

Conference Proceedings

COMMUNICATING THE FUTURE: ENGAGING THE PUBLIC IN BASIC SCIENCE

What is known about effective public engagement with basic sciences? What is unknown? Is there an appetite among scientists and communication professionals for delving into questions about the knowns and unknowns of basic science communication and engagement?

These questions led SciPEP (**Science Public Engagement Partnership**) to convene a virtual conference, ***Communicating the Future: Engaging the Public in Basic Science*** as part of a broad landscape exploration and analysis to identify research and resource needs to advance the field of public engagement in basic science.

Leading up to the conference, the Kavli Foundation commissioned two literature surveys to assess the landscape of published scholarship about basic-science-specific science communication and engagement in disciplinary science and technology journals as well as in prominent science of science communication journals. The two literature survey reports and a video recording of the pre-conference webinar about the report findings, *“Missing in Action: Communication and Public Engagement Scholarship on Basic Science,”* are available on the SciPEP website. The primary, shared finding of these studies is that very little has been published about basic science communication and engagement - the opportunity to conduct research in this space is wide-open. This finding set the stage for the Communicating the Future conference.

The conference was organized with the input of a multidisciplinary steering committee, under the chairmanship of Erika Shugart, with the goal of serving as a broad call out to the community. In addition, Civic Science Fellow Karen Andrade helped with outreach, to diversify the pool of basic scientists and projects that could help the community think about what it means to engage people in basic science.

More than 1,200 people from a broad range of professional sectors and countries attended the conference. Approximately 50% of attendees represented academia (postdoctoral trainees, professors, communications staff, and leadership). Other attendees represented the U.S. state and federal government, international government, philanthropy organizations, museums, the media, creative arts, college and graduate students, and advocacy groups. Conference attendees also represented 60 different countries, an indication of the global nature and interest in communicating about basic research.

These proceedings are a record of the rich sessions and phenomenal speakers and panelists who participated in the conference. It is also a portal to the insights and ideas that will fuel SciPEP discussions and ideation long after the conference. Hyperlinks will transport you to the SciPEP YouTube channel to watch video recordings of pre-conference webinar, the conference plenary sessions, the conference deeper dive discussions, and the conference poster splash talks. These proceedings also include links to the transcripts of the provocative commentary of the three conference rapporteurs' in the "Where do we go from here?" session as well as the report-outs of the "Brainstorming for the Future" discussion groups.

Enjoy!

CONFERENCE OVERVIEW

On July 27-28, 2021, SciPEP convened a two-day virtual conference exploring the unique characteristics of the relationship between the public and basic research, drawing from the experience and expertise of our colleagues in the science and science communication communities. The conference program was framed by three overarching questions: *Why* do we engage the public about basic science? *What* are we doing now in public engagement across various institutions and platforms? *How* should we be doing public engagement with basic science going forward? The following themes were explored throughout:

- **Scholarship** (e.g., communications research) – whether and how it can be applied to public engagement practice, and identification of new research questions;
- **Training** – public engagement skills development for scientist-communicators and the communication professionals who work with them;
- **Engagement practice** – activities or programs that provide opportunities for mutual learning or exchange of ideas between scientists and members of the public;
- **Justice, equity, diversity, and inclusion** in public engagement; and
- **Evaluating the effectiveness** of public engagement activities and programs.

The intent was to spark ideas and dialogue about what we do and do not know about public engagement in basic science, and what research and resources are needed to advance the field. In addition, the SciPEP leadership team sought to identify opportunities for SciPEP to play a supporting role in building and providing resources for our community.

PLENARY SESSIONS

Communicating the Future: Engaging the Public in Basic Science featured nine plenary sessions where leading experts served as speakers, panelists, and moderators to interweave the five conference themes described above through thoughtful presentations and discussions.

- PLENARY 1 COMMUNICATING BASIC SCIENCE: ENGAGING SCIENTISTS, ENGAGING THE PUBLIC**
Speakers: Rick Borchelt, Brooke Smith, Erika Shugart, Keegan Sawyer, and a recorded welcome from Cynthia Friend and Harriet Kung
- PLENARY 2 WHAT IS PUBLIC ENGAGEMENT IN SCIENCE?**
Speaker: Bruce Lewenstein
Panel: Ann Bartuska, Jayatri Das, Kirsten Ellenbogen
Moderator: Nanci Bompey
- PLENARY 3 EXPLORING THE RELATIONSHIP BETWEEN BASIC SCIENCE AND THE PUBLIC**
Speaker: Shobita Parthasarathy
Panel: Marta Entradas, Leslie Krohn, Susan Renoe
Moderator: Samuel Dyson
- PLENARY 4 WHAT SPARKS CURIOSITY, WONDER, AND AWE?**
Speakers: Tania Lombrozo, Daniel Silva Luna
Panel: Jeanne Garbarino, David Kirby
Moderator: Sara Yeo
- PLENARY 5 HOW CAN WE ENSURE PUBLIC ENGAGEMENT IN BASIC SCIENCE IS EQUITABLE AND INCLUSIVE?**
Panel: Mónica Feliú-Mójer, Beronda Montgomery, Edna Tan, Kyle White
Moderator: Raj Pandya
- PLENARY 6 FROM RIBOSOMES TO REVOLUTION: A SCIENTIST'S REFLECTIONS ON THE LIFE CYCLE OF PUBLIC ENGAGEMENT IN BASIC RESEARCH**
Speaker: Jennifer Doudna
Correspondent: Joe Palca
Moderator: Brooke Smith
- PLENARY 7 HOW DO WE MOVE FORWARD FROM HERE?**
Rapporteurs: Mariette DiChristina, Brain Nord, Roger Pielke Jr.

Three thought leaders reflected on the conference discussions and shared their insights on resource needs and research gaps for the future of communicating basic science.

Some of their questions:

- *What does basic science do that applied science doesn't for the public, for the public's perspective? Is it really important to separate the two?*
- *Are there approaches that can help publics deal with uncertainties of basic research and see those uncertainties as valuable parts of the journey to knowledge? Why don't we ask members of the publics to join us at sessions like SciPep?*
- *Is justice ever really a starting point for any of our conversations? Is justice an explicit goal?*
- *Can we imagine new systems of engaging in the plurality of scientific endeavors and systems that don't pit good goals against one another?*
- *How do we evaluate success and failure in communication as a process and its outcomes?*
- *how might we better understand our responsibilities as experts in democratic governance?*

Read the transcript of the full rapporteur remarks.

PLENARY 8 MAKING SCIENCE FUN(NY) WITH *SCIENCE! THE SHOW*
Presenters: Russell Cohen-Hoffing, Dylan Farr, Alex Shifman

**PLENARY 9 SciPEP: A LOOK TO THE FUTURE OF PUBLIC ENGAGEMENT IN
BASIC SCIENCE**
Speakers: Brooke Smith, Erika Shugart, Rick Borchelt

DEEPER DIVE SESSIONS

The conference featured 13 deeper dive discussions that took place in parallel sessions. These deeper dives built upon many of the ideas introduced during the Plenary sessions, bringing additional expertise and perspectives from basic research scientists, social scientists, and communication professionals.

1A. HOW DOES THE BROADER PUBLIC VIEW BASIC SCIENCE?

Speaker: Chris Volpe

Panel: Celeste Frazier Barthel, Clio Heslop

Moderator: Rebecca Thompson

1B. DO WE NEED TO ANCHOR COMMUNICATION ABOUT BASIC RESEARCH TO ITS POTENTIAL FOR FUTURE APPLICATIONS?

Panel: Marley Jarvis, Katie McKissick, Ben Shouse, Barbara Theirs

Moderator: Sara Yeo

1C. WHAT DOES TWO-WAY COMMUNICATION LOOK LIKE FOR BASIC SCIENCE?

Panel: Ivvet Abdullah-Modinu, Gregory Bowman, Sarah Garlick

Moderator: Raj Pandya

1D. WHAT DID WE LEARN ABOUT NEEDS IN PUBLIC ENGAGEMENT BY ORGANIZING THIS CONFERENCE?

Panel: Karen Andrade, John Besley, Todd Newman, Gail Porter

Moderator: Matthew VanDyke

2A. WHY DO FEDERAL AGENCIES COMMUNICATE ABOUT BASIC RESEARCH?

Speaker: Kei Koizumi

Panel: Allison Eckhardt, Josh Chamot, Barbara Mattson

Moderator: Amanda Greenwell

2B. MEET PEOPLE WHERE THEY ARE, OR INVITE THEM OVER?

Panel: Paula Croxson, Deepti Pradhan, Mark Rosin

Moderator: Ben Wiehe

2C. WHY DO SCIENTISTS ENGAGE THE PUBLIC IN BASIC SCIENCE?

Speaker: Nichole Bennett

Panel: Paige Jarreau, Mohamed Noor, Todd Newman

Moderator: Adam Fagen

2D. HOW CAN PUBLIC RELATIONS CONTRIBUTE TO PUBLIC ENGAGEMENT WITH BASIC SCIENCE?

Panel: Jeong-Nam Kim, Katherine McComas, Katherine Rowan, Maureen Taylor

Moderator: Nicole Lee

3A. CURIOSITY, WONDER, AND AWE IN SCIENCE ENGAGEMENT: A DEEPER DIVE

Panel: Tania Lombrozo, Daniel Silva Luna, Jeanne Garbarino

Moderator: Sarah Davies

3B. WHAT ARE THE EFFECTS OF SOCIETAL CONTROVERSY ON THE COMMUNICATION OF BASIC SCIENCE?

Panel: Mikhaila Calice, Megan Hochstrasser, Alysson Muotri

Moderator: David Sittenfeld

3C. WHAT IS THE IMPACT OF PUBLIC DEFERENCE TO SCIENTIFIC AUTHORITY?

Speaker: Emily Howell

Panel: Eric Kennedy, Ubaka Ogbogu

Moderator: Erika Shugart

3D. HOW ARE JUSTICE AND EQUITY TAKEN INTO CONSIDERATION FOR PUBLIC ENGAGEMENT TRAINING?

Panel: Alexandra Canet, Katherine Carter, Alberto Roca

Moderator: Chloe Poston

3E. HOW DO WE KNOW IF WE ARE MAKING A DIFFERENCE?

Speaker: Eric A Jensen

Panel: John Besley, Sylvia Leatham, Karen Peterman

Moderator: Christine Reich

BRAINSTORMING SESSIONS

What are research needs and priorities to empower our SciPEP community to more effectively engage the public in basic science? Session attendees reflected on observations shared in Plenary 7, “How do we move forward from here?”, and broader conference discussions to generate research ideas for the five following topics:

- EQUITY** Barriers to and incentives for scientists and members of the public to equitably participate in public engagement with basic science.
- EVALUATION** Opportunities and challenges to better understand and assess efforts to engage the public with basic science.
- GOODWILL** Approaches and activities to sustain and expand upon the existing reservoir of public “goodwill” towards basic science through public engagement (2-way dialogue with mutual learning).
- UNIQUENESS** Opportunities and challenges unique to basic research that should inform, and potentially change, public engagement strategies.
- TRAINING** Developing effective training resources and training incentives for scientists who desire to participate in public engagement on basic science.

During Plenary 9, the final session of the conference, Erika Shugart, Brooke Smith, and Rick Borchelt provided a high-level synthesis and analysis of key themes and research questions raised during Brainstorming for the Future discussions.

Read the transcript of the brainstorming report-outs.

POSTER PRESENTATIONS

The conference featured 63 posters, selected by a review panel after a broad call for abstracts. Poster authors were invited to record a short splash talk in addition to participating in live discussions about their work during the conference. A number of poster authors were also invited to participate in deeper dive discussions sessions (noted with an * following the poster title). Posters were organized into 5 broad categories: Community Engagement, On Air & Online, Scholarship, SciComm on Basic Science, SciComm on Broad Topics, and Training. Click on the category titles below to view a YouTube playlist of the splash talks.

Note:

** Indicates that the poster presenter also participated as a panelist.*

^ Indicates that a splash talk is not available for this poster.

COMMUNITY ENGAGEMENT

Communication programs and activities with direct interactions or partnerships between scientists and publics.

Aquí Nos Cuidamos: A model for inclusive community-centered science engagement*

Mónica I. Feliú-Mójer, Edmy Ayala-Rosado, Ramdwin González-Otero, Xavier Ortiz-Torres, Giovanna Guerrero-Medina

Engaging the public with science through art collaborations*

Paula L. Croxson, Lisa Dinh, Alissa Mayers

Community Collaboration: Joining schools and church groups together in a bid to showcase science

Claire L. Price

Connecting and Engaging Children with Real-Life Science and Engineering Experts

Jennifer Swanson

Diverse, Inclusive Public Outreach through the Global Community of Amateur Astronomers

Mike Simmons

Embedding Public Engagement with Science at Long Term Ecological Research Sites (PES@LTERs)*^

Sarah Garlick, John C. Besley, Kathy Fallon Lambert, Marissa Weiss, Peter Groffman, Pamela Templer

Folding@home: Omnidirectional communication within a citizen scientist ecosystem tackling everything from basic research to global health threats*

Gregory Bowman

Fostering Familial Scientific Appreciation through Graduate Student-Led Activities in Children's Museums (SciMuse)

Mayank Kejriwal

Independent science cafes run by community members bring science to a wider cross-section of society*

Deepti Pradhan

Meet a Scientist: Facilitating informal conversations between researchers and public audiences

Mimmi Martensson

Taking basic science to society, one cup at a time! The Journey of Chai and Why

Arnab Bhattacharya, Surendra Kulkarni, Ulhas Vaidya and the Chai and Why? team

The STEM Ambassador Program: Guiding scientists to build community connections and expand opportunities for public engagement

Caitlin Weber, Nalini Nadkarni, Julie Risien, Dennis Schatz, John Besley

ON AIR & ONLINE

Communication and engagement activities that employ Internet-based or radio broadcasting communication tools, including animation, video, podcasts, and social media platforms.

Animating science: A behind-the-scenes look at creating animations for research communication

Vandana Suresh, Dharmesh Patel, Donna Malak, Tanner Konarik

Accelerating Public Engagement in Fundamental Science through the CERN Social Media

Chetna Krishna, Loic Bommersbach

Communicating Science through Animated Videos

Oludurotimi Adetunji

Promoting Community Science Literacy: The Power of Public Storytelling

Frederic Bertley, Marci Howdysshell, Tony Auseon

Putting the Politics of COVID-19 Under the Microscope

Elizabeth Thompson, Naira Abou-Ghali, Nina Glenn, Joanna Yeung

Teaching data science in Mexico during the COVID-19 pandemic

Gabriel Missael Barco, Andrea Monserrat Arredondo-Rodríguez, Claudia Ivette García-Gil, Alicia de Carmen Hernández-Guzman, Rogelio Antonio Hernández-López, Benjamin Manuel Sánchez-Lengeling, Carla Márquez-Luna

“Up close with science”: conveying the excitement of basic research virtually, live from the lab, during the COVID 19 pandemic

Ulhas Vaidya, Surendra Kulkarni, Dibyasankar Das, Arnab Bhattacharya, TIFR outreach team

“Your Weekly Dose of Whoa!” – A Science Series Targeting Television News Viewers in Louisiana

Jordan Sandler

SCHOLARSHIP

Social science research on science communication and engagement, including on public views of science and scientists, scientists perceptions of publics, and the effectiveness of different communication and engagement tactics and platforms.

A Ten-Year Case-Study of Science Communication Training at Laval University, Québec, Canada

Amélie Daoust-Boisvert

Basic Science vs. Policy: Multi-Engagement Approaches at Long-Term Ecological Research Sites (LTERs)

Leigh Anne Tiffany, John C. Besley

Connecting research and storytelling to engage with audiences through documentary film: Insights from a scientist-filmmaker collaboration*

Emily L. Howell, Amanda L. Molder, Meredith DeSalazar, Yachao Qian, Dietram A. Scheufele, Elliot Kirschner, Sarah S. Goodwin

Developing Evidence-Informed Science Engagement Programs with the ECO Framework*^

Sarah Garlick and Kathy Fallon Lambert

Engaging the public in a digitized world: How we can communicate scientific revelations and technological breakthroughs

Dr. Lars König and Priska Linda Breves

Guerilla Science: a STEAM-approach towards science outreach that engages culturally interested audiences who might not ordinarily engage in STEM*

Mark Rosin, Jen Wong, Kari O'Connell, Martin Storksdieck

How scientists' understanding of how their audiences learn influences their outreach strategies*

Cèleste Frazier Barthel, Martin Storksdieck

Immersive outreach: study on the accessibility of physical locations and the pilot of online interactive experiences

Alexander A Kaurov

The Efficacy of the European Space Agency's Strategic Communication: A Case Study

Axel Pflieger, Alexander Gerber, Alexander Struck

What US citizens want from science communicators: Findings from a representative survey*

Clio Heslop, Anthony D. Dudo, and Jacob Copple

When educated Whites don't see a problem: Divides in public opinion on AI-based policing based on race and literacy*

Mikhaila N. Calice, Isabelle Freiling, Dietram A. Scheufele, Dominique Brossard, Todd P. Newman, and Michael A. Xenos

SCICOMM ON BASIC SCIENCE

Instructive communication and engagement activities or programs in which basic research is the central focus.

Applied Science Communication: Best Practices for Public Engagement with Basic Science*

Marley Jarvis and Amelia Bachleda

Berkeley Lab: The Next 90 – A 90th Anniversary Celebration

Jenn Tang, Dan Krotz

Connecting Minds to Nuclei in the Cosmos through JINA-CEE's Outreach Pipeline

Ana Becerril, Zachary Constan, Michael Kilburn, Hendrik Schatz

COVID-19 Prequel Stories: How basic science research helped combat the pandemic

Daren R. Ginete, Bishakha Mona, Jason Maier

Familiar First: An argument for engaging the public with applied science before basic science*

Ben Shouse

From LIGO to EHT: Media engagement in an age of global science collaboration*

Josh Chamot

How Can Graduate Students Inspire the Next Generation of Scientists and Engineers? We L.E.A.D.!

Madeline Memovich, Mark Bernard, Charles Machan

Making the Case for Basic Research^

Isobel Ronai

PDB-101: Molecular Explorations through Biology and Medicine

Christine Zardecki, David S. Goodsell, Shuchismita Dutta, Maria Voigt, Stephen KL. Burley

TINA - Training In Nuclear Astrophysics for the Public

Hendrick Schatz, Falk Herwig, Pavel Denisenkov, Stephenson Yang

SCICOMM ON BROAD TOPICS

Instructive communication and engagement activities or programs on a broad range of science and technology in which basic research is a peripheral focus.

Adult Education in Science through OLLI Programs

Peter Luykx

Are South Africa's Great White Sharks heading for extinction? And why should we care?

Wiida Fourie-Basson, Sara Andreotti, Stefan Els, Marina Joubert

Communicating CRISPR and Sickle Cell Disease Through Immersive Virtual Reality*

Megan Hochstrasser, Lee Bishop, Laura Lynn Gonzalez

Engaging U.S. and Japanese Publics in the Future of Science

David P. Janes

Gaining STEAM!: Illuminating Research Through Art

Khoa A. Tran, Kelly M. Montgomery, Jaye C Gardiner

In Their Eyes: Building Scientific Knowledge, Environmental Stewardship, and Science Identity through Innovative STEAM Programming

Jaye Gardiner, Claire Meaders, and Samantha Wynns

Science Clubs International: An international hands-on STEM education program

Bruna Paulsen, Sofia Espinoza-Sanchez, Oscar Hernandez Murillo, Carla Marquez-Luna, Gerald Salazar, Elisa Chaparro Aguirre, Ana Karen G. Barajas, Laura Pena, SCI Organizing Team

Science communication at the forefront of genomics and society

Prabarna Ganguly, Alyssa Jones, Sarah Bates, Chris Gunter

Science Communication in the Trenches: 5G and Covid-19

Eric S. Swanson

Science for Buddhist Monks and Nuns

Chris Impey

STEMM Diversity @ McGill

Charles Cong Xi

Yale Science Communication – A Graduate Student Organization: Communicating Science, Igniting Scientific Engagement, and Training Science Communicators

Lizzy Nand, Emma Carley, Caleb Gordon, Nicholas Ader, Harini Sadeeshkumar, Yangqi Gu, Milind Singh

TRAINING

Programs and methods that teach various communication and engagement skills.

A Science Communications Curriculum Rooted In Science

Annie Neimand, Ellen Nodine, Matt Sheehan, Ann Searight Christiano

Creating science-informed communication tools to increase trust in COVID-19 vaccines

Jack Barry, Annie Neimand, Ann Searight Christiano

Graduate Certificate in Science Communication

Chris Impey

Graduate Training in Science Communication: Promises and Pitfalls*

Kate Carter, Michelle Valkanas

IAU Public Engagement Training Sponsored by the Kavli Institute

Kelly Blumenthal, Pedro Russo, Lina Canas, and Jon Chase

Insights from Partnering with Faculty: University-wide Training & Tools Programs

Dana Topousis

On-the-Spot Feedback: Developing an Important Science Communication Skill

Dennis Schatz, Elysa Corin, Martin Storksdieck, Greg Schultz

Stories Worth Telling: Equipping Scientists to Share their Science Broadly

Paul Runci

Supporting the researcher journey: Developing specialised training to support high quality, inclusive researcher-led public engagement*

Alexandra Canet Font, Susan Wallace, Damian Hebron, Louise Walker

Technology Tools to Combat Scientific Misinformation

Chris Impey

A COMMUNITY RESOURCE

The 2021 *Communication the Future* conference was the first public event of a five year partnership between the DOE Office of Science and the Kavli Foundation. Please be sure to subscribe to the SciPEP mailing list to receive notifications about upcoming events.

Please treat these proceedings and other SciPEP materials as a community resource. Here is a list (with links) of the 2021 conference-related materials available to you on the SciPEP website:

- Public engagement in basic science literature survey reports and webinar recording
- *Communicating the Future* conference video recordings
- “Where Do We Go From Here?” conference rapporteur transcript
- “Brainstorming for the Future” session report-out transcript

If any of these materials stimulate you to develop basic science communication efforts of your own - research, writing, video, engagement activity, training module, or anything at all - please let SciPEP know at scipep@info.org. The SciPEP team would be delighted to know if this work is the sparking point for any of your conversations and publications.

ACKNOWLEDGEMENTS

This conference was content-rich, provocative and fun. It came together quickly over a 6-month period. The reason the conference was such a success is due to the amazing group of people from DOE and the Kavli Foundation who formed the SciPEP team. Keegan Sawyer joined DOE to lead SciPEP's work a week before the first conference planning meeting. Keegan's leadership, thoughtfulness, and remarkable ability to juggle everything from strategic content development to speaker prep was remarkable. Also supporting all the work for this conference was an amazing team from both DOE and The Kavli Foundation Natalie Soldan, Alison Eckhardt, Katie McKissick, Elaine Bui, Lauren Budenholzer and Melina Fuentes The nearly seamless virtual experience was due to the excellent folks at Corinthian Events.

We are grateful to the members of the conference steering committee and Erika Shugart, who chaired the steering committee. Erika and the steering committee contributed intellectual capital to shape the conference agenda. They also participated in all of the different sessions as moderators, speakers and panelists. We are grateful for their expertise, energy, and time.

We also are grateful to all the invited participants - the speakers, the moderators, the panelists, the folks who have submitted posters and spoke with conference attendees about their work during the poster sessions.

Finally, the number of people who attended this conference exceeded our expectations. Thank you for showing up and thinking with us. The participation and ideas that came forward from this actively engaged group was impressive and inspiring. We are going to be talking about this conference for a long time to come and invite you to join us in those conversations. We expect many great basic science communication opportunities and work to arise in the years to come.

2021 was an unusual and difficult year to hold virtual conferences like this one. However, an advantage of the virtual environment is that so many more people could attend and actively participate in the discussions. Thank you all so much. Don't be strangers. Let's make this a continuing and robust engagement.

Rick Borchelt, Department of Energy
Brooke Smith, The Kavli Foundation

SciPEP (**Science Public Engagement Partnership**) is a collaboration of The Kavli Foundation and the Department of Energy to ensure that basic science engagement is supported, sustainable, and effective.

Learn more at scipep.org.