinction because they see scientific research on a continuum, with the concepts of “basic” and “applied” as theoretical poles and particular fields, topics, and research programs occupying various gray areas in between. Perhaps because of this uncertainty, or because communication and engagements focused on basic science topics were not salient for interviewees, even when they were explicitly asked about basic science topics, interviewees frequently defaulted to talking about “all science” and provided examples of communication or engagement on clearly applied science topics (e.g., health recommendations related to COVID-19).

Basic science was most often associated with one-way communication, rather than multi-directional, collaborative forms of engagement

With the recognition that the prospectus included questions pertaining to both one-way communication and bi-directional engagement because of the paucity of research on either topic specific to basic science, our interviews revealed that the answers to many of our questions (e.g., what kinds of trainings are most effective?) are likely to be quite different for these two different modes of sharing scientific information. Notably, *communication* was much more salient and concrete for participants when thinking about basic science topics. When asked generally about communication and engagement, most offered prototypical communication examples, such as media (e.g., press releases, YouTube videos), education (e.g., scientists volunteering in classrooms), and other events (e.g., public lectures). Those who offered examples of more multi-directional engagement tended to share examples of exchanges on applied science topics. Some participants explicitly noted that they couldn't picture what engagements like dialogue, deliberation, or knowledge co-production would look like for basic science topics. They were unsure what such activities would be designed to accomplish or what they could accomplish in reality. Others stated that engagement is much more difficult for the basic sciences because it's more challenging to equip public audiences

to be effective partners and to determine what they would gain from activities like collaborative research. Still others asserted that for basic science topics, engagement is not really relevant; rather, the field should focus on communication.

Interviewees found it challenging to articulate potential approaches to addressing the unanswered questions they identified

Each time we discussed a question or challenge related to basic science communication and engagement, we asked interviewees how they thought the field could make progress on addressing it. Many interviewees found it challenging to articulate what could be done—whether particular research, convenings, or resource development were needed, what those activities would look like, and who would be responsible for catalyzing and contributing to them. The three takeaways described above may all contribute to this challenge. Specifically, the desire for detailed, context-specific insights may have made it challenging to think about what can be done to support a diverse field (especially given resource limitations). Similarly, for the majority of participants who were uncertain about what should or must be learned about “basic science” specifically, it may have been challenging to articulate what activities would be most fruitful, since they were not yet fully convinced of the premise upon which any approach would be based. Finally, recognizing that the idea of basic science engagement (as opposed to one-way communication) was hazy or irrelevant for most interviewees, it may not be surprising that many struggled to come up with activities that could inform such diverse—and perhaps unclear—forms of sharing science.

In addition, we recognize that especially for those who do not often (or ever) think about basic science communication and engagement, coming up with approaches the field could take—especially when most are used to thinking at individual- or institutional-levels in their day-to-day work—was a difficult request. This would be true even if the questions at hand were relatively simple or unidimensional, but as our conversations confirmed, many of the questions and challenges facing stakeholders committed to public engagement with basic science are complex and do not lend themselves to straightforward activities that will reveal clear-cut answers.

Unanswered questions and suggested approaches

In this section, we describe questions prioritized by researchers, practitioners, and basic scientists. In the interviews, it became apparent that clarity on these particular questions would result in more effective and equitable basic science communication and engagement. Many of the priorities discussed in the interviews were first articulated in the prospectus. When such topics arose, we asked interviewees to share *why* they thought the question was important, which helped us assess the extent to which it might be a priority for the field. In addition, we asked interviewees *how* the questions they discussed could be pursued. In doing this, we aimed to advance the conversation a step beyond the prospectus, by distilling

potential next steps that would improve the field's understanding of the most important questions on basic science communication and engagement.

In many cases, interviewees described challenges and open questions about science communication and engagement broadly (i.e., not specific to basic science). We followed up on these points by asking whether they felt there was an aspect of the challenge or question that was unique to *basic science*. In this report, we focus on the priorities and questions for which interviewees explicitly stated or implied that there may be unique considerations or insights for basic science topics with less direct application. As a result, this report does not cover some of the challenges that are well known to the science communication and engagement field, such as institutional incentives (e.g., promotion and tenure policies) or applying scholarship on communication and engagement in practice.

We have outlined these priorities through six questions, their rationales, and recommended next steps.

1. What are the values that guide basic science communication and engagement?
2. What does the field need to know about audience perspectives?
3. What does the field need to know about the role of training?
4. What goals does the field want to achieve?
5. How should the field frame basic science topics?
6. What are the outcomes of communications and engagements?

What are the values that guide basic science communication and engagement?

- **Priority:** Explicitly articulate the “why” of communication/engagement.
- **Why this is important:** This articulation underlies everything that happens with science communication and engagement; it forms an element of the measure of success.
- **Recommended next step:** Undertake field-wide discussions to articulate and discuss values: why are communications and engagement important? As new experiences and insights emerge, follow-up discussions can help refine and update field-wide thinking about values.

What does the field need to know about audience perspectives?

- **Priority:** Focus qualitative research on individual audiences' experiences, assumptions, understandings, motivations, and priorities for engaging with basic science topics.
- **Why this is important:** Understanding the specific audiences for specific communications or engagements is crucial for setting strategic goals, designing effective opportunities, and evaluating impact.
- **Recommended next steps:** Carry out small-scale, community-specific qualitative research initiatives to understand the unique audiences a communicator is attempting

to engage. Discuss creating a clearinghouse to share qualitative research projects widely so that communicators can learn from others.

What does the field need to know about the role of training?

- **Priority:** Determine the elements of training that are necessary and valuable for basic science communicators. Then, champion the programs or elements that provide the most value.
- **Why this is important:** Effective and equitable basic science communication and engagement rely on communicators receiving quality training, little is known about what exactly that entails.
- **Recommended next step:** Undertake detailed and thorough evaluations of training programs to better understand what works and what doesn't, for whom, and why.

What goals does the field want to achieve?

- **Priority:** What are communicators' goals for sharing basic science? What factors shape those goals?
- **Why this is important:** This understanding will clarify field needs, including training, incentives, and other structures, in addition to providing a baseline for assessing the extent to which individuals or the field as a whole is achieving success.
- **Recommended next step:** Assess and undertake qualitative research as needed. If key questions emerge, conduct one-on-one interviews with strategic groups of communicators for deeper understandings.

What is important to learn about framing basic science topics?

- **Priority:** How should basic science topics be framed to achieve particular goals with particular audiences?
- **Why this is important:** Every communication must be framed, yet interviewees expressed a great degree of uncertainty about effective (and ineffective) frames.
- **Recommended next step:** For individual communications or engagements, champion ethnographic work to shape hypotheses about framing best practices, then test the hypotheses in experiments.

What outcomes are possible, under what conditions?

- **Priority:** Surface insights on what outcomes are possible and common, and how communicators and institutions can most effectively evaluate their efforts.
- **Why this is important:** An understanding of possible and likely outcomes serves as the basis for setting strategic goals, tailoring approaches, and assessing success. Developing and sharing tools and models to enable more widespread evaluation will build the whole field's capacity to develop effective and equitable basic science communications and engagements.

- **Recommended next step:** Undertake comprehensive, longitudinal evaluation efforts to assess a diverse set of short- and long-term changes. To the greatest extent possible, make evaluation tools and processes usable for the broader field.

Conclusion and next steps

There were a number of questions and challenges that were repeatedly raised in our interviews (many of which reiterate and emphasize those surfaced in the prospectus), and a number of interviewees had some ideas about how these could be addressed. We supplemented their suggestions with our own insights, as social scientists who have experience employing a range of methods for diverse projects and stakeholders, to arrive at a set of recommended questions and approaches that will meaningfully advance the field's understanding of effective and equitable basic science communication and engagement:

- **Articulating values:** Organize field-wide discussions to articulate and discuss values, addressing questions such as: why are communications and engagement important? As new experiences and insights emerge, follow-up discussions can help refine and update field-wide thinking about values.
- **Supporting context- and community-specific research:** Support small-scale, community-specific qualitative research initiatives to understand the unique audiences a communicator is attempting to engage. For individual communications or engagements, champion ethnographic work to shape hypotheses about framing best practices, then test the hypotheses in experiments.
- **Sharing findings:** Create a clearinghouse to share qualitative research projects widely so that communicators can learn from others.
- **Supporting comprehensive evaluation:** Catalyze a set of comprehensive, longitudinal evaluation efforts to assess a diverse set of short- and long-term changes resulting from both training programs and from communication and engagement efforts. To the greatest extent possible, make evaluation tools and processes usable for the broader field.

Most importantly, given the significant challenge interviewees faced in articulating ways to address the complex questions they identified, there is a need for creative ideas and approaches from the science communication and engagement field. This report aims to be a resource that the field can draw on as they collaborate to take on this challenge.