



A2A: Awareness to Action

Science, Art, and Sustainability 2018 Workshop:

Briefing Materials





A2A: Awareness to Action, Science, Art, and Sustainability 2018 Workshop Briefing Materials (NewKnowledge Publication #NSF.156.414.01) by NewKnowledge.org is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License

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Photographers from the Arctic Arts Project hike into an ice cave on the Vatnajokull ice cap, Iceland in 2015. The photographers work with scientists to understand and record the rapidly changing Arctic. The entrance of this ice cave had retreated by 400 feet, and the ice above the cave had thinned from 100 to 40 feet, since the previous year. Photo courtesy of Arctic Arts. © Kerry Kolpping Arctic Arts Project.



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NewKnowledge is a non-profit research institute working to advance social justice so all people can live life to the fullest in harmony with a thriving biosphere.

January 26, 2018

Dear A2A Participant,

Thank you for agreeing to participate in the A2A Planning Workshop funded by the National Science Foundation (Grant #1746106) held simultaneously in Boulder and Princeton, February 21-23, 2018.

We have an extraordinary trans-sector gathering of participants coming from the sciences, the arts, and a variety of sustainability-related fields. Our common goal is to establish an operational strategy for knowledge sharing across our various and different disciplines, networks, and associations. Outcomes from this workshop include the identification and preliminary mapping of successful evidence-based best practices in science-arts sustainability collaborations, a strategic vision for interdisciplinary collaboration across networks; and an initial framework for the dissemination of findings that can reach across disciplines.

Enclosed is a briefing booklet for you to read prior to your arrival. It includes bios, logistical information, meeting agenda, and a four-page introduction to the workshop that our facilitator, the New Knowledge Organization, has developed to contextualize our discussions. Also shared in the email transmitting this letter is a dropbox link to a treasure trove of resources that you collectively supplied in conjunction with your questionnaires. Thank you for your work selecting these.

We look forward to seeing you in February!

Sincerely,



Jim and Marda

A2A PLANNING TEAM:

James W.C. White, (PI), Alison Carey, Max Boykoff, Marda Kirn, Bethany Wall, Tom Windham, John Fraser and Nezam Ardalán, with additional assistance in Boulder CO from Shelly Sommer, Anna Jensen, Patrick Chandler and Sarah Fahmy, in Princeton NJ, Elke Weber and Charmaine Smiklo, and in New York NY, Joanna Brucker and Julie Aromi.

Evaluation: Elizabeth Bachrach Simon.

ACKNOWLEDGEMENTS:

The organizers wish to thank Al DeSena from the National Science Foundation for his guidance in preparing the proposal that secured grant funding for this work and directing us to useful resources in the NSF archives. We extend our thanks to the leaders of our early arrivers special tours, Tim Barnes & Tim Scheitlin at the National Center for Atmospheric Research and Veronica White & Catherine Riihimäki at the Princeton Art Museum. And additional thanks to Joanna Brucker and Julie Aromi at NewKnowledge for their work on resource management and coordination. Thanks to our Princeton host Elke Weber, and our logistics support team, Shelly Sommer (Boulder) and Charmaine Smiklo (Princeton) and the many others who helped make this workshop possible.

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Agenda

February 21st, 2018- Day 1:

4:30 pm MST – 7:00 pm MST

6:30 pm EST – 9:00 pm EST

- 4:30 MST / 6:30 EST Arrival
- 5:00 MST / 7:00 EST Connecting teams [LiveStream]
- Welcome
 - Introductions
 - Overview of the Program
 - Dinner

February 22nd, 2018- Day 2:

8:00 am MST – 7:00 pm MST

10:00 am EST – 9:00 pm EST

- 8:00 MST / 10:00 EST [LiveStream]
Coming together
- 8:30 MST / 10:30 EST - Shared Vision
- 10:00 MST / 12:00 EST Coffee break
- 10:15 MST / 12:15 EST [LiveStream]
Recap of Goals, Activity Outline
- 10:30 MST / 12:30 EST – Languages and Capabilities
- 12:00 MST / 2:00 EST Working lunch: Recap, Rest, Integrate
- 1:00 MST / 3:00 EST – [LiveStream]
Reconnecting / Reflecting
- 1:30 MST / 3:30 EST – Exploring Process
- 4:00 MST / 6:00 EST – [LiveStream]
Exchanging Recommendations
- 5:30 MST / 7:30 EST – Working Dinner:
Gathering consensus and reflections

February 23rd, 2018- Day 3:

8:00 am MST – 11:00 am MST

10:00 am EST – 1:00 pm EST

- 8:00 MST / 10:00 EST – [LiveStream]
Charge for the Day / Reconnecting
- 8:30 MST / 10:30 EST – Defining Success
- 10:00 MST / 12:00 EST – [LiveStream]
Setting Collective Goals to Advance the Field

Workshop concludes at 11:00am MST / 1:00pm EST

Note:

This workshop focuses on setting the terms for engagement at a professional convening that will help advance understanding of processes and products that bring the sciences and arts together to advance sustainability. Participants are asked to consider what concepts or questions are necessary to understand how transdisciplinary or interdisciplinary engagement can lead to environmental sustainability at the biological, individual and human systems levels.

**SPECIAL OPPORTUNITY AT 5:00pm EST on 2/21
FOR PRINCETON EARLY ARRIVERS!**

On Wed, 2/21 at 5:00pm at the Princeton Museum of Art join Veronica White and Catherine Riihimaki for a behind-the-scenes tour of the Art Museum. See page 4 for details.

**SPECIAL OPPORTUNITY AT 3:00pm MST on 2/21
FOR BOULDER EARLY ARRIVERS!**

On Wed, 2/21 at 3:00pm join Tim Scheitlin for a guided tour of NCAR's Mesa Lab, Climate Change Exhibit and Visualization Lab. See page 2 for details.

Boulder, CO Travel, Logistics and Maps

Hotel Info

Millennium Harvest House Boulder Tel (303) 443-3850
1345 28th St, Group contact: **Sarah Avila**
Boulder, CO 80302
Info: www.millenniumhotels.com/en/boulder/millennium-harvest-house-boulder/

Hotel is an easy 20- to 25-min walk from the SEEC Building

Getting to Boulder

Traveling from Denver International Airport (DEN) to Boulder: The trip is 45-60 minutes, depending on weather and traffic.

By shuttle: Green Ride \$40 (visit the website to book)
<https://www.greenrideboulder.com/>

By bus: RTD Denver runs the AB1 bus from the bus and train station at DEN to downtown Boulder every hour or half hour for \$9 (riders should bring exact change and ask for a transfer). You will have to transfer to a local or regional bus to get from the AB route to the hotel: Use Google maps to see the best route at the time you will be arriving.

RTD Schedule: <http://www.rtd-denver.com/airport.shtml>

ROUTE AB/AB1/AB2: BOULDER / DENVER AIRPORT

Getting from the hotel to the meeting place

Wednesday activities will take place at the National Center for Atmospheric Research (NCAR) Mesa Lab. Thursday-Friday activities will take place at the Sustainability, Energy, and Environment Community (SEEC) on the University of Colorado-Boulder (CU) East Campus.

Getting from the hotel to the meeting place

WEDNESDAY National Center for Atmospheric Research
NCAR Mesa Lab 1850 Table Mesa Drive, Boulder, CO 80305
<https://www2.ucar.edu/campus/mesa-laboratory>

Tel: reception desk 8:00 a.m.-4:30 p.m.(303) 497-1126
After hours security: (303) 497-1139

**SPECIAL OPPORTUNITY AT 3:00 pm MST on 2/21
FOR BOULDER EARLY ARRIVERS!**

On Wed, 2/21 at 3:00pm join NCAR staff members and Tim Scheitlin and Tim Barnes for a guided tour of NCAR's Mesa Lab, Climate Change Exhibit and Visualization Lab <https://www2.cisl.ucar.edu/vislab> The Vislab supports an immersive environment for visualizing complex datasets (including storms, climate models, etc.) in stereo-3D and collaborating across sites via high-definition video conferencing. Meet fellow participants and nourish your spirit during this informal conversation before heading into NCAR's Damon Room for the full group session at 4:30pm.

For the tour at NCAR, please meet in the hotel lobby by 2:30 p.m. We will provide shuttle service to NCAR for the tour.

All others please meet in the hotel lobby at 4:00 p.m. We will provide shuttle service to NCAR for the evening session.

If your plane arrives such that you can't catch either of those shuttles, please do not go to the hotel but come directly to NCAR.

Workshop Details: Schedule, Locations, Meals

SEEC –

The Sustainability, Energy, and Environment Community

University of Colorado Boulder East Campus
4001 Discovery Drive, Boulder, CO 80303

The SEEC Building is an easy 20- to 25-minute, 1.2 mile walk from the hotel.

Walkers please meet in the hotel lobby by 7:15 a.m. for a group walk along the Boulder Creek path to SEEC.

Rides will be available for those who don't wish to walk, meet in the hotel lobby by 7:30 a.m.

Wednesday, 2/21 – Museum tour, kickoff and dinner

NCAR Damon Room, 4:30-7:00 p.m. (The dinner takes place at an early hour to synchronize with the group at Princeton.)

Transportation will be provided back to the hotel.

Thursday, 2/22, 8:00 a.m - 7:00 p.m.

Breakfast on your own. Hotel restaurant opens 6:30 a.m.; light breakfast will also be available at SEEC.

Meeting begins promptly at 8:00 a.m. in **SEEC room S228**

Working lunch in meeting room

Thursday dinner: (5:30 p.m.)

Zolo's Restaurant Patio, a 32 minute 1.5 mile walk from SEEC and a 6 minute walk from the hotel.
2525 Arapahoe, Boulder, CO 80302

Friday, 2/23, 8:00am – 11:00am

Breakfast on your own (hotel restaurant opens 6:30 a.m.; light breakfast available at SEEC)

Meeting begins promptly at 8:00 a.m., **SEEC room S225**

Workshop concludes at 11:00 a.m.

Other Useful Information

NCAR Mesa Lab

Daily guest wireless pass will be available upon arrival

For more information:

<https://www2.ucar.edu/campus/mesa-laboratory>

Standard open hours for the Mesa Lab are 8:00 a.m. to 4:30 p.m. (we have special permission to stay longer through our kickoff and dinner).

NCAR host, **Lisa Gardiner**, can provide answers to questions regarding NCAR (303) 870-8732 cell.

SEEC

Standard open hours for campus buildings are 7:00 a.m. to 7:00 p.m.

SEEC host, **Shelly Sommer**, can provide answers to questions regarding SEEC (303) 859-9898 cell.

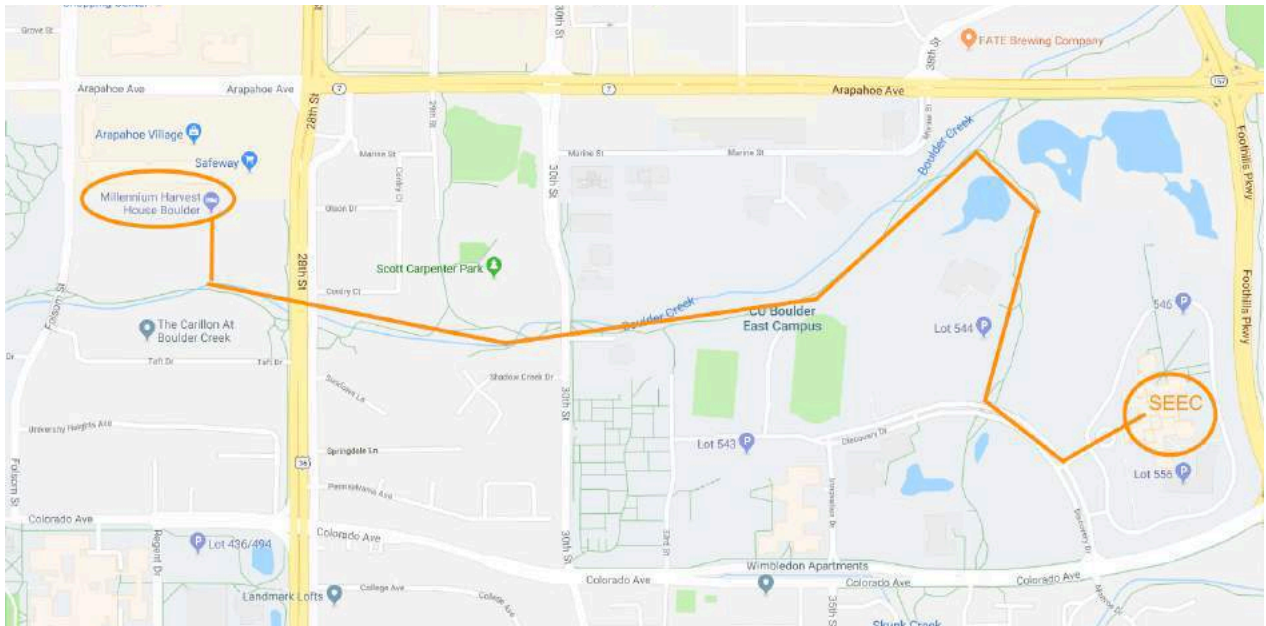
Altitude

Boulder is at 5280 feet above sea level, and you may experience some effects of being at a high elevation: shortness of breath, dizziness, headaches, and/or difficulty sleeping – or you may experience no effects at all. Each person is different.

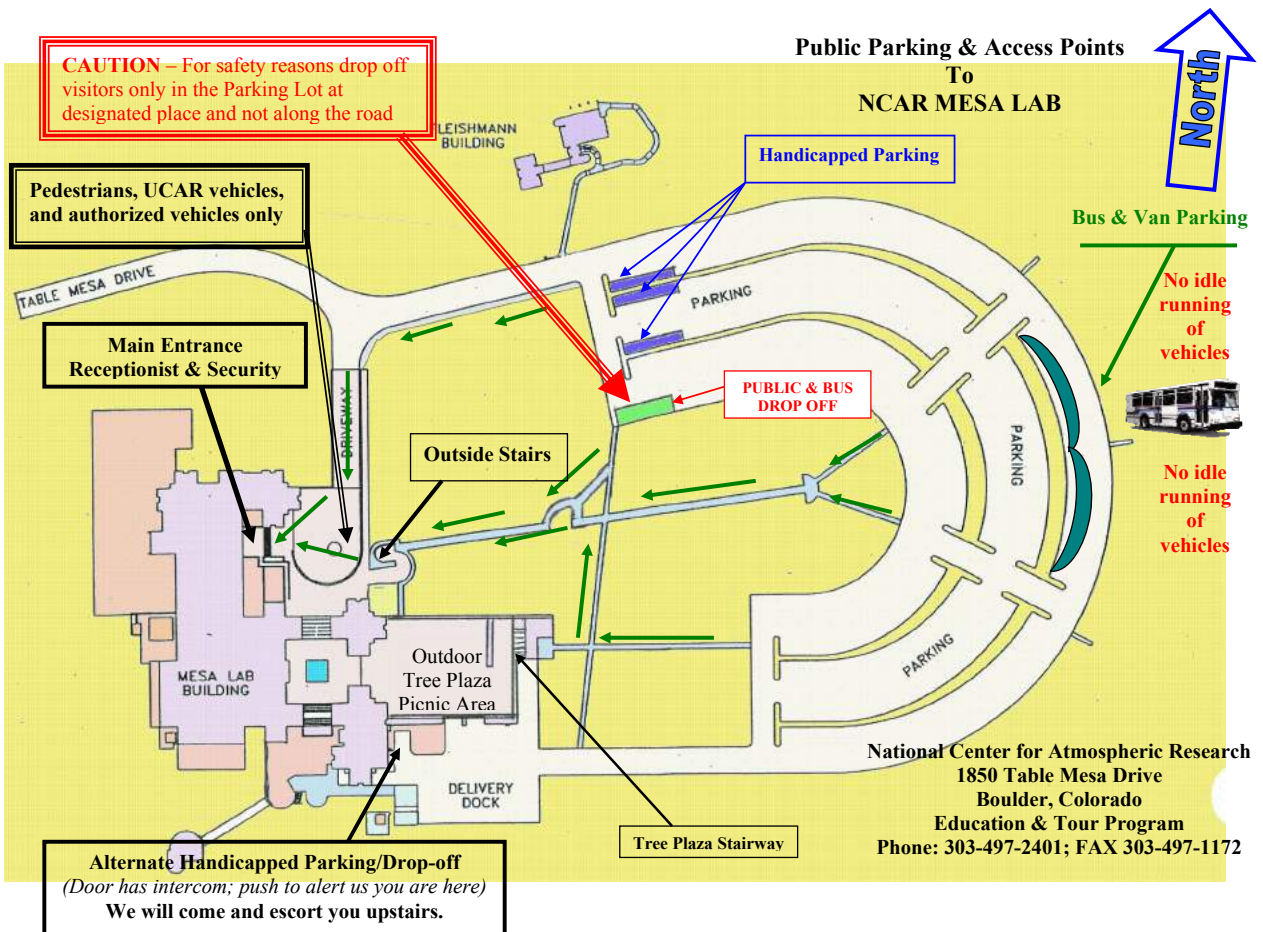
Drink water, be aware that alcohol will affect you more than at sea level, and if you wish, bring over-the-counter altitude sickness medication.

“Day of” questions or confusion?

First try **Marda Kirn (303) 359-3811** and/or on Wednesday, **Lisa Gardiner at NCAR, (303) 870-8732** on Thursday-Friday **Shelly Sommer (303) 859-9898**.
Texts preferred.



Directions from **Millennium Harvest House** to the Sustainability, Energy, and Environment Community (SEEC)



Princeton, NJ Travel, Logistics and Maps

Hotel Info

Nassau Inn Tel (609) 921-7500
100 Palmer Square East, Group contact: **Kyle Pitts**
Princeton, NJ 08542 Info: **www.Nassaulnn.com**

Hotel is an easy 12-min walk from the Princeton Dinky train station.

Getting to Princeton

Visit the University's website for visitors to Princeton University for ground transportation info:
<https://www.princeton.edu/meet-princeton/visit-us#air-train-travel>

Traveling from Newark Airport (EWR): Take NJ Transit train from EWR to Princeton. The trip is just over one hour. One-way fare is \$17-\$19.

Traveling from NYC: Take NJ Transit train from Penn Station to Princeton. The trip is under 1.5 hours. One-way fare is \$16-\$18.

Traveling from points south of Princeton: Take Amtrak to Princeton OR Trenton (if Trenton, connect to NJ Transit train to Princeton; 12-15 minute ride) and follow "Dinky" directions below.

Arrival by train: Transfer from the main NJ Transit train in Princeton Junction to the small "Dinky" train for a 5-min ride to the Princeton station, then walk to hotel (10-12 minutes) or meeting site (14-20 min). Search NJ Transit for Princeton trains, and the Dinky leg of your trip will be factored into the resulting trip times. Your NJ Transit ticket to Princeton includes the short ride from Princeton Junction to Princeton.

NJ Transit schedule:

http://m.njtransit.com/mo/mo_servlet.srv?hdnPageAction=TrainSchedulesTo

Dinky schedule:

http://www.njtransit.com/sf/sf_servlet.srv?hdnPageAction=TrainSchedulesFrom.

Getting from the hotel to the meeting place

All meetings and activities are within 10-15 minute walking distance of one another.

Hotel to Maeder Hall (meeting site) is approximately one mile, an easy walk through campus. The attached map notes key locations.

Tiger Transit is the campus shuttle bus service. Routes and schedules:

<https://transportation.princeton.edu/options/tigertransit>

All shuttle buses are accessible for wheelchairs.

Princeton Art Museum Tour:

Where to meet: Facing the Museum main entrance, walk around to the right, down the stairs and through the tunnel to a wooden door on the left that says "staff entrance."

SPECIAL OPPORTUNITY AT 5:00pm EST on 2/21
FOR PRINCETON EARLY ARRIVERS!

On Wed, 2/21 at 5:00pm at the Princeton Museum of Art, join Veronica White and Catherine Riihimaki for a behind-the-scenes tour of the Art Museum when it is closed to the public. Learn about their interdisciplinary work exploring ways in which people can discuss climate change and our relationship to the environment through analyzing historic paintings and photographs. White and Riihimaki will engage participants in a formal analysis of several works, while also discussing how they use these works to open doors (and minds) to the connections between art, science, and the world at large. Meet fellow participants and nourish your spirit during this informal conversation and tour before heading to Maeder Hall for the full group session at 6:30pm.

Workshop Details: Schedule, Locations, Meals

All A2A Princeton meetings will take place on the Princeton campus at:

Andlinger Center for Energy and the Environment:

Main meeting: **103 Maeder Hall**

Breakout discussions: **102 Maeder Hall**

Wednesday, 2/21 – Museum tour, kickoff and dinner

Andlinger Center for Energy and the Environment:
6:30-9:00 p.m.: **103 Maeder Hall:**

Thursday, 2/22, 10:00am- 9:00pm

Breakfast on your own (suggestions, see map):

- PJ's Pancake House at 154 Nassau Street,
- Small World Coffee at 14 Witherspoon Street, and the
- EQuad Café in the School of Engineering.

Meeting begins promptly at 10:00am, **103 Maeder Hall**

Working lunch will be served in the meeting room

Thursday dinner in Prospect House located on campus a short walking distance from Maeder Hall

Friday, 2/23, 10:00am- 1:00pm

Breakfast on your own (see suggestions above)

Meeting begins promptly at 10:00am, **103 Maeder Hall**

Other Useful Information

Princeton University Visitor Wireless Network Name:
puvisitor

No login or password is required

For more information:

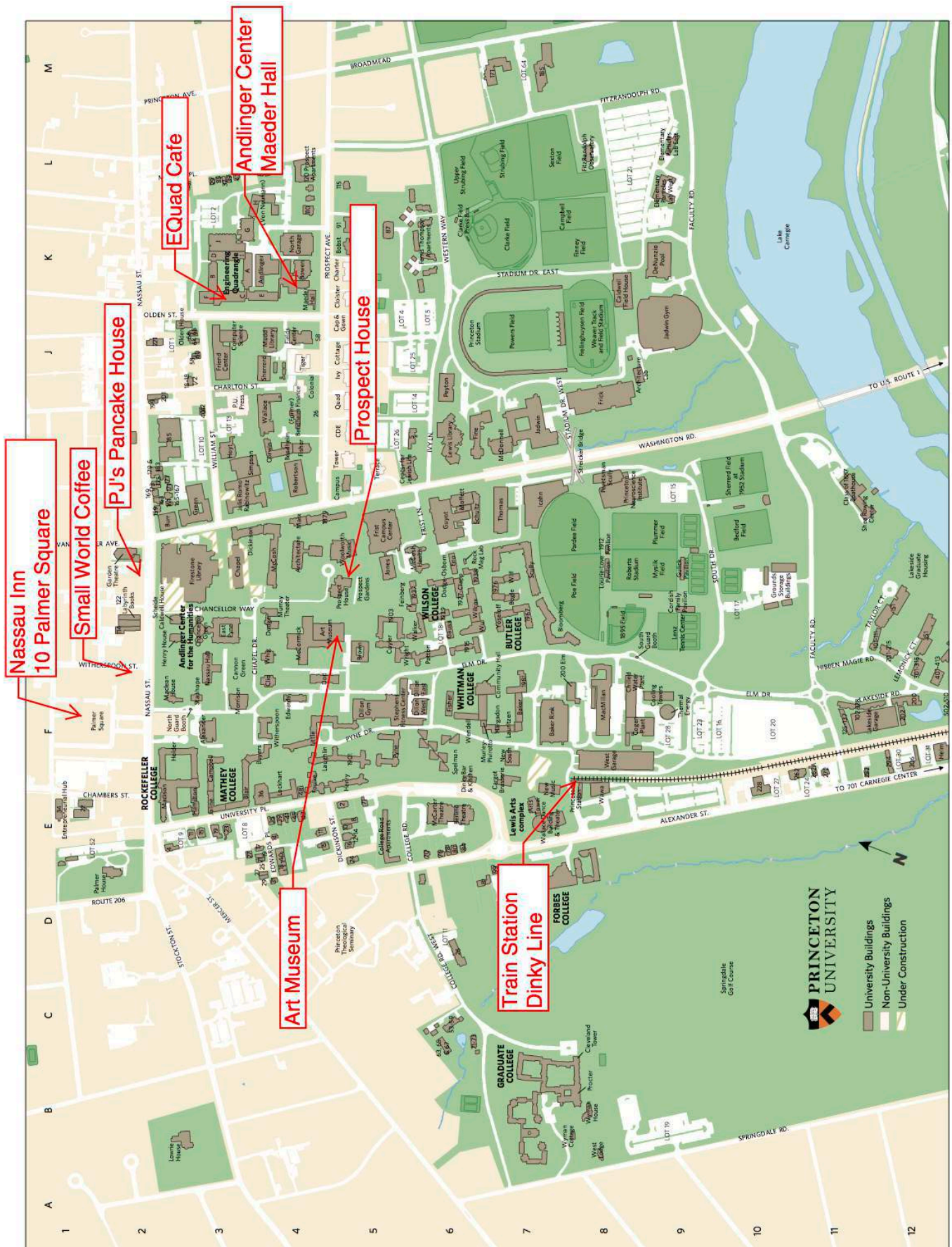
<https://www.princeton.edu/frist/OITVisitorWireless.pdf>

Standard open hours for campus buildings are
7:00am to 8:30pm.

Princeton hosts: **Elke Weber** and **Charmaine Smiklo** will provide any access needed outside of regular hours. No special security access is needed for our meeting locations.

“Day of” questions or confusion?

First try **Elke Weber (646) 896-9410** and then
Charmaine Smiklo (609) 203-3175



Perspectives on Science, Art, and Sustainability

Introduction

On behalf of INSTAAR, EcoArts Connections, NewKnowledge Organization (NKO), and our planning team, we'd like to thank you for participating in the **A2A: Awareness to Action Planning Workshop** February 21-23, 2018. The project team has convened an inclusive group of scientists, artists and other thinkers and practitioners from diverse backgrounds and disciplines, all in pursuit of creating a more sustainable world. You were invited to join because of your expertise and excellence in your field.

Together, A2A participants' fields of knowledge, experience, and wisdom include: Earth system, atmospheric, and climate sciences; FEW (food, energy, and water) security; social science and survey research; science education and outreach; STEM and STEAM (Science, Technology, Engineering, Art, and Math); visual, socially engaged, and digital/media art; storytelling, playwriting, and theatre; music and film; writing, literature, and Afrofuturism; arts administration and producing; digital fabrication; social and environmental justice; Traditional Knowledge; urban planning and design; energy efficiency; economics and business analysis; social, conservation, cognitive, and depth psychology; rational vs. emotional/intuitive information processing; early childhood education, literacy, and instructional practice; community-based social marketing; medicine, epidemiology, and toxicology; engagement strategizing, community building, social mobilization, coalition and network development, and cross-sector collaboration and partnerships; policy change; philanthropy; systems thinking; environmental philosophy, utopistics, transition studies, and political ecology; and more.

Implicit in the diversity of participants is our acknowledgement that we do not see any one discipline as having greater or lesser ownership of knowledge, experience, insight or wisdom, and that we value the breadth of distinct voices that will be in our rooms. As you read the following pages, we also want to recognize that the language and terminology we use here is specific to the histories and

disciplines of the authors at NewKnowledge. This overview is one approach among many. We look forward to diving deeper into the topics at hand with your experience and expertise over the course of the workshop.

With a respect for multiple perspectives in mind, we'd like to thank you for the time you are taking to be in Boulder or Princeton, and the time you took to complete the questionnaire and share resources. You will find a list of all A2A participant-provided resources in the Resources & References section, and will have access to them through the Dropbox link, also provided in that section. These materials are organized into a number of broad categories: Art Education, Climate Literacy, Indigenous Cultures, Artworks, Science and Art Collaborations, Science Education, and Social Impacts. We hope these resources can be tools for your workshop preparation and more. Feel free to read what interests you and time permits. This is not a requirement, however we ask you to consider reviewing 3-5 resources outside your disciplinary boundaries.

This is a planning workshop. It is the first in what will be three step-wise convenings. In this first convening, we are working toward understanding how future cross-disciplinary convenings can more efficiently and effectively bring science and STEM disciplines to a wider public in collaboration with the arts through sustainability topics that are place-based, targeted to, and meaningful for specific audiences. Our work together centers on the *operational strategies* for collaborative work, rather than the *substance* of prospective collaborative projects. This is a nuanced difference, but an important one. We feel that putting our full attention on determining the best ways to share our expertise and experience across disciplines, networks and professions is essential to creating convenings that most effectively support successful sustainability-focused collaborations.

In the questionnaire you received, you noted barriers to facilitating effective science-art-sustainability collaborations, suggested potential solutions to these barriers, and expressed what you hoped to achieve in attending the

workshop. The most commonly mentioned barrier was the lack of a common language, with disciplinary silos, time constraints, and disciplinary/professional equity following on and representing significant areas of overlap. Other less common, but no less important, descriptions of barriers included differences in process, values, and theories of change; linear rather than systems thinking; lack of understanding around social and personal change; lack of resources, funding, and public understanding; geographical separation; different disciplinary customs and norms around emotional engagement and expression; finding appropriate settings to collaborate; dominant paradigms; gloom and doom messages devoid of nuance or agency; and issues of evaluation and measurability.

Many of you responded thoughtfully to how these barriers might be addressed. Four suggestions ranked the highest: incorporate science-art sustainability collaborative interests into educational venues, create prolonged networks and connections among scientists, artists, and others, find and champion positive case studies, and increase/facilitate communication. These responses appear to correspond to the barriers of common language, disciplinary silos and time constraints. Other solutions that were offered included making efforts to be more equitable, creating solution-focused partnerships, emphasizing accountability, understanding metrics of success, funding, more effectively addressing emotional aspects, working with imagination and storytelling, understanding processes, listening, staying open minded, facilitating strategic partnerships, including joy, fun and kindness, working with acceptance and inclusion, and being more politically involved.

The barriers and solutions you mentioned we too at NKO have encountered in our own work and research. We look forward to exploring how to engage with the tensions and space they can create. These issues will help guide our discussions.

Background

A2A is intentionally designed to undo the stereotypical science-art binary by including other disciplines to fill gaps in knowledge and practice as well as to provide additional pathways for understanding and results. Because so many

past cross-disciplinary collaborations have embraced the binary, however, we thought it might be helpful to offer a quick, academic history of science-art interaction.

Science and art have been connected for more than 20,000 years; images of the pre-historic cave paintings in Lascaux, France are claimed on the first pages of both science history and art history books as “first images” of their disciplines. Taking a cursory look over the last three millennia, it’s clear that art and science have had a consistently connected history and that the separation of the two appears to be a relatively recent trend. Within Western European traditions, for example, poetry has been intertwined with scientific study since at least the sixth or fifth century B.C.E., when Pre-Socratics used verse to write about physics, chemistry, geology, astronomy, theology, metaphysics, and epistemology (Curd, 2016). Renaissance philosophers from Leonardo da Vinci to Johann Wolfgang von Goethe often don’t distinguish between their work as artists and their study of biology, anatomy, botany, and astrology.

In spite of the long marriage of science and art, these two broad areas of practice are now often typified as opposed forces, polar opposites on a spectrum of mental process. As Wright and Linney (2006) note, science and art are “stereotypically thought to be at opposite ends of the intellectual spectrum,” and evidenced by the “legacy of blind faith in scientific fact, coupled with romantic notions about the subjective and imaginative qualities of art” (p.11). These two disciplines are often pitted against each other due to their perspectives on core epistemological questions, where art is “comfortable with uncertainty, and is not necessarily interested in finding answers... whereas much of science is looking for answers, and is — in some cases misguidedly — seeking certainty” (Wright & Linney, 2006, p.11).

These differences in perception are used as arguments both for and against collaboration. Science and art are often seen on these spectra: objectivity vs. subjectivity, restriction vs. freedom, public vs. private. Joining forces across these disciplines enables collaborative teams to use subjective notions to express their objectives in a more free and public arena, touching a wider audience in an inspirational and moving manner, while at the same time conveying sound scientific information. However, some believe that the

collaboration may compromise the integrity of the work, not only in its content but also in its critique. For example, skepticism among arts gatekeepers about the appropriateness and potential aesthetic excellence of “issue-based art” continues to hinder support for collaboration. Although interesting and thought provoking, interdisciplinary work might also weaken its impact by spreading itself thin between two disciplines. An individual may be taken more seriously in their field by focusing on their area of specialty.

Still, there appear to be an increasing number of science-art collaborations in a wide variety of academic, museum, not-for-profit organization, and independent research contexts, among others. The increase in the number of science-art-sustainability collaborations has the potential to impact society broadly. Unfortunately, there also appear to be barriers to the creation, proliferation, dissemination, and evaluation of the products of and research about these collaborations. While you and other A2A participants have collectively identified many of these barriers, as mentioned before, additional and specific barriers should also be noted.

For example, while the STEM to STEAM movement is infusing art and design into the teaching of STEM subjects across the country, professional performing and visual arts networks are largely separated from STEM endeavors. In addition, efforts to apply both STEM and arts research, modes of knowing, and wisdom to sustainability topics (e.g. food, energy, and water security; transportation; health; waste management; and urban planning, etc.) are often not grounded in basic social science research for effective communication and engagement strategies. Furthermore, as Wright and Linney (2006) explain, “A motivating factor at the heart of both arts and sciences is a desire for the pleasure of understanding something new and of communicating this to others” but a “binary division” between science and art often neglects to take into consideration how the social and cultural context informs the pursuit of each discipline. Finally, in the face of climatic disaster, the need for cross-disciplinary collaborations to inspire action is essential - in addition to increasing knowledge and awareness.

The authors of this briefing feel they have witnessed science-art-sustainability collaborations on increase across the US. We acknowledge that “sustainability” in many of these

projects and others we may not be aware of, has been defined in many different ways. Therefore, we felt it important the purposes of our planning workshop, to adopt the definition of sustainability outlined by the United States Global Change Research Program. On behalf of the 13 federal agencies it represents, the program states, sustainability is “*balancing the needs of present and future generations while substantially reducing poverty and conserving the planet's life support systems*” (U.S Global Change Research Program, 2012), in an effort to work toward a healthy human society that is in harmony with both natural and social/cultural environments. This includes concepts of environmental justice, resilience, regeneration, stewardship, and sustainability sectors that include food, energy, and water security; health; transportation; waste management, urban planning, Traditional Knowledge, mental health and well-being, and politico-social paradigms.

While these cross-cutting topics have been investigated by the natural sciences, the social sciences, and a broad array of artists working across various art forms, science-art-sustainability collaborations are a relatively newer field often involving social practices that have not received the same amount of research. For those collaborations initiated by artists, most have had to rely on anecdotal reports of their wide-ranging effects since few quantitative studies have been funded to demonstrate a substantive relationship to the collaborations’ broader impacts on society. To date there is a lack of empirical research that describes how successful collaborations resulted in significant behavioral changes that lead to environmental sustainability - something that we hope to explore as part of our workshop. Given the potential importance of this work, measurements of impact are vital to continuing to determine best practice in collaboration.

Plurality of Thought

We believe the issues of a common language and disciplinary silos are very relevant and address them here in greater detail to set the tone for our gathering. Science, art, and other disciplines may have distinct cultures and distinct outputs, and yet they share similar intentions and precepts at their foundations, which can create the perfect situation to explore the possibilities of their partnership. We suggest that one of the greater obstacles to appreciating the value of

science-art-sustainability-thinker-and-practitioner collaborations is primarily due to a misunderstanding of how to facilitate communication between different cultures. Our work at NKO across science and art suggests that much interdisciplinary work has fallen prey to a natural tendency to acquiesce and diffuse tension through compromise. This desire to suppress difference, perhaps as a way to avoid tensions, may have concealed important epistemological differences. These differences play key roles in impactful interdisciplinary collaborations.

Conflict Transformation Theory offers a useful set of principles that can aid in the exploration of a deeper potential in cross-disciplinary collaborations. The theory acknowledges the underlying intentions of all participants to seek and produce knowledge or gain wisdom and insight through their disciplinary rules and practices. Conflict Transformation Theory suggests that to reach beyond those disciplinary practices, it is important to let go of prescribed or assumed successful outcomes that have conformed to past rules and practices within a discipline in order to compare consequences of each discipline alongside those of other disciplines. We hope that this workshop offers an opportunity to explore collaborations with the understanding that deeper knowledge may arise not in spite of a tension between fields, but because of it. If we, as a group, acknowledge the value in paradox and tension, we can allow that different perspectives can contribute different bodies of knowledge concerning the same phenomena and all be appropriate, without threatening the integrity of any practical or intellectual pursuit. This negotiation among worldviews we understand as the value of plurality of thought.

Within the field of conflict resolution, conflict is merely a point of departure from which different, seemingly incompatible trajectories begin. These trajectories can either fail to resolve or be ameliorated through successful resolution. Certainly, having multiple and at times competing perspectives is a natural manifestation of the human experience. However, plurality of thought and tensions that cause an impasse are two different things. Here we focus on plurality of thought that can *strengthen* collaborations.

To find deeper levels of truth and greater understandings of reality, as put forth by scientific, artistic and other disciplines,

we feel Bhabha's 1990 model of emergent production of knowledge in a "third" space is essential. That is, a space that is not owned by any of the disciplines relevant to this project, whether that be sustainability as a premise about human interactions with natural and social systems, the scientific method of knowledge production, or the arts as paths for exploring the human experience. For this workshop we identify the context of our work together as a third space we can all enter together outside of our disciplinary homes and work pursuits. We accept Bhabha's premise that together we will allow ourselves to work in a physical, emotional, and intellectually hybrid space that allows for learning to occur amidst potentially, seemingly incompatible narratives. By allowing ourselves this discomfort, we hope this effort encourages the emotional and intellectual space needed to make new meaning, gain understanding, and to explore new ideas. In Bhabha's words describing the third space, it is where meaning is constructed across the bar of difference and separation (Bhabha 1990, p. 210).

Within these rules of engagement, Bhabha notes that it is important to have a moderator/interpreter (or educator in Bhabha's framing), who serves to translate the multiple languages without suppressing the value of any (in other words, the plurality of thought). This is perhaps exactly the phenomenon that Tom Finkelpearl illuminated when, as the Executive Director of the Queens Museum of Art, he noted that "a lot of artists want to do social action but they haven't been trained in social action and there are people who know how to do that stuff called Community Organizers for example. And we have community organizers on our staff and we've had staff members who have gone for training in community organizing because they've been trying to do things that community organizers do but they don't know how to do it" (Finkelpearl, 2012). Finkelpearl's framing of this new space for knowledge did not cede territory to community organizers, but rather, he suggested that by opening the doors of an art museum to disciplinary specialists, it was possible to create new ways for artists and communities to develop shared knowledge.

Natural scientists have long been interested in reaching broad audiences with their research, but are often not trained in communicating to people outside of their own fields. In

those cases, forming new alliances with those whose specialties include social science, communications, and/or the arts offers rich new terrain for the production of shared knowledge. In our case, workshop facilitators will attempt to serve as translators and moderator/interpreters among and across all disciplines and worldviews present. They are charged to call on participants to delve deeply into their practices to explore the tensions that surface when rules and conventions for understanding are disrupted. They will ask all present to describe difference and disruption to past practice that may be uncomfortable, but may also allow ways that we can consider science, art, and sustainability from new shared perspectives.

The project team hopes to create this greater understanding over the course of our workshops in Boulder and Princeton as we discover and refine best practices for future convenings that support cross-disciplinary collaboration focused on inspiring sustainable living.

Lastly, the authors of this workshop introduction brief want to recognize each A2A participant's personal intentions and hopes for attending this workshop. The majority of you mentioned expanding or creating a network of professionals, finding partners to collaborate with in the future, and/or deepening understanding of art, science and sustainability intersections. There will be time built into the workshop to pursue these important community-deepening and network-building goals.

Thank you again for your interest, time and commitment. We look forward to working together.

Boulder Participants



Kim Abeles
arts, sustainability,
environment

Kim Abeles is an artist whose community-based projects explore biography, geography and environment. She has created projects with the California Science Center, air pollution control agencies, health clinics and mental health departments, and natural history museums in California, Colorado and Florida. Abeles received the 2013 Guggenheim Memorial Fellowship and is a recipient of fellowships from the J. Paul Getty Trust Fund for the Visual Arts, California Community Foundation and Pollack-Krasner Foundation. She is currently working on sculptural suitcases for Camp Ground: Arts, Corrections and Fire Management in the Santa Monica Mountains that embeds artists in the Los Angeles County Fire Department to work in collaboration with paid and inmate workforces. Her work is in public collections including MOCA, LACMA, Berkeley Art Museum, California African American Museum, and National Geospatial Intelligence Agency. Abeles' journals, books, and process documents are archived at the Center for Art + Environment, Nevada Museum of Art.



Max Boykoff
social science,
sustainability,
environment, policy work

Maxwell T. Boykoff (Max) is an Associate Professor in the Center for Science and Technology Policy, which is part of CIRES (Cooperative Institute for Research in Environmental Sciences) at the University of Colorado-Boulder. He teaches in the Environmental Studies program and is Adjunct faculty in the Geography Department. In addition, Boykoff is a Senior Visiting Research Associate in the Environmental Change Institute at the University of Oxford. He holds a PhD in Environmental Studies from the University of California-Santa Cruz and Bachelor of Sciences in Psychology from The Ohio State University. His interests include climate adaptation, cultural politics and environmental governance, science-policy interactions, and political economy and the environment.



Alison Carey
art, social justice,
organizing

Alison Carey is director of American Revolutions: the United States History Cycle, the Oregon Shakespeare Festival's multi-decade program of commissioning and developing 37 new plays about moments of change in United States history, including Tony and Pulitzer winners and works that explore the history of the relationship between Americans and their environment. Carey is co-founder and former resident playwright of Cornerstone Theater Company, which creates work with and for communities across the United States. Her *California: The Tempest* explored the effects of climate change on the Golden State and her work has been produced at venues nationwide, including Arena Stage, the Public Theater, the Mark Taper Forum, the shuttered mother plant of Bethlehem Steel, and a dirt-floor cattle sale barn. She speaks nationally on the importance of the arts in undermining white supremacy, promoting environmental justice, and shaping healthy and equitable societies.



Ramón Cruz
sustainability,
environment, policy work

Ramón Cruz brings experience that intersects fields of sustainability, environmental policy, urban planning, energy and climate change. In his native Puerto Rico, he worked in the public sector as Deputy Director of the Environmental Quality Board (the state environmental regulatory agency) and as Commissioner of the Puerto Rico Energy Commission. Non-governmental work includes senior positions at the Environmental Defense Fund, the Partnership for New York City and the Institute for Transportation and Development Policy.

Boulder Participants



Frank Ettawageshik
arts, sustainability,
social justice,
environment, organizing,
policy work, business

Frank Ettawageshik lives in Harbor Springs, Michigan, with his wife Rochelle. He has four adult children and six grandchildren. He served in tribal elected office for sixteen years, fourteen as the Tribal Chairman of the Little Traverse Bay Bands of Odawa Indians in Harbor Springs. During his tenure as Tribal Chairman he was instrumental in the adoption of the Tribal and First Nations Great Lakes Water Accord in 2004 and the United League of Indigenous Nations Treaty in 2007. Now serving as the Executive Director of the United Tribes of Michigan, he also serves on the Environmental Justice Workgroup for the State of Michigan, the Michigan Water Use Advisory Council, and on the Executive Board of the Little Traverse Conservancy. In 2015 he attended the UNFCCC COP21 (United Nations Framework Convention on Climate Change, Council of the Parties 21) in Paris, France, as a delegate from the National Congress of American Indians.



Alexis Frasz
arts, sustainability,
social justice,
environment, digital
media/technology

Alexis Frasz is co-director of Helicon Collaborative, a research and strategy consultancy working for a more sustainable, equitable and creative future. She leads Helicon's work at the intersection of art and environmental sustainability, which seeks to understand, create, and share effective arts and culture based strategies for change, and amplify the role of artists in society. Selected recent work related to art and sustainability includes: Participating in and reporting for Beyond Green: The Arts as a Catalyst for Sustainability (at the Salzburg Global Seminar, a convening of 60 practitioners from 27 countries across the arts and sustainability sectors); developing a framework for understanding socially-engaged artistic practice; research on how place-based arts and cultural interventions are advancing sustainability outcomes for communities; and research into the state of funding at the intersection of art and environment (including convening 36 arts funders, environmental funders, and artists to discuss work at this intersection).



Johnny Fraser
social science,
architecture,
environment, social
action

John Fraser (Johnny) is a conservation psychologist, architect, and educator. His research focuses on how our experience with media and community influences learning, attitudes, and motivations for engagement with solving the problems that face society. He has formal training in environmental studies, experimental art and film, and worked in a variety of capacities on feature films and an Emmy winning environmental documentary. He is Adjunct Professor in Earth Science at Indiana University, Editor of *Curator: The Museum Journal*, and a founding editorial board member for *Museums & Social Issues*. He is President Elect of the American Psychological Association's Division 34, Society for Environment, Population and Conservation Psychology and a Bill and Melinda Gates Foundation Media Impact Fellow at the Norman Lear Center, Annenberg School of Journalism and Communication, University of Southern California.

Johnny will facilitate the program in Boulder



Anne Gold
climate change, natural
science, education

Anne Gold is Director of Education and Outreach at CIRES (the Cooperative Institute of Research in Environmental Sciences). A climate scientist by training, she received her doctoral degree in paleoclimatology from the University of Regensburg in Germany. Her science expertise focuses on glaciation patterns in European and Asian Mountain Ranges and landscape evolution. She focuses now on science education for educators, students and the general public around climate and general geoscience education.

Boulder Participants



Jeff Hohensee

sustainability, social justice, environment, organizing, business.

Jeff Hohensee has been a change agent for over 40 years. He has worked in corporate finance, public schools, nonprofits, and clean tech start-ups. Throughout his career he has helped catalyze breakthrough innovation, accelerate sustainability implementation and enhance human well-being. At TreePeople Hohensee helped build a statewide network for environmental education and led social mobilization campaigns that integrated media, service learning, leadership development and mentoring to inspire over 100,000 teenagers annually to lead service projects in their neighborhoods. At Natural Capitalism Solutions he built a consulting practice that guided sustainability planning and breakthrough implementation for corporate clients representing 3% of U.S. GDP. Hohensee oversaw concept design of the recent Alliance Center renovation which integrated space design, green building, workplace well-being and technology to improve tenant productivity and encourage innovation. He recently started working at a clean-tech start-up to scale deployment of their breakthrough technology to help feed the world.



Mark Kesling

natural science, arts, sustainability, social justice, environment

Mark Kesling is an artist and science educator who has worked in the field of museum education and design for more than 30 years. He has designed, created and managed major exhibits and installations in museums including The Children's Museum of Indianapolis, The Museum of Science and Industry in Chicago, The Carnegie Museum, The Exploratorium, and the Children's Museum of Wilmington. He is currently the Founder and CEO of the daVinci Pursuit. Kesling continues to provide leadership in art and science through the design of a "museum without walls." He works with neighborhood, city, institutional, artist and educational partners to create science installations in some of the most neglected neighborhoods in Indianapolis.



Jeff Kiehl

natural science, social science.

Jeffrey T. Kiehl (Jeff) is a senior scientist at NCAR (the National Center for Atmospheric Research) and an adjunct professor in the Environmental Studies Department at the University of California, Santa Cruz. He has published over 140 articles on climate change and is the author of the new book (Columbia University Press), *Facing Climate Change: An Integrated Path to the Future*. He was the 2012 recipient of the American Geophysical Union Climate Communication Prize. Kiehl also holds a master's degree in psychology from Regis University and is a Diplomat Jungian Analyst with the C.G. Jung Institute of Colorado, the Inter-Regional Society of Jungian Analysts and is a member of the International Association of Analytical Psychology. He is a Fellow of both the American Meteorological Society and the American Geophysical Union. Kiehl has given numerous talks nationally and internationally on the psychological dimensions of communicating the science of climate change.

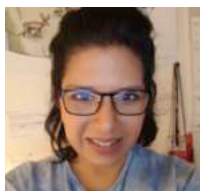


Marda Kirn

arts, sustainability, social justice, science-arts-sustainability collaborations

Marda Kirn is the founding director of EcoArts Connections (EAC), which brings the arts together with science, social justice, and Indigenous ways of knowing to inspire people of all ages to live more sustainably – environmentally, economically, socially/culturally, and personally. EAC commissions, produces, presents, and consults on collaborative activities including performances, exhibits, convenings, youth programs, and other events held in both traditional and non-traditional venues. Previous to EAC, Kirn was the founding director of the Colorado Dance Festival, which was considered one of the top three dance festivals in the US during her 14-year tenure (1982-96), bringing artists to Colorado from across the country and the world. She was also a founder and former director of the International Tap Association. Kirn has written for various publications, received numerous awards, and has been a speaker, panelist, and/or consultant for organizations in five continents.

Boulder Participants



Heidi McCann

social science, sustainability, environment, policy work, museum.

Heidi McCann is a graduate of the University of Colorado-Boulder (CU) Museum and Field Studies program and American Studies program. An enrolled citizen of the Yavapai-Apache Nation of Camp Verde, AZ, upon completion of her studies she worked as a Cultural Resource Specialist with the Yavapai-Apache Nation focusing on language preservation and revitalization. She is currently a research faculty member of CU Boulder, an Associate Scientist II at CIRES (the Cooperative Institute for Research in Environmental Sciences) and the Knowledge Exchange Coordinator for ELOKA (the Exchange for Local Observations and Knowledge of the Arctic Project) at the National Snow and Ice Data Center where she has planned cultural events for ELOKA partners and collaborators. She works closely with Arctic community members, Knowledge Holders and researchers from various parts of the Arctic region in North America and Northern Europe.



Frank Niepold

natural science, social science, sustainability, environment, organizing

Frank Niepold is Senior Climate Education Program Manager and the Climate Education Coordinator at NOAA's Climate Program Office in Silver Spring, MD, Climate.gov Education section lead, the U.S. Climate Action Report Education, Training, and Outreach chapter lead for the UN Framework Convention on Climate Change (UNFCCC), and a member of the Federal Steering Committee for the Fourth National Climate Assessment (NCA4). At NOAA, he develops and implements NOAA's climate goal education and outreach efforts that specifically relate to NOAA's climate goal and literacy objective. Niepold is the "Teaching Climate" lead for NOAA's Climate.gov web portal that offers learning activities and curriculum materials, multimedia resources, and professional development opportunities for formal and informal educators who want to incorporate climate science into their work. Additionally, he is a co-chair for the Climate Literacy and Energy Awareness Network (CLEAN) Leadership Board.



Beth Osnes

arts, sustainability, social justice, environment, organizing

Beth Osnes is an Associate Professor of Theatre and Environmental Studies at the University of Colorado-Boulder. She is co-director of Inside the Greenhouse, an initiative for creative communication on climate (www.insidethegreenhouse.net). She recently toured an original musical *Shine* to cities in the 100 Resilient Cities Initiative to facilitate local youth voices in resilience planning, and her book on this, *Performance for Resilience: Engaging Youth on Energy and Climate through Music, Movement, and Theatre*, was recently published. Open Source Materials for using Shine to engage youth are available at: <http://www.insidethegreenhouse.org/shine>. She is currently developing a method toward vocal empowerment for young women that she is researching in Guatemala, Tanzania and the USA. Her book *Theatre for Women's Participation in Sustainable Development* includes her work specific to gender equity in Panama, Guatemala, India, Nicaragua and the Navajo Nation. She is featured in the award-winning documentary *Mother: Caring for 7 Billion* (www.motherthefilm.com).

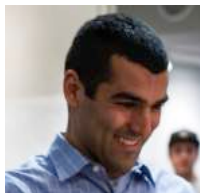


Paty Romero-Lankao

social science, sustainability, social justice

Patricia Romero-Lankao (Paty) is an interdisciplinary sociologist and has worked with scholars and decision makers at local, national and international scales. She is a Research Scientist at NCAR (the National Center for Atmospheric Research), and is currently leading the Urban Futures initiative there <https://ral.ucar.edu/csap/urban-futures>. Along with other scientists and stakeholders in the US and internationally, she is currently designing urban-scale interdisciplinary studies and art creations that inform and are informed by sustainability challenges at all levels. In addition to her research work, she has participated in global and local endeavors promoted by IPCC, UNEP, IAI and UN-HABITAT. She was co-leading author to Working Group II of the Nobel prize-winning IPCC Fourth Assessment Report (AR4). Born in Mexico, but considering herself a citizen of the world, she is passionately engaged in finding options to move humankind toward more sustainable, resilient and fair futures.

Boulder Participants



Shawhin Roudbari
social science,
sustainability, social
justice

Shawhin Roudbari is an Assistant Professor of Environmental Design at the University of Colorado-Boulder. He studies the activism of design professionals through political and community engagements. Roudbari uses ethnographic and qualitative sociology methods to examine the work of architects, landscape architects, urban designers, planners, and civil and environmental engineers as the professionals who design and construct our built environments. He is the principal investigator on two NSF awards investigating dissent in the design professions and the ethics of community engagement work by engineers in developing communities, respectively. Shawhin teaches interdisciplinary research methods, design studios, and histories and theories of political engagement in design.



Connie Roser-Renouf
social science

Connie Roser-Renouf is an Associate Research Professor at the Center for Climate Change Communication at George Mason University. Her research focuses on understanding how diverse audiences use, interpret and respond to information on the issue of climate change. Since 2008, Dr. Roser-Renouf has served as Co-Principal Investigator (with Edward Maibach and Anthony Leiserowitz) of the Yale/George Mason University Climate Change in the American Mind audience research program. This research has identified six distinct audience segments that hold divergent beliefs and favor different responses to the threat – *Global Warming's Six Americas*. These segments are now used by a wide range of informal science educators in government agencies, museums and zoos to improve their climate change communication. Roser-Renouf has a PhD in Communication Research from Stanford. Prior to her career in social science, she received a BFA in dance and performed with a modern dance company.



Jennifer Tabanico
social science,
sustainability,
environment

Jennifer Tabanico is President and owner of Action Research, a firm that specializes in changing behavior for the public good by applying marketing and social science research to outreach programs that promote clean, healthy, and sustainable communities. Tabanico has a Master of Arts degree in Experimental Psychology from California State University and more than a decade of experience developing and implementing community-based social marketing programs for public and private agencies. Her work has spanned a broad range of social issues including water quality, waste and recycling, litter prevention, energy-efficiency, water conservation, and sustainable forestry. Recent clients have included the City and County of San Diego, the New York State Energy Research and Development Authority, the Urban Sustainability Directors Network and the American Forest Foundation. Her work has been published in a variety of outlets including the *Journal of Environmental Psychology*, *Social Influence*, and *Social Marketing Quarterly*.



Tony Tapia
arts, social justice,
business

Tony Tapia, President of Bridging Worlds Philanthropic Advisors, advises on global philanthropy, economic development, corporate giving, performing arts, immigration, Latino, and aging issues. He has worked in the nonprofit, foundation and corporate sectors for over 30 years. He also serves as Director for the Colorado Latino Age Wave and is Program Director for The Conference Board's Corporate Social Responsibility and Philanthropy & Engagement Councils. Prior to his current work, Tapia was the Senior Program Director for the Western Union Foundation leading global-giving programs. Previously, he was Director of Grantmaking at the Gill Foundation and Program Director of Cultural Programs at the Association of Performing Arts Presenters. He currently serves as a board member of Borealis Philanthropy and the Bright Mountain Foundation and as a member of the Colorado Strategic Action Planning Group on Aging. He has served on numerous boards and National Endowment for the Arts review panels.

Boulder Participants



Monique Verdin
arts, social justice,
environment, organizing

Monique Verdin has been intimately documenting the complex interconnectedness of environment, economics, culture, climate and change in southeast Louisiana for decades. Her indigenous Houma relatives and their lifeways at the ends of the bayous, enduring the realities of restoration and adaptation in the heart of America's Mississippi River Delta, has been the primary focus of her interdisciplinary work. Verdin is the subject/co-writer/co-producer of the award-winning documentary *My Louisiana Love* (2012). She is a member of the United Houma Nation Tribal Council and director of The Land Memory Bank & Seed Exchange; an experiential project engaged in building a community record through cultural happenings, strategic installations and as a digital archive. She is part of the Another Gulf Is Possible Collaborative core leadership circle of brown (Indigenous, Latinx and Desi) women from Texas to Florida working to envision just economies, vibrant communities and sustainable economies.



Bethany Wall
arts, sustainability,
social justice,
environment, policy work

Bethany Wall is a development and strategy consultant whose practice centers on helping communities gain strength culturally, environmentally and politically. She spent 20 years in philanthropy at the NYC-based Mertz Gilmore Foundation (MGF), working largely in civic and cultural spheres, typically with equity and access at the core. Subsequent development experience with environmental, civic and arts organizations informs her ongoing work. While at MGF, she managed a portfolio of approximately \$7 million, split between Human and Built Environment, NYC Arts, and a pool of named beneficiaries of the LuEsther T. Mertz Charitable Trust. Regularly bridging silos of environmental and arts grantmaking, she developed funder sessions about the benefits of working at the intersection of art/culture and environment. In 2009, Wall project-managed *Our Lady of Detritus*, an interactive portable performance about trash and transformation that traveled to public spaces across NYC.



Jenny Wells
natural science, social
science, arts,
sustainability, social
justice

Jennifer Wells (Jenny) is a San Francisco based humanities scholar and activist, focused on utopia and transition studies. She received a PhD from Berkeley and the Sorbonne, Paris IV, in critical social and environmental theory and philosophy. Her work interweaves theory, art, activism, geopolitics, and geopoetics, as tools for change. In particular, she focuses on real utopias and how the humanities and arts help inspire transformation of pressing challenges, such as: climate justice, transcultural cooperation, and economic transition. She draws on transcultural voices on global change: marginalized and privileged, arts and sciences, indigenous and modern. Wells' book *Complexity and Sustainability* (Routledge 2012), examines how complexity theories contribute to systemic transition towards climate stabilization. She is working on a book on art, theory, and praxis of real utopias and global transition, and is Associate Professor of Transformative Studies at the California Institute of Integral Studies.



Jim White
natural science,
sustainability, environment,
organizing, policy work,
business, climate change

James W.C. White (Jim), PhD, is an internationally known paleoclimatologist and Dean of the College of Arts and Sciences at the University of Colorado-Boulder, as well as a Professor in the Department of Geological Sciences and the Environmental Studies Program. White served as Director of the Institute of Arctic and Alpine Research (INSTAAR) from July 2008 until August 2017 and was founding director of CU Boulder's Environmental Studies Program. During decades of cross-campus service, White has broken down barriers between the natural sciences and social sciences, humanities, journalism, arts and business, engaging the broader CU community in the study of sustainability and environmental change. As one of the top publishing researchers in geoscience, White's highly cited work has appeared in high-profile journals such as *Science* and *Nature*. He has appeared as climate expert in multiple documentaries, such as the critically-acclaimed 2012 film *Chasing Ice* and the recently released *Bill Nye: Science Guy*.

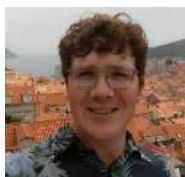
Boulder Participants



Guy O. Williams

sustainability, social justice, environment, organizing, policy work, business, environmental justice

Guy O. Williams is President & CEO of Detroiters Working for Environmental Justice. A graduate of Bucknell University, Williams is the 2017 recipient of the Great Lakes Leadership Academy William Milliken Leadership for the Common Good Award, as well as Bucknell's prestigious Alumni Board of Directors Award for Service to Humanity. Named 2014 Michigan Green Leader by the Detroit Free Press, he is known locally and nationally for his work as an advocate for environmental justice. Williams, the author of the *Detroit Climate Action Plan*, is a Director on the Boards of the Rails-to-Trails Conservancy (Chair 2013–2016), and Pesticide Action Network North America. He also serves on the Advisory Board for the Center for Urban Responses to Environmental Stressors and the External Advisory Board of the Center for Sustainable Systems at the University of Michigan School of Environment and Sustainability.



Patrick Chandler

note taker

Patrick Chandler is an Environmental Education Consultant with the Washed Ashore Project, Earth Science Information Partnership Fellow, and Master's of Environmental Studies Candidate based at the University of Colorado-Boulder.



Sarah Fahmy

note taker

Sarah Fahmy is a first year University of Colorado-Boulder Theatre MA student from Alexandria, Egypt whose research and creative work focuses on the use of applied theatre to empower women to participate in sustainable development.



Erin H. Leckey

note taker

Erin H. Leckey is an education and outreach specialist working at CIRES (Cooperative Institute for Research in Environmental Sciences) with a background in Earth and life sciences, helping people understand climate impacts and build resiliency.

Princeton Participants



Nez Ardalan
art/science theory,
mindfulness

Nezam Ardalan (Nez) has focused his work on the intersection of conservation biology and the arts, with a specific interest in how artists and scientists collaborate to raise awareness, educate, and create interventions to prevent biodiversity loss. Nez also leads yoga and mindfulness practice as a way to facilitate team coherence, well-being, and performance.

Nez will facilitate the program in Princeton.



John Balbus
health, environment,
policy work

John Balbus is an amateur musician who has set his sights on playing jazz piano on a stage, after getting his nerve up to perform on flute about three years ago. He is also an amateur at musical theater, having co-written a full length musical comedy in college and writing and directing shows and songs in medical school. He is currently Senior Advisor for Public Health to the Director of the National Institute of Environmental Health Sciences and HHS principal to the US Global Change Research Program. Balbus has served as a lead or review author for major climate assessments for over two decades. Before joining NIEHS, he was Chief Health Scientist for the Environmental Defense Fund. He started his career at The George Washington University Schools of Medicine and Public Health and Health Services, where he was founding Director of the Center for Risk Science and Public Health. Balbus received his AB degree in Biochemistry from Harvard University, his MD from the University of Pennsylvania, and his MPH from the Johns Hopkins School of Hygiene and Public Health.



Chantal Bilodeau
arts, sustainability,
social justice,
environment

Chantal Bilodeau is a playwright and translator whose work focuses on the intersection of science, policy, art, and climate change. She is Artistic Director of The Arctic Cycle – an organization created to support the writing, development and production of eight plays that look at the social and environmental changes taking place in the eight Arctic states, the founder of the blog and international network Artists and Climate Change, and a co-founder of Climate Change Theatre Action. She is a recipient of the Woodward International Playwriting Prize as well as the First Prize in the Earth Matters on Stage Ecodrama Festival and the Uprising National Playwriting Competition. Bilodeau curates the HowlRound series *Theatre in the Age of Climate Change* and has written about the intersection of arts and climate change for *American Theatre Magazine*, the Center for Energy and Environmental Research in the Human Sciences, and the World Policy Institute.



Chris Dwyer
social science, arts,
policy work, education

M. Christine Dwyer (Chris) is senior vice president of RMC Research, a national research firm focusing on the well-being of families, children, and communities, specifically education, the arts, literacy, media, and health care and prevention. Dwyer's experience includes program and policy research and evaluation, and translation of research into practical products for use in training and technical assistance. In the arts, she has worked for a number of national and regional foundations and organizations, including the Rockefeller Foundation, Pew Charitable Trusts, Americans for the Arts, Animating Democracy, and the President's Committee on Arts and Humanities. Dwyer has had extensive pro bono service in the arts as a board member, municipal leader, and consultant in her state and community, including chairing the boards of an art museum and a performing arts center.

Princeton Participants



Nettrice Gaskins
social science, arts,
social justice,
environment, digital
media/technology

Nettrice Gaskins attended Georgia Tech where she received a PhD in Digital Media in 2014. Her model for 'techno-vernacular creativity' is an area of practice that investigates the characteristics of this production and its application in STEAM (Science, Technology, Engineering, Art, and Math). Gaskins blogs for Art21, the producer of the Peabody Award-winning PBS series, *Art in the Twenty-First Century*, and is published in several journals and books. She has worked as a teaching artist for the Boston 100K Artscience Innovation Prize; was a youth media/technology trainer for Adobe Youth Voices; has served as Board President of the National Alliance for Media Arts and Culture; and is on the board of the Community Technology Centers Network (CTCNet). Gaskins received funding from NSF for Advancing STEM Through Culturally Situated Arts-Based Learning (2014). She was the director of the STEAM Lab at Boston Arts Academy and lectures internationally. She is currently a program manager at the Fab Foundation.



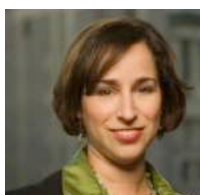
Olivia Georgia
arts, sustainability,
environment

Olivia Georgia is Executive Director of CALL/City as Living Laboratory, founded by environmental artist Mary Miss to make sustainability tangible through the arts. CALL supports artists and designers in projects and programs engaging local communities to raise awareness of the environmental risks that affect every day urban life. CALL combines environmental awareness, activism, arts, science, and civic leadership to provide a path for meaningful action to bring about positive change. Prior to CALL, Georgia served as Executive Director of Meredith Monk's House Foundation for the Arts, the Bronx Museum of the Arts, and Maryland Art Place and was Director of Visual Arts for the Snug Harbor Cultural Center, and Assistant Director of the Washington Project for the Arts. Since 1980, Georgia has organized over 30 exhibitions and produced numerous performance series. She currently serves on the board of directors of Look & Listen, a new music festival, and the Harpo Foundation.



Tamara Shapiro Ledley
natural science, Earth
and climate science

Tamara Shapiro Ledley received her PhD from MIT in atmospheric science. Early in her career, she led a scientific research program in Earth system science and climate change focused on the polar regions. She then turned her focus to Earth and climate science education. Among her many grant funded efforts, Ledley led the development of the award-winning Earth Exploration Toolbook and the Climate Literacy and Energy Awareness Network (CLEAN) Collection of rigorously reviewed climate and energy educational resources and has chaired the CLEAN Network, a professionally diverse community of climate and energy literacy stakeholders. Ledley is a member of the Board of Overseers of the Museum of Science Boston and the Board of Directors of the Blue Hill Observatory. She received the American Geophysical Union's Excellence in Geophysical Education Award in 2013. She is also active in the arts as a hobby through her work in pottery.



Heather Loebner
natural science, arts,
sustainability, social
justice, health,
environment

Heather Loebner is Executive Director, Palisades Parks Conservancy, supporting a bi-state system of 120,000+ acres of 20 parks and 9 historic sites. Previously, Loebner advised clients such as NOAA (the National Oceanic and Atmospheric Administration), The JPB Foundation, NY City Audubon, the National Fish and Wildlife, and The Chicago Community Trust. As Executive Director of the USA Foundation at ArcelorMittal, she led sustainability and Corporate Responsibility where she directed an award-winning public-private partnership that achieved \$64 million dollars in on-the-ground conservation impact. Prior to leading corporate responsibility with ArcelorMittal and HSBC, Loebner was Executive Director of The Suzuki-Orff School for Young Musicians, a Chicago-based nonprofit arts organization.

Princeton Participants



Roger Malina
natural science, arts,
organizing

Roger F. Malina is an astrophysicist, arts/science researcher and editor. He served as director of the Observatoire Astronomique de Marseille Provence and was NASA Principal Investigator for the Extreme Ultraviolet Satellite project at the University of California, Berkeley. He is also a publisher and editor in the new emerging research fields that connect the sciences and engineering to the arts, design and humanities. He founded, and serves on the board of two nonprofits, ISAST in San Francisco and OLATS in Paris, which advocate and document the work of artists involved in contemporary science and technology; he serves as Executive Editor of the Leonardo Publications at MIT Press. He co-directs the ArtSciLab at University of Texas at Dallas, which works on projects that require collaboration between artists and scientists from the beginning of a project; the lab also works in the field of experimental publishing through the art-science-technology aggregator platform arteca.mit.edu



Chad Monfreda
natural science, social
science, sustainability,
environment

Chad Monfreda is an interdisciplinary researcher whose work explores the relationship between the ways people know and govern the global environment. He has published in both the physical and social sciences on a range of topics, including global land-use change, the science-policy interface for biodiversity conservation, and the governance of carbon markets. At Princeton, Monfreda's research investigates the relationship between the environmental imagination and social transformation. This work draws on comparative, historical studies of the social imagination in cities grappling with a changing climate, in order to draw practical and conceptual lessons for the transformation of education, arts-science integration, and the narrative imagination for sustainability in the Anthropocene. Monfreda's professional experience also extends to policy and practice, including engagements with the International Institute for Sustainable Development (IISD) as an Editor and Thematic Expert on Sustainable Energy and writer for the Earth Negotiations Bulletin.



Eve Mosher
arts, sustainability,
environment

Eve Mosher is an artist living and working in New York City, best known for her public art installation *HighWaterLine*, which premiered in NYC in 2007. Her predictions about where waters would rise due to climate change were validated by flood levels during Hurricane Sandy in 2012. Other locations for *HighWaterLine* include Miami, Florida, where it was created with the help of Heidi Quante and volunteers from the community-led Resilient Miami action group, and in Bristol, UK. Her work has been profiled in international media including *The New Yorker*, *The New York Times*, *The Guardian*, *WHYY Public Radio*, *ARTnews*, and *American Scientist*. She has worked with researchers from NASA-GISS, Center for Research on Environmental Decision Making, and Climate Central. More recently she has been collaborating with ecologists in New York, the University of Pennsylvania Program in Environmental Humanities, the Social Science Research Council and is an advisor to ArtPlace/One Water on their Water, Culture, Art program.



ashley sparks
arts, social justice,
environmental justice

ashley sparks is a southern theatre maker, engagement strategist, and consultant. She has worked in urban and rural communities across the country with award-winning theater companies Cornerstone Theater Company and ArtSpot Productions. With the Network of Ensemble Theaters she co-produced MicroFest USA. Part festival / part think-tank, this national series focused on cross-sector collaborations in Detroit, Harlan County, New Orleans, and Honolulu. sparks' engagement work includes collaboration with the Natural Resources Defense Council and their Energy Efficiency for All Project to incorporate story into their advocacy effort to increase energy efficiency resources in affordable housing. sparks provides consulting on network development and facilitation for the Network for Energy, Water, and Health in Affordable Buildings (NEWHAB); including producing and design for NEWHAB's Annual Convenings for advocates and implementers. Currently A Blade Of Grass Fellow for her performance and dialogue experiment *Good Old Boys*, she is also a member of Alternate ROOTS and Showing Up for Racial Justice.

Princeton Participants



Peter Taylor

science, social change,
environment,

Peter Taylor is Professor at the University of Massachusetts Boston, where he directs the Critical & Creative Thinking and Science in a Changing World Graduate Programs, which provide their mid-career or career-changing students with "knowledge, tools, experience, and support so they can become constructive, reflective agents of change in education, work, social movements, science, and creative arts." *Taking Yourself Seriously: Processes of Research and Engagement* with J. Szteiter (2012). The intellectual basis for his interdisciplinary endeavors lies in his analyses of complexity in the social situation in which the research is undertaken as well as in the situations studied in science *Unruly Complexity: Ecology, Interpretation, Engagement* (2005). Since 2004 he has organized the New England Workshop on Science and Social Change.



Shin-pei Tsay

social science,
sustainability, health,
environment, policy
work, urban planning

Shin-pei Tsay is Executive Director of the Gehl Institute, which conducts research and convenes diverse players to use public life as an intentional driver for design, policy, and governance. Her diverse experience in practice, design, and policy centers around creating a more accessible, equitable, and sustainable built environment. She helped build the Transit Center (urban transportation), founded and directed the Cities and Transportation Program under the Energy and Climate Program at the Carnegie Endowment for International Peace, and was Deputy Director of Transportation Alternatives, expanding community participation in bicycle and pedestrian advocacy and forging connections with professionals in the public health and design fields.



Elke U. Weber

social science,
sustainability,
environment, policy work

Elke U. Weber, is the Gerhard R. Andlinger Professor in Energy and the Environment and Professor of Psychology and Public Affairs at Princeton University. Her research models decision-making under uncertainty and time delay in financial and environmental contexts from a psychological and neuroscience perspective. Prior to Princeton, she spent 17 years at Columbia University, where she founded and co-directed the Center for Decision Sciences and the Center for Research on Environmental Decisions. Her expertise in the behavioral decision sciences has been sought out by advisory committees of the National Academy of Sciences on Human Dimensions in Global Change, an American Psychological Association Task Force that issued a report on the interface between psychology and global climate change, and Working Group III for the *5th Assessment Report* of the UN Intergovernmental Panel on Climate Change (IPCC). She is past president of the Society for Neuroeconomics, the Society for Judgment and Decision Making, and the Society for Mathematical Psychology.



Tom Windham

social science, arts,
social justice, health,
organizing, policy work

Tom Windham, Psychologist: integrates intellectual, experiential, spiritual, and mythic ways of knowing to enhance individual, group, and organizational behavior. Formative years: NYC's Harlem and South Bronx. Graduate: High School of Music and Art, Ph.D., Psychology, (CU Boulder), Specialist in Education, (CU Denver), MS and BS, Psychology, (NM Highlands University). Employment: Senior Advisor, NSF Office of the Director, (Arlington, VA); Principal Investigator, UCAR NCAR's Significant Opportunities in Atmospheric Research and Science (SOARS), (Boulder, CO). Service: President, BVSD Board of Education, American Psychological Association Distinguished Visitor Program, NOAA Blue Ribbon Panel. Recognitions: Boulder County Multicultural Award for achievements in diversity and systemic change; Boulder Daily Camera Pacesetter Award for Science, Medicine and Health; Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring; American Meteorological Society Charles E. Anderson Award "for vision and determination to promote diversity in the field of atmospheric science through mentoring, research, and outreach."

Princeton Participants



Marion Friedman Young
arts, organizing

Marion Friedman Young returned to Princeton in 2015 to become Executive Director of Princeton's Lewis Center for the Arts. Immediately prior, she served as Executive Director of Art-Reach in Philadelphia, a nonprofit organization dedicated to connecting underserved audiences to the arts. Young spent 10 years in New York City as a production stage manager and then Managing Director of The Civilians, an investigative theater company based in Brooklyn. As a stage manager, Marion worked on and off-Broadway with much of her career focused on the work of playwright August Wilson including his final play Radio Golf and a festival of his 10-play Century Cycle at the Kennedy Center in Washington DC. Young received her AB from Princeton and an MFA from the Yale School of Drama.



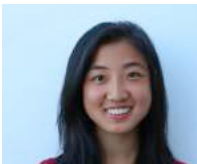
Naomi Cohen-Shields
note taker

Naomi Cohen-Shields is a sophomore at Princeton University from Maryland studying Civil and Environmental Engineering focused on environmental studies with an intended certificate from the Center for Human Values.



Laura Herman
note taker

Laura Herman is a senior Princeton undergraduate studying Psychology, Neuroscience, Cognitive Science, and Cultural Studies. Her research focuses on sensory neuropsychology, and she hopes to apply this to improve the "human factors" of engineering.



Cecilia Shang
note taker

Cecilia Shang is a senior undergraduate student at Princeton University concentrating in the Woodrow Wilson School for International and Public Affairs with certificates in Environmental Studies, Cognitive Science, and Dance, and academic interests in applying behavioral science to issues of sustainability and food choices.

Project Funding Summary

Overview

The Institute of Arctic and Alpine Research (INSTAAR) in collaboration with EcoArts Connections and the National Center for Atmospheric Research (NCAR) seek NSF Support for a Planning Workshop, which will be the first of 3 stepwise convenings gathering experts from the fields of natural and social science, arts, energy/water conservation, and related disciplines in order to establish an operational strategy for knowledge sharing across entities, networks, and associations designed to strengthen communities of practice nationally to better conceive, conduct, and evaluate projects for the public, working at the intersection of science, art, and sustainability.

Workshop Outcomes

1. Identification and preliminary mapping of successful evidence-based best practices in science-arts sustainability collaborations
2. A strategic vision for interdisciplinary collaboration across networks; and
3. An initial framework for the dissemination of findings that can reach across disciplines.

Workshop Outputs

1. A briefing booklet;
2. A white paper;
3. A network of experts from the fields above; and
4. An agenda for the second (larger) convening.

The trans-disciplinary strategy promises to more efficiently and effectively bring science and STEM disciplines to a wider public in collaboration with the arts through sustainability topics that are place-based, targeted to, and meaningful for specific audiences.

Intellectual Merit

The study of science-arts collaborations has primarily focused on synergies between artist practice and the instrumental illustration of science facts, or process efforts that focus on product creation. Little if any effort has been made to identify an interdisciplinary theory of practice that has reciprocal benefit to disciplinary pursuits in ways that can enhance public understanding of disciplinary science, nor a focus on the role of the arts in increased understanding of the Nature of Science. Furthermore, what efforts have been made in science-arts programs have traditionally excluded the social sciences, an omission of glaring magnitude given the role the social sciences play in exploring how cognitive, affective, and behavioral processes are implicated on decision-making. This workshop uses a variety of natural and social sciences, arts, and work force sustainability topics as the impetus for describing the hybrid practice that has shown promise for science-based innovation and STEM knowledge gains in ways that can spawn innovation.

Broader Impacts

This effort seeks to reinvigorate thinking about the value of interdisciplinary practice as a fundamental aspect of science thinking. In essence, all scientists and artists are part of one another's general public. Too often, the argument about science-art collaborations is that they reveal new insights to a general public that has expertise in neither discipline. This workshop turns this approach on its head. In lieu of the deficit model that sees lack of action as a knowledge deficit, the workshop lays a foundation for accepting arts and humanities reasoning as attributes that, if embraced, increase public engagement with STEM content. Through the workshop, the team will seek to identify a new foundational approach for assessing meaning making in public understanding of STEM topics and a convening strategy that can be used to expand this new approach beyond those who attend this first convening and at a scale that matches the national challenge.

Resources & References

The following list of resources is a compilation articles, studies, images, and other resources submitted by A2A participants and those supporting the workshop but unable to attend. These materials can be found in the Dropbox folder entitled A2A Resources viewed at:

<https://tinyurl.com/ya9gwsdb>

The A2A Resources dropbox for this workshop contains copyrighted material, the use of which has not always been specifically authorized by the copyright owner. In accord with our nonprofit and educational mission, we are making this material available to advance understanding of sustainability work among artists and scientists. We believe this constitutes fair use of any such copyrighted materials as provided in Section 107 of the US Copyright Law. In accordance with Title 17 U.S.C. Section 107, the material in this packet is distributed without profit to those who have expressed a prior interest in receiving the included information for participation in this conference. If you wish to use copyrighted material from this packet for purposes of your own that go beyond fair use, you must obtain permission from the copyright owner.

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