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# ***CULTIVATING DIVERSITY CHAMPIONS***

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Practices and Lessons from  
Two NSF Geoscience Opportunities for Leadership In  
Diversity (GOLD) Projects



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### **Cultivating Diversity Champions: Practices and Lessons from Two NSF Geoscience Opportunities for Leadership In Diversity (GOLD) Projects**

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# EXECUTIVE SUMMARY

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The United States needs a diverse scientific workforce in order to tap fresh thinking and talent needed to advance the country's competitive edge and economic well-being. This is particularly true in the geoscience fields, where women and people of color have been underrepresented for decades. Geoscience expertise is crucial to weather forecasting, sea commerce, air safety, protecting communities from wildfires and many other applications.

The National Science Foundation's Geoscience Opportunities for Leadership in Diversity, which ran from 2016 to 2019, sought ways to improve diversity, inclusion and equity in the geosciences. Its five projects took different approaches, but all faced common challenges as they developed model activities to guide the diversification of the geosciences. One key challenge was the widespread belief among geoscience faculty that "science is science", and that the question of who gets to practice geoscience is answered using the scientific method. The key lesson learned was that greater levels of diversity, equity and inclusion in the geosciences will not happen unless the time and effort spent diversifying the geosciences counts for tenure and promotion. Any institution wishing to recruit and retain top talent will find its efforts thwarted unless it creates an environment in which its champions for greater diversity in the geosciences can pursue diversity, equity and inclusion work and thrive professionally.



# CHAPTER 1 - INTRODUCTION

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## Overview

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The geosciences do not look like the society they serve. Like many engineering and other STEM disciplines, geoscience fields suffer from a lack of engagement, recruitment, and retention of people of color, women, LGBTQ individuals, and people with disabilities (Levine et al., 2007; Mattox et al., 2008; Stokes, et al., 2007, 2015). Indeed, National Science Foundation data show that since 1966, the geosciences have graduated fewer bachelor's, master's, and Ph.D. students than any other STEM field (Huntoon & Lane, 2007). In atmospheric sciences, for instance, women's participation in undergraduate degrees averaged roughly 23 percent between 1998 and 2008 (Canetto et al., 2012), and in 2013 women made up about 30 percent of the geoscience workforce (Stokes et al., 2015). Rates for people of color are much lower (Baber et al., 2010). Only 7 percent of bachelor's degrees, 5 percent of masters' degrees, and 2 percent of doctoral degrees in geoscience were awarded to African-American, Hispanic, or Native American students in 2007, and those minority groups comprised only 4.4 percent of the geosciences workforce at that time (American Geological Institute, 2008; National Science Foundation, 2007).

Many programs at the K-12 and college level have tried to address this problem. For example, there have been field-based programs created for Native American adolescents (Unsworth et al., 2012), summer camps for middle school minority students (Sherman-Morris et al., 2017), recruitment efforts by individual universities (Serpa, 2007), and community based research projects (Murray et al., 2012). Several reports have synthesized best practices for broadening participation in geosciences (Huntoon & Lane, 2007; Pandya et al., 2007), including specifically for students with disabilities (Carabajal et al., 2017). Additional articles on diversity initiatives in the geosciences can be found on the GOLD homepage (<https://cpaess.ucar.edu/gold/resources>).

In 2016, the National Science Foundation created a new program aimed at addressing the lack of diversity in geosciences. The program was titled *Geoscience Opportunities for Leadership in Diversity (GOLD)*. Five GOLD projects—ASPIRE, FIELD, GeoDES, Hearts of Gold, and Sparks for Change—were funded. The GOLD projects originated from a 2016 Geoscience Ideas Lab organized by the American Society for Engineering Education. A detailed report about the Ideas Labs can be read here:

<http://aeir.asee.org/wp-content/uploads/2015/06/2016-Ideas-Lab-Report-28high-res.29-1.pdf>

Though they differed in approach, all five projects were united by a focus on increasing diversity, equity, inclusion, and social justice in the geosciences. An overview of each project is provided in the following section.

The remaining chapters provide detailed accounts of the GeoDES, and Sparks for Change projects and are written for STEM audiences outside of the geosciences to learn from. Each chapter includes a description of what the teams did, the biggest challenges they encountered, lessons learned, and best practices developed. A modified version of the Guideline for Reporting of Evidence-based Practice Educational Interventions and Teaching (Phillips et al., 2016) is used to report each project's methods. A concluding chapter synthesizes the findings and outcomes.

Additionally, the handbook features two appendices. Appendix 1 consists of handouts describing different types of leadership and informational posters with useful advice for people leading culture change programs and people supporting URM faculty members.

Appendix 2 is a transcript of the introductory episode of the Leadership for Broadening Participation Podcast Series. This transcript is included to introduce readers to general issues of discussion in broadening participation in the geosciences.

ASEE's aim in producing this handbook is to disseminate the knowledge gained through the GOLD projects to a wider STEM audience and to identify practices and lessons that other fields can adopt.



## Overview of the GOLD Projects

### ASPIRE

Active Societal Participation in Research and Education (ASPIRE) aimed to cultivate a generation of geoscientists with the leadership knowledge and skills, scholarship, and material support to reframe and rebrand the geosciences as socially relevant, and to broaden participation in these fields. These geoscientists will do so by bridging long-standing divides that impede access to and inclusion in the geosciences: between basic and applied science, between scholars in the academy and members of historically marginalized communities, and between the places where science is needed and the places where it is typically conducted. To bring about these types of change, ASPIRE drew upon, refined, and institutionalized the working group model as the Mobile Working Group (MWG). Led by a geoscientist with one foot in the academy and the other in the community—the “gate opener”—each MWG focused on a single issue linked to one community. ASPIRE supported multiple MWGs working across the geographic, ethnographic, and “in practice” community space, as well as across the body of geoscience research and application.

Leadership team:

- Corey Garza, Principal Investigator, California State University, Monterey Bay
- Lora Harris, Co-PI, University of Maryland Center for Environmental Science - Chesapeake Biological Laboratory
- Julie Posselt, Co-PI, University of Southern California

Website:

<https://csumb.edu/cme/active-societal-participation-research-and-education>

## FIELD

The Fieldwork Inspiring Expanded Leadership for Diversity (FIELD) project made field activity in the geosciences more accessible and inclusive by equipping field leaders with perspectives and skills to recognize and reduce common barriers in field settings. The project team convened an immersive leadership-development institute for field scientists to engage in practical skills training (e.g., bystander intervention, managing cross-cultural relationships) and collaboratively develop new approaches that could be implemented in their own field experiences. The goal of the project was to understand the nature of field culture and how field activity can be exclusionary, and to explore potential solutions, with the long term aim of reducing the exclusionary nature of field culture.

Leadership team:

- Darrin Pagnac, Principal Investigator, South Dakota School of Mines and Technology
- Gillian Bowser, Co-PI, Colorado State University
- Peggy Fong, Co-PI, University of California-Los Angeles
- Mary Hubbard, Co-PI, Montana State University
- Anne-Marie Nunez, Co-PI, Ohio State University
- Julie Posselt, Co-PI, University of Southern California
- Wendy F. Smythe, Co-PI, National Science Foundation
- Lisa D. White, Co-PI, University of California Museum of Paleontology
- Carolyn Brinkworth, Collaborator, University Corporation for Atmospheric Research

Website:

<https://cpaess.ucar.edu/gold/field-project>

## GeoDES

GeoDES tested new research-based methods for providing professional development in equity and inclusion for geoscientists using mixed-reality role-play simulations designed to teach the cohort to recognize prejudice and effectively intervene in geoscience-specific scenarios. The GeoDES leadership curriculum harnesses these new skills by focusing them on institutional work to minimize the effects of prejudice on gatekeeping decisions. The project used principles from social-cognitive theory and social-closure theory to provide professional development for a cohort of geoscientists to 1) increase their knowledge of prejudice and social justice issues relevant to the geosciences; 2) engage in bystander intervention techniques using interactive, mixed-reality simulations to learn how to counteract prejudice; 3) develop their leadership skills to target critical gatekeeping decisions as a strategy to transform their own home institutions; and 4) support their continued development into champions for diversity, equity, and inclusion.

Leadership team:

- Jason A. Chen, Principal Investigator, College of William and Mary
- Brentt Brown, Co-PI, Mursion Inc.
- Heather Houlton, Co-PI, American Geosciences Institute
- Jerlando F. L. Jackson, Co-PI, University of Wisconsin-Madison
- Justin Byron Richardson, Co-PI, University of Massachusetts-Amherst
- Brian J. Teppen, Co-PI, Michigan State University
- Carolyn Brinkworth, Co-PI, University Corporation for Atmospheric Research

Website:

<https://cpaess.ucar.edu/gold/geodes-project>

## Hearts of GOLD

The goal of Hearts of GOLD was to help leaders in geosciences become champions for diversity. Many of the most established geoscientists have histories of promoting and mentoring colleagues and students from underrepresented groups, but they rarely are outspoken about this practice because their expertise and experiences are not related to diversity. This project brought together those giants in the field in an effort to teach them the tools and skills needed to become champions for diversity in the greater interest of the geosciences.

Leadership team:

- P. Grady Dixon, Principal Investigator, Fort Hays State University
- Kathy Quardokus Fisher, Co-PI, Florida International University
- Eric K. Kaufman, Co-PI, Virginia Tech
- LaToya Myles, Co-PI, National Oceanic and Atmospheric Administration
- Denise R. Simmons, Co-PI, University of Florida
- Carolyn Brinkworth, Co-PI, University Corporation for Atmospheric Research

Website:

<https://www.fhsu.edu/geo/gold/>

## Sparks for Change

The diversity of faculty in the geosciences remains far below that of the population as a whole, and this has an effect on attracting and retaining a diverse student body. The NSF-Geoscience Opportunities for Leadership in Diversity Sparks for Change program focused on improving the retention of underrepresented faculty in STEM using small-group theory to overcome institutional inertia toward broadening-participation efforts. One underlying reason for this inertia may be tenure and promotion policies that offer little departmental motivation to recognize and reward efforts to broaden participation. The result is a departmental culture that does not view broadening participation efforts as important, and an environment in which underrepresented minority (URM) faculty may not feel supported.

Sparks for Change targeted these challenges with “triads” that brought together the experience and broadening-participation values of an early-career minority faculty member (the Spark), a supportive later-career faculty member in the same department (the Partner), and an external broadening-participation expert (the Sponsor), within a multi-institutional supportive cohort. Participants in the Sparks for Change Institute, held in Boulder, Colo., in September 2017, were empowered with leadership training specific to their role in the triad and department and supported in developing action plans for changing the culture of their own department. They remain connected through a supportive community of practice. Sparks for Change has produced indications of a growth in leadership capacity, mentoring of Sparks, and inter-institutional collaboration toward cultural change.



#### Leadership team:

- Robert Kirsch, Principal Investigator, Arizona State University
- Rebecca Batchelor, Co-PI, University Corporation for Atmospheric Research/University of Puerto Rico Humacao
- John Crockett, Co-PI, San Diego State University
- Sennai Habtes, Co-PI, University of the Virgin Islands
- Brenee King, Co-PI, Kansas State University

#### Publications:

Kirsch, R. (2018). Focusing on leadership to improve diversity in the geosciences. *Eos*, 99.

Posselt, J. R., Chen, J., Dixon, P. G., Jackson, J. F., Kirsch, R., Nuñez, A. M., & Teppen, B. J. (2019). Advancing inclusion in the geosciences: An overview of the NSF-GOLD program. *Journal of Geoscience Education*, 67(4), 313-319.

#### Conference Presentations:

Batchelor, R., Crockett, J., Habtes, S., King, B., and Kirsch, R. (2019, November). Sparks for Change: Advancing leadership for broadening participation. Short course presented at the Association of American Colleges & Universities' Transforming STEM Higher Education conference. Chicago, Illinois. (<https://www.aacu.org/conferences/stem/2019/workshops>)

Kirsch, R. (2019, May). Solidarity in the Public Realm: Non-constituted leadership for social change. Paper presented at the annual meeting of the Public Administration Theory Network in Denver, Colorado.

Batchelor, R., Kirsch, R., King, B., Habtes, S., and Crockett, J. (2019, February): Sparks for Change: Developing DEI Change Agents in the Geosciences. Paper presented at the Association for Sciences of Limnology and Oceanography. San Juan, Puerto Rico. (<https://www.aslo.org/wp-content/uploads/ASLO-2019-Program-Book-with-addendum.pdf>)

Batchelor, R., Kirsch, R., King, B., Habtes, S., and Crockett, J. (2018, January). Sparks for Change: Supporting and retaining minority faculty in the geosciences. Paper presented at the annual meeting of the American Meteorological Society. Austin, Texas. (<https://ams.confex.com/ams/98Annual/webprogram/Paper328335.html>)

Kirsch, R., and Batchelor, R. (2017, December). Small Groups, Big Change: Preliminary findings from the Sparks for Change Institute. Paper presented at the annual meeting of the American Geophysics Union. New Orleans, Louisiana. (<https://agu.confex.com/agu/fm17/meetingapp.cgi/Paper/239469>)

King, B. (2017, November) Leadership Strategies for Equity and Inclusion in the Geosciences, AGU/AGI Heads and Chairs webinar (<https://www.americangeosciences.org/webinars/leadership-strategies-equity-and-inclusion-geosciences>)

#### Website:

<https://scied.ucar.edu/soars/sparks>



## Further information and Resources

- GOLD projects homepage: <https://cpaess.ucar.edu/gold>
- Leadership for Broadening Participation Podcast Series: <https://kardiagroup.com/leadership-for-broadening-participation-podcast-series/>

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# CHAPTER 2 - USING COMPUTER SIMULATIONS TO BROADEN PARTICIPATION IN THE GEOSCIENCES: GeoDES

By Jason A. Chen, Anna Strasshoffer, Brian J. Teppen, Jerlando F.L. Jackson, Dena Samuels and Carolyn Brinkworth

## Intervention Overview

GeoDES tested new research-based methods for providing professional development in equity and inclusion for geoscientists using mixed-reality role-play simulations, which show participants how to recognize prejudice and effectively intervene in geoscience-specific scenarios. Mixed-reality simulations combine human intelligence and intuition with artificial intelligence to create hyper-realistic practice scenarios. The intervention involved 29 “gatekeepers”—tenured geoscience faculty members with significant administrative responsibilities. It opened with an intensive three-day workshop at which two speakers, Dena Samuels and Jerlando Jackson, described institutional practices and individual behavior that close off opportunities to people who are historically underrepresented in the geoscience field. Next, participants engaged in a series of three mixed-reality simulations. In the first, participants had to identify and respond to, or “call in,” microaggressions during a meeting with a white male department chair and an African American female colleague. In the second, participants had to advocate for a Latina job candidate who was worthy of consideration but lacked the “cultural assets” favored by the search committee. In the third simulation, participants had to make a compelling case for aligning the department’s annual merit reviews with criteria related to diversity, equity, and inclusion (DEI). These reviews have pay implications for all faculty in the department. The exercise required participants to manage effectively the pushback from faculty members opposed to changing the report. In the final component of the intervention, participants formed three virtual journal clubs, and the GeoDES team led discussions about how participants could apply what they had learned to their home departments.

## Theory

**Social closure theory.** Increasing the number of traditionally underrepresented minorities (URMs) who are admitted to the geosciences is an observable and measurable outcome (a dependent variable) leading to broadened participation. Achieving a systematic increase requires a mechanism (Reskin,

2003) to overcome gatekeeping practices that tend to exclude URMs.

What personal and structural interventions (independent variables) can leaders exercise that make each particular gatekeeping function more inclusive? The answer involves applying social-closure theory, which provides a systematic and concrete leadership strategy for improving diversity within the profession. “Social closure” (O’Brien, 2010; Tomascovic-Devey, 2014; Vallas and Cummins, 2014), is a “process of subordination whereby one group monopolizes advantages by closing off opportunities to another group of outsiders that it defines as inferior and ineligible” (Murphy, 1988, p. 88). Social-closure theory emphasizes “the role of key organizational actors (i.e., gatekeepers) in the process” (Jackson and Leon, 2010).

**Social cognitive theory.** In the teacher professional development (PD) literature, Hamre et al. (2012, p. 114) advise that “[i]nterventions that primarily target beliefs and knowledge may have limited impacts on teachers’ practice unless they directly focus on practice.” Therefore, teaching people the forms of behavior and habits that are consistent with adaptive beliefs makes it more likely that they will not only change behaviors for the long term, but also will correspondingly change their beliefs.

Counteracting prejudicial practices in geoscience demands a considerable amount of political and social tact. Advocates for specific actions need to bring with them a robust sense of efficacy (Bandura, 1997), since missteps in such situations could cause them not only embarrassment but serious and long-lasting social consequences. Individuals willing to risk such social jeopardy require a robust sense of efficacy (Bandura, 1997). Our mixed-reality simulations target Bandura’s (1997) four hypothesized sources of self-efficacy: mastery experiences (i.e., past successes), vicarious experiences (i.e., watching similar others or videos of oneself perform a task), social persuasions (i.e., the encouraging verbal and nonverbal affirmations that trusted others communicate), and physiological/affective states (i.e., anxiety, emotions) to develop people’s self-efficacy for intervening in key gatekeeping decisions.

## Learning Objectives

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- A. Identify microaggressions in workplaces.
- B. Effectively “call in” someone who has engaged in microaggression against another.
- C. Act as an ally for someone who is on the receiving end of microaggressions.
- D. Identify how gatekeepers close off opportunities to those who have been historically underrepresented in the geosciences within the context of an academic job search.
- E. Advocate for a job candidate who does not possess the “cultural assets” of the dominant group by using official documents of the university and one’s professional organizations.
- F. Make a compelling case for why diversity in an organization is important, both from an equity standpoint and also for the creativity and productivity of the organization.
- G. Advocate for changes to a department’s reward structure that reward faculty for doing work related to diversity, equity, and inclusion.
- H. Manage resistance by those who oppose spending time and energy on diversity, equity and inclusion work in the geosciences in a way that generates more “light” than “heat” – welcoming them into the conversation rather than pushing them out and causing resentment.

## Simulation Goals and Materials

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For the three-day workshop, we provided participants with handouts of the slide deck that our presenters used. This included information about social identity, privilege and power, implicit bias, microaggressions, recruitment strategies that are attentive to social closure, establishing an inclusive culture, and identifying and countering known barriers for career advancement.

*Simulation 1.* The goal of this simulation was to identify microaggressions as they occur in a real conversation, and to “call in” the white, male, department head when he engages in microaggression against an African American female colleague. Participants also act as an ally to show support for the colleague.

Materials provided:

- Handout on what microaggressions are;
- Handout on how one might respond to (“call in”) microaggressions.

*Simulation 2.* The goal for this simulation was to identify what social closure might look like within a faculty search committee, and to advocate for a Latina candidate whose publication and teaching record are not held in the same light as a white male candidate whose record is given the benefit of the doubt.

Materials provided:

- Description of a fictional university, where the participant is a part of the geoscience department;
- Mock job call for an assistant professor in participant’s geoscience department;
- Mock CVs for four candidates who are being interviewed for the position.

*Simulation 3.* The goal of this simulation was to use official documents from the fictional university in Simulation 2, and documents from geoscience professional organizations, to make a case for diversity, and make a case for revising the department's annual merit review processes such that merit-based pay can be tied, in part, to activities related to diversity, equity, and inclusion.

Materials provided:

- Short list of research documenting the benefits of diversity
- Examples of diversity statements from organizations in the geosciences
- Fictional university's mission, vision, and values statement (wording was inspired by other prominent universities' statements).

Material provided to journal-club participants included analyses of the roles of diversity in problem-solving ability (Phillips, 2014; Page, 2007), commentary on the need for men to take uncomfortable stands when advocating for women (e.g., West, 2017), theory and application of social closure as a way to conceptualize exclusion, and arguments that faculty members should strategically focus on gatekeeping activities most strongly within their spheres of influence (Mitchneck et al., 2016) in order to actively begin changing policies, procedures, and structures.

## Educational Strategies

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We used three strategies. First, we conducted an in-person three-day workshop to engage everyone in learning basic vocabulary and concepts, and to learn strategies for countering prejudice and prejudicial structures. Second, we used three mixed-reality simulations, which combine human intelligence and intuition with artificial intelligence to create hyper-realistic scenarios where participants can practice skills. Third, we held three virtual journal clubs to further our participants' learning and to help them apply this learning to their home institutions.

## Incentives

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We paid for all travel, accommodations, and meals for all participants to attend the three-day workshop. The workshop was held at the offices of UCAR (University Corporation for Atmospheric Research) in Boulder, Colorado.

## Instructors

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**Dena Samuels, Ph.D.**, a speaker at the workshop, was also involved in creating the simulations. Samuels serves as a mindfulness-based diversity, equity, and inclusion (DEI) author, speaker, leadership development trainer, and consultant. Samuels taught at the University of Colorado–Colorado Springs for 20 years while consulting around the United States and beyond. Samuels's latest book, *The Mindfulness Effect: An unexpected path to healing, connection, & social justice* offers 25 mindfulness practices and activities for health/wellness, self-empowerment, culturally inclusive leadership, social and environmental justice, and an accompanying Journal & Practice Planner. Her previous book, *The Culturally Inclusive Educator: Preparing for a Multicultural World* (Teachers College Press, 2014) provides transformative inquiry and specific strategies for building cultural inclusion both personally and institutionally.

**Jerlando F. L. Jackson, Ph.D.**, a speaker at the workshop, was also involved in creating the simulations. Jackson is the Vilas Distinguished Professor of Higher Education, Department Chair of Educational Leadership and Policy Analysis, and the Director and Chief Research Scientist of Wisconsin's Equity and Inclusion Laboratory (Wei LAB) at the University of Wisconsin–Madison. Jackson's research on hiring practices, career mobility, workforce diversity, and workplace discrimination, resulting in more than 125 publications, has evolved into a focus on organizational disparities and on interventions designed to broaden participation for underrepresented groups in the scientific workforce. Jackson teaches administration and governance of colleges and universities and the administration of intercollegiate athletics.

Although the actors behind the avatars in our simulations were not formal instructors in the traditional sense, they did run the simulations and provided feedback on participants' performance. The actors are called simulation specialists—trained professionals who are certified by Mursion (our partner company responsible for creating and running the simulations) to interact with individuals on specific scenarios. For the purpose of this project, one lead specialist, **Andy Sarouhan**, trained three other specialists to help deliver the three simulations for GeoDES. A lead simulation specialist for Mursion since 2015, Sarouhan is responsible for scenario design and delivery, recruiting and training other simulation specialists, project management, and client engagement. He holds a B.A. in theater from the University of California-San Diego and an MFA in Creative Writing from UC Riverside. Sarouhan has 20 years' experience as both a professional stage improviser and a trainer in improvised performance and its practical applications in personal and professional life outside the theater.

Mursion's simulation specialists have some form of acting background in theater, film, improv, or other forms of performing art. Improv experience is particularly relevant, as the essence of improv training is the development of empathy with the audience. They must pass a live audition that confirms they can deliver a prepared scenario to the standards of all parties involved in simulation design. The simulations are not scripted, but the specialists have guidelines that suggest how far they can push the trainee and how to handle the "hits" and "misses" a trainee might make (i.e., whether or not participants successfully achieved a performance objective).

**Brian J. Teppen, Ph.D.** led the virtual journal clubs, helped select reading materials for the journal clubs, and helped write Simulation 3 and handout materials for Simulation 2. Teppen is a professor of soil chemistry in the Michigan State University (MSU) Department of Plant, Soil, and Microbial Sciences. Since 1998, he has taught both graduate and undergraduate soil chemistry and mineralogy courses each year. His research area is the sorption of (mostly organic) chemicals to soil particle surfaces, with a focus on mechanisms and driving forces. This focus carries over into studies of inclusion; Teppen is fascinated by the structural mechanisms that

enact exclusion. During the GeoDES collaboration, he learned about social-closure mechanisms from Jerlando Jackson, about facilitation skills and the "business case" for diversity from Carolyn Brinkworth, and about agency, efficacy, and educational technology from principal investigator Jason Chen. He then shared this new knowledge with other geoscientists in the cohort. In other activities related to diversity, equity and inclusion, Teppen actively participated in 10 meetings of an NSF-sponsored DEI mentorship program called GOLDEN, led by Diana Kardia and Kelly Mack. GOLDEN was a virtual support community for those working within GOLD to boost efficacy and agency among trainers. Teppen also participated in the GOLD proposal process, comprising two DEI-focused retreats: a four-day an Ideas Lab and a three-day a post-award workshop. The retreats helped him build conceptual frameworks, networks, and confidence.

**Carolyn Brinkworth, Ph.D.**, a co-PI, served as an informal facilitator during the workshop and helped select reading materials for the virtual journal clubs. Brinkworth is the chief diversity, equity and inclusion officer at UCAR. She holds a Ph.D. in Astrophysics and a M.A. in education with a focus on social justice in higher education. Her experience as a postdoc and staff scientist in the field of astronomy and her expertise in DEI enable her to bridge the two disciplines and effectively communicate with scientists about DEI content. Brinkworth has extensive facilitation experience and co-leads the UCAR/NCAR equity and inclusion (UNEION) training program at UCAR. She has been on six NSF grants related to DEI in the geosciences, including three as lead PI.

## Delivery

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The in-person workshop involved two speakers formally (Samuels and Jackson), and Brinkworth served informally as a conversation facilitator. There were two speakers involved formally (Samuels and Jackson), but Brinkworth served informally as a conversation facilitator.

Mursion Inc.'s actors (simulation specialists) scheduled and ran computer-driven mixed-reality simulations, in which participants engaged using their own computers. Using a combination of human conversational intuition and artificial intelligence, Mursion's "human-in-the-loop" technology allows one simulation specialist to "inhabit" up to five different avatars— each one representing a different "character" with whom participants interact. Given the potentially sensitive nature of discussions that could transpire within these simulated environments, participants interacted in these virtual environments individually rather than within groups.

Finally, the virtual journal clubs were led by Teppen and Jason Chen, who hosted participants using the online conferencing software Zoom. There were three journal club meetings. For each meeting, we set aside two days and times for when participants could join. This was done in a virtual group setting so that participants could discuss and share with each other their own experiences with diversity, equity, and inclusion.

## Environment

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The workshop took place in a conference room at UCAR, in Boulder, Colo. The first simulation was conducted using three laptops set up in private rooms at UCAR so that three individuals could participate at a time. Simulations 2 and 3 and the virtual journal clubs were conducted wherever the participant felt comfortable. Participants used their own devices throughout.

## Schedule

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The workshop, including the first simulation, occurred over three days in November 2017, during Year 1 of the project. It lasted from 8:30 a.m. to 5:00 p.m. for the first two days, and from 8:30 a.m. to 3:00 p.m. on the third day. For simulations 2 and 3, participants scheduled sessions with Mursion Inc. directly. Simulation 2 was scheduled within a month of the workshop, and simulation 3 was scheduled during the Summer of 2018. Each simulation lasted roughly 15 minutes, with an additional 5 to 10 minutes of feedback and discussion between the simulation specialist and the participant. For each of the three simulations, participants spent some time preparing for them by reading background information (see **Simulation Goals and Materials**). Finally, we hosted three 60-minute virtual journal clubs in February, March, and June of 2018. To prepare, participants read one or two articles. For journal clubs 2 and 3, participants watched recordings of their own simulation performances before joining a virtual conference call so that they could discuss with each other their experiences in the simulations.

## Planned Changes

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Because the mixed-reality simulations needed to be both domain-specific and task-specific, we adapted the technology and script-writing for the actors to be specific to situations in the geosciences. For example, during the simulation on conducting a job search, we created mock CVs and a mock geoscience department's job call. We also created avatars with profiles that our participants would likely find within their own geoscience departments, such as a faculty member who is very well-respected in the scientific community and is unwilling to make diversity, equity, and inclusion a part of the department's annual merit-review criteria.

## Unplanned Changes

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The intervention was not substantively modified from original plans. However, due to time and logistical constraints, we were only able to do three instead of four virtual journal club meetings. The journal club was intended as a way to help translate the knowledge, practice, and efficacy that participants developed during the workshop and simulations to the participants' home departments, with the intention that participants would become active change agents. A benefit of the GeoDES process was that Teppen became a much more active DEI change agent at his own institution (MSU) and a participant in campus governance activity following revelations in early 2018 of sexual assault by sports doctor Larry Nassar.

## Attendance

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The three-day workshop drew 29 participants, as shown on the sign-up list and confirmed by a visual count of people in the conference room. All of their expenses were covered, and they participated in all three simulations.

A total of 20, 17, and 12 participants attended journal clubs 1, 2, and 3 respectively. Because simulations could be done at the convenience of the participant's schedule and in the comfort of their own space, there was little disruption to their schedules. Virtual journal clubs were scheduled by finding the best day and time for most people to meet. In addition, we held open slots for two different days, thereby accommodating the greatest number of participants' schedules. Scheduling was very difficult for 31 people, although discussion was vibrant for those who could attend, because geoscientists interested in DEI often don't have like-minded colleagues with whom to share and compare experiences.

## Processes Used to Determine if Intervention was Delivered as Planned

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Our external evaluator performed the following tasks: (1) collected observational data during the three-day workshop to chronicle alignment of topics discussed with the GeoDES project's main goals; (2) conducted a content analysis of our two presenters' slide decks; and (3) conducted post-workshop and follow-up interviews with nine participants who volunteered to discuss the GeoDES project. Our evaluator met with the lead PI of the project multiple times during the project to discuss her findings and methods, and will hold a virtual presentation of her final report in the fall of 2019 for all co-PIs on GeoDES.

## Schedule and Delivery of Educational Intervention

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The timing and duration of the workshop was delivered as expected, as were the number, frequency, timing, and duration of the mixed-reality simulations. Although we planned for a total of four virtual journal clubs, we delivered three due to logistical issues with participants and facilitators.

## Outcomes

Using self-reported survey data, we found that, on average, the 29 participants' beliefs about their capabilities (self-efficacy) and beliefs about their department's collective capabilities (collective efficacy) to confront prejudices and prejudicial structures grew from the start of the project—with sharp growth in the first three months.

	<b>Self-Efficacy</b>	<b>Collective Efficacy</b>
Start of project	3.45	3.14
After 3 months	4.38	3.96
After 12 months	3.78	3.28

*Note:* Beginning: Mean (self-efficacy)=3.45; Mean (collective efficacy)=3.14; (After three months) Mean(self-efficacy)=4.38; Mean(collective efficacy)=3.96.

## Biggest Challenges

The three biggest challenges from the perspective of the curriculum design team were: (a) identifying suitable and relevant simulation scenarios; (b) structuring the diversity, equity, and inclusion learning experience in such a way that it would resonate with geoscientists; and (c) customizing instructional content to present complex concepts in easy to implement terms. The process of selecting appropriate simulation scenarios was not a simple task. It required the instructors to learn enough about the simulation technology to understand its range of options and its limitations. Likewise, the instructors had to learn how to write the scripts associated with the avatar, actor, and participant interactions. This script-writing process was challenging because we had to anticipate the range of reactions that participants might have to our avatars' words and actions. The simulation is structured in terms of "hits" and "misses" that reflect whether or not participants met a specific performance objective. Determining whether something counted as a hit or miss, and then figuring out how an actor might respond to the variety of hits and misses, took a considerable amount of thought, rehearsing, and reflection.

The people involved in this simulation-design process included the instructors (Dena Samuels and Jerlando Jackson), an actor from Mursion (Andy Sarouhan), and some of the GeoDES co-PIs who interviewed several geoscientists about their experiences of prejudice so that we could develop a better understanding of what prejudices and prejudicial structures look and feel like in the geosciences. Having expertise from (a) diversity, equity, and inclusion; (b) learning sciences; (c) technology; and (d) improvisational theater allowed us to draw from each other's skills and knowledge to create an innovative simulation. To aid us in this endeavor, we recruited an external theater troupe that performs Theatre of the Oppressed at universities to serve as consultants as we constructed these scripts. This group reviewed videos of our team acting out the various scenarios and then provided feedback and sample videos of how we might make the scenarios more authentic. This diversity was a strength, but it also meant there were disagreements that had to be resolved. Given that individuals in our team were located all over the United States, the lead PI had to coordinate with all team members, resolve disagreements, and keep everyone focused on producing a final product that we all approved.

Although our team followed best-in-class practices, we could tell by the participants' questions and feedback that one of our significant challenges was communicating the human aspect of doing science. For example, during the in-person workshop, some participants thought it was outside the scope of their teaching job to discuss with students how gender identity, race, and culture color the ways in which we view the world, which in turn colors how we do science. This is not surprising, given the ways in which science has been and continues to be taught. In sum, the challenge we faced was to disrupt the assumption among our group of geoscientists that "science is science," no matter who is doing it.

Finally, we faced the challenge of ensuring that take-home work and take-away messages from our workshop and simulations would find a longer lifespan when participants returned to their home institution. We know that shaping behavior requires repeated real-world practice. Following the on-site workshop, each individual was required to participate in two additional simulations. However, scheduling

the remaining sessions was difficult once participants returned to work. Although participants completed all three simulations, it required a significant amount of effort on the part of the GeoDES team. Aside from finishing all simulations, ensuring that the take-home work sticks would require a great deal more effort than simply participating in three virtual video conferences. It specifically would take working with key administrative partners in one's home institution to effect institutional change. Given the scope of work that our grant funded, however, we were unable to provide this follow-up work. We are still learning ourselves, and working progressively for DEI within predominantly white institutions (PWIs) turns out to require a significant range of skills, each with its own vocabulary and learning curve, that are challenging for geoscientists. Among them:

1. Flexible, multi-pronged DEI strategies (e.g., Sandoval, 2000)
2. Good arguments for the benefits of diversity (e.g., Page, 2017)
3. Arguments for illuminating the prevalence of unconscious processes in scientific practice (Bourdieu, 1990; Latour and Woolgar, 1986) and academic life in general (Bourdieu, 1996)
4. New habits for managing one's own implicit bias (e.g., Forscher and Devine, 2014)
5. Bystander intervention skills for supportively challenging the implicit biases of others
6. An ability to make structural arguments regarding fundamental inequities in the entire educational system (Carnevale et al., 2019) and advanced degrees in particular (Reeves, 2017)
7. An ability to describe the socially constructed and affluence-protecting biases in our concepts of scientific and academic merit (e.g., Karabel, 2005)
8. Articulation of lessons learned from failed diversity initiatives in the past (Gutiérrez y Muhs et al., 2012; Matthew, 2016)
9. Institution-specific knowledge of the key gatekeeping activities in a given academic hierarchy
10. Agency, efficacy, and, above all, time to grow one's social network of relationships while effectively engaging in difficult conversations (Patterson et al., 2012) with diverse partners across the power spectrum.

All PWIs profess their desire for diversity, but in practice many are structurally racist and sexist institutions that are as yet unwilling to pay the equity price needed to welcome and sustain diversity. As such, there seem to be no PWIs and few departments of any kind that provide concrete examples of inclusionary practice. Geoscientists can attack certain local biases and institutional structures, but they remain faced with the immense challenge of changing their institution's core values-in-practice to align with professed values.

## Lessons Learned

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Because context specificity is so important for simulations to reflect authentic situations, we learned that, in the process of writing completely new scripts (as was the case for us), having content experts share their personal experiences of prejudice in the field with the simulation design team was invaluable for authenticity. This consulting theater troupe was university-based, so they understood the university context well, which was important for our actors, who had no experience working in a university setting.

Because our actors were not familiar with a university context and not trained in issues related to diversity, equity, and inclusion, we learned that they need significant support to be able to deliver a simulation that is as true as possible to the context of the situation. For example, some of our participants noted that during the simulation, they used geoscience terminology that made it difficult for the actors to respond. We do not know for certain what "support" for actors would look like, and we believe it is an empirical question as to whether a general actor, armed with tools that include sophisticated technological supports (i.e., artificial intelligence) and topic-specific training, would be better equipped at handling simulations than an actor who is very familiar with, for example, a university geoscience context. We look forward to finding answers to these types of questions in future research.

Most people, including those in the GeoDES project, have not experienced role-play with avatars. So why is it that avatars are so critical for bystander training scenarios compared with traditional role play? One lesson that GeoDES reinforced was that learners need to experience some amount of discomfort if learning is to occur at all. With traditional role play, it may be difficult or awkward for an inexperienced role-player to push the learner outside of his or her comfort zone without breaking the illusion that the situation is real. It takes this sort of pushing to trigger the mistakes that are so costly in real life. If a simulation is to inoculate the learner against emotional reactions that trigger bad decisions, this pushing is essential. With VR simulation, the mask of being behind an avatar enables the simulation specialist (the role-player) to push the learner to take risks without ever breaking character. In VR, the learner never catches the gaze of the other person, and so they never connect as humans. Fox et al. (2015), from Stanford University's Virtual Human Interaction Lab, have shown that social influence is greater during interactions where a human is behind the avatars during these conversations. Thus, the simulation specialist feels liberated to push the learner in ways they would find very hard to do repeatedly and consistently in a live context. One example of this presented itself during the first simulation, when learners had to identify and "call in" Max's microaggressions and then also act as an ally for Maia. During this exchange, one learner in particular was very good at calling Max in and being an ally for Maia. The actor could immediately tell, and when the learner decided to share something personal to take the "heat" off of Maia, the avatar made offensive comments toward the learner. The comments surprised and forced the learner to recover. This was not at all a part of the actor's script but an in-the-moment, instinctive response that the learner was advanced enough to be pushed—a decision that may have been facilitated by the fact that the actor wore a digital "mask."

It is also worth noting that a single simulation specialist is able to play several avatars simultaneously, which eases the logistics and costs for such programs. Despite the scheduling challenges mentioned earlier, the technology still allowed for continued sessions in which both the simulation specialist and participant could connect remotely, which would not have been possible if traditional role-play was used.

Practicing difficult conversations on avatars reduces the potential risk of damaging relationships that otherwise may have been the case in peer-to-peer role playing. By digitizing the experience in a virtual setting, learners tend to take more risks in a conversation they would never take in person. By giving learners a psychologically safe space to practice, both the emotional and cognitive processes of the brain are engaged so that deep learning can occur.

Talking with a human-mediated avatar can cause confusion if participants are not familiar with avatar-based simulations. Over the course of the GeoDES project, we learned that the format of an on-site workshop worked well for ensuring all learners were comfortable with this new technology before conducting follow-up sessions on their own. In the first simulation, part of the work of the simulation specialist is to help participants understand how the technology works and to set clear expectations so that participants are able to ease into the simulation fluidly and without anxiety. The simulation specialist has many tactics to guide the participants without breaking character and to instill suspension of disbelief. We did have one or two participants who felt very uneasy at first with the avatars during the first simulation. Having the GeoDES team (including Mursion's people) available in person during that first simulation, especially with a touchy topic like microaggression, was instrumental in helping all participants get used to talking with digital characters and debrief after the simulation, so that they were able to interact in this digital context for the second and third simulations. Had we not done the first simulation at the in-person workshop, we are uncertain whether these participants would have returned for the second and third simulations.

Finally, especially during the journal club, we learned about the need for educating STEM audiences about the social world. For example, implicit bias is described by several different disciplines, each using different jargon. So is structural inequity. There is a strong need to collect, systematize, and present social knowledge in a coherent form—and with minimal jargon for STEM audiences—in order to help STEM researchers see how their roles might become more equitable.

## Recommendations and Best Practices For the Larger STEM Community

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### Recommendations on Simulations:

Bias influences all humans; it is automatic and universal. We would recommend that anyone responsible for making key decisions in an organization, such as hiring or admitting students, should participate in this type of training. Because institutions of higher education may have different ways of making key decisions, we do not make specific recommendations, but in general, department chairs, directors of centers, and program directors are examples of groups who could benefit. One caveat: There are people in some departments who lack formal titles that would suggest they are gatekeepers, but who nevertheless possess power. These individuals potentially also could be good to involve in professional development.

This is not a “one and done” activity. Rather, it must be applied repeatedly. In moments of stress or high-stakes situations, training typically is forgotten and we return to our instincts. That is why it’s essential to continuously apply and practice these skills. The larger organizational culture also must foster inclusiveness, which involves implementing programs that will institutionalize a community of learning and belonging. We believe that one reason we did not see widespread, long-term changes in our participants’ behaviors and institutional climates is because this sort of change requires institutional buy-in, especially from key administrators. Although we were training our participants to advocate for institutional change while working with key administrators, it takes concerted and strategic effort with multiple collaborators to effect institutional change.

Regarding the simulations specifically, we recommend that all scenarios should be recorded so that participants can watch and reflect on their performances. The recording is the first step to quantifying success and tracking progress over time, and can be reviewed by others for further

feedback and coaching. It is this combination of being in a realistic, stressful situation and reflecting on the performance after the role-playing that makes it effective. We also recommend that these recordings be discussed in collaboration with others who can offer helpful insights into how participants can improve.

Scenarios also can be adapted to other areas of STEM as long as the institutional and contextual knowledge is provided to those designing and driving the simulations. Most of the skills and behaviors for diversity, equity, and inclusion are universal, and the scenarios created from the project have created foundational competencies. Mursion has since adapted the scenarios and has delivered hundreds of simulations to Fortune 500 companies for training hiring managers. For example, Mursion was contacted to train over 1,000 managers at LinkedIn. The company is a rapidly growing multinational tech giant that has more than 5,700 employees and more than 1,000 managers in various supervisory roles. Rapid growth and the diversity of the workforce stretched managers around the world; many were new to their role and had never experienced difficult conversations. Leaders at LinkedIn sought a safe environment for managers to practice how to handle unpredictable conversations while promoting an inclusive workplace culture. To do this, Mursion leveraged the work of GeoDES and worked with LinkedIn to create true-to-life scenarios that managers at LinkedIn would likely face. LinkedIn will be rolling out the program to their 1,000+ managers by the end of 2019.

### Recommendations on the Workshops:

We found that the workshop was very helpful not only in helping participants to develop knowledge and skills, but also for building a sense of community and trust between GeoDES staff and the participants. This was especially important given the sensitive nature of the topics with which our participants were wrestling. We found that personal invitations worked quite well and generated a strong buy-in from participants. That said, our participants all self-selected to become involved. There is evidence from the literature (Dobbins and Kalev, 2013; Legault et al., 2011) that mandating trainings for diversity,

equity, and inclusion may backfire, leading to more resistance, especially from those who may need trainings the most.

Highly skilled and experienced consultants and trainers are also an invaluable part of a successful training. Such a consultant should be interested in understanding the organization's goals for diversity, equity, and inclusion, and how the trainings fit into that vision. Consultants/trainers should be sensitive to the group participating (in our case, geoscience university professors who are also gatekeepers in their organization), and should know what their goals are so that the trainings are matched to desired outcomes. Canned presentations without context may do more harm than good.

We recommend that learners work together to create guidelines for collectively interacting. For example, at the start of our GeoDES workshop, we agreed that when someone says something that another person finds insensitive or offensive, the person on the receiving end of those comments should say "ouch" out loud, so that others in the room are alerted. The facilitator would then guide the group toward a conversation about what happened, and how to work through the discomfort to learn about issues of diversity, equity, and inclusion. See Samuels's 2019 "Guidelines for Effective Community Engagement" for an example.

For an academic audience such as the group of geoscientists who participated in our GeoDES program, we recommend including a significant research base that shows the evidence for the claims that the trainers/consultants are making regarding diversity, equity, and inclusion. The more evidence, and the more specific the evidence is (especially to the academic field in question), the more convincing the message will be. Of course, empirical evidence is specific and necessarily has its limitations. We recommend being upfront about both the evidence for diversity, equity, and inclusion as well as the limitations of that evidence. We found that the geoscientists in our program were keen on asking specific and pointed questions regarding the claims--demanding evidence, and asking about the limitations of those claims.

Finally, we recommend that trainers/consultants use common language and provide specific definitions so that everyone has a common vocabulary for

speaking about diversity, equity, and inclusion. Just because the word "microaggressions" has been used quite a bit in popular media outlets, for example, does not mean that everyone has heard the term or even understands what it actually means. Building awareness and vocabulary is a challenge for professional development. However, professional development must focus specifically on solution-oriented skill-building and practice. Knowing about diversity, equity, and inclusion is a beginning, but doing something about it produces actual change. The *doing* takes practice.

## Recommendations Regarding the Journal Club:

DEI-related journal articles from disparate fields are laced with jargon that is mostly new to STEM faculty members and presents barriers to both comprehension and discussion. This is especially so for concepts like implicit bias, structural inequity, and power, for which even the specialists cannot agree on vocabulary. Thus, facilitators need to be able to translate the jargon into terms that are relevant and meaningful to a STEM audience.

More important, because we were most interested in developing participants' ability to act, the journal club should be a place where people discuss techniques for how to apply concepts learned to their specific context. Therefore, we recommend that journal clubs be used as a space for brainstorming and discussing strategies that are aligned with best practices and research.

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# CHAPTER 3 - A TEAM APPROACH TO BUILDING DIVERSITY AND INCLUSION IN THE GEOSCIENCES: SPARKS FOR CHANGE

*By Robert Kirsch, Rebecca Batchelor, John Crockett, Brenee King, and Sennai Habtes*

## Intervention

The diversity of faculty in STEM remains far below that of the population as a whole, with racially underrepresented minorities (URM) comprising fewer than 9 percent of the assistant, associate, and full professors with science, engineering and health doctorates employed in four-year universities and colleges (NSF 2019, table 9-26). Low levels of representation among minority faculty make it more difficult to recruit and retain URM students in the sciences (Cohen and Garcia, 2008; Nelson and Brammer, 2010; Allen-Ramdiel and Campbell, 2014). Building a critical mass of URM faculty would help to mitigate feelings of isolation, attract URM students, and provide role-models (Nelson and Brammer, 2010) as well as improve departmental and campus culture to value diversity. More broadly, building more inclusive and more diverse faculties and student bodies will allow the United States to benefit from a broader range of scientific and engineering talent. However, retention of URM students and faculty has been a challenge. In particular, faculty of color must overcome challenges associated with ‘tokenism’, isolation, unwelcoming campus environments, and increased service responsibilities on committees and as mentors (Turner et al, 2008). Increasingly, the bulk of efforts to increase minority participation in the sciences are also placed on these URM faculty, many of whom have not yet achieved full professor rank or tenure within their institutions (Jiminez et al., 2019). While many of these faculty are passionate and supportive of efforts to broaden participation, such activities can be viewed as taking away time from research and publication efforts that are rewarded by traditional promotion and tenure pathways (Turner et al., 1999; Thompson et al., 1998; Nelson and Brammer, 2010; Jiminez et al., 2019).

The Sparks for Change initiative aimed to improve the retention of underrepresented faculty in the geosciences by working to change departmental culture to better value broadening participation efforts and build structures that support the career progression of URM faculty. Sparks for Change’s approach used a novel strategy of leadership development and empowerment based on political economist Elinor Ostrom’s small-group theory of governing the commons (McGinnis and Ostrom, 2007). The model uses an intervention based

on ‘triads’ that incorporates the experience and broadening participation values of an early-career URM faculty member (the Spark), a supportive later-career faculty member in the same department (the Partner), and an external broadening participation expert (the Sponsor). The project brought together a cohort of seven of these triads, representing a range of institution types, at a 2.5-day Sparks for Change Institute in September 2017. The workshop focused on unlocking leadership potential through recognition of existing leadership capacity, leadership development relevant to the individual’s role in the triad and department, and supportive, inter-institutional community of practice. Triads were supported in developing departmental action plans for changing the culture of their own department to better value and distribute the work of broadening participation along with bolstering the career progression of the URM faculty member.

Sparks and partners returned to their home institutions following the workshop to adapt and implement their plans in their respective departments, with continued support from the Sponsor as needed. The Sparks for Change project team fostered ongoing connections with institute participants through monthly community meetings, termed Sparks Information Exchanges (SIEs), that have allowed participants to connect, provide one another with support and encouragement as plans were put into place or adapted to reflect shifting priorities, and share information on best practices. Small seed-funding awards also were provided to support the action plans beyond the institute. The interpersonal and collaborative nature of the workshop, in conjunction with the SIEs and organized communication platforms unique to the Sparks for Change community, have allowed participants to form a small community of practice and establish lasting connections that will exist beyond the Sparks for Change program.

## PARTICIPANT SPOTLIGHT



**SORA KIM – SPARK**  
([HTTPS://SORA.LEEKIM.ORG](https://sora.leekim.org))  
ASSISTANT PROFESSOR  
UNIVERSITY OF CALIFORNIA MERCED

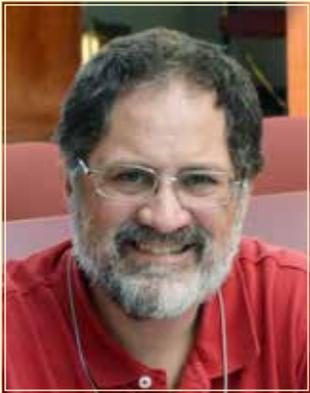
Sora attended the Sparks for Change Institute shortly before starting her second tenure track faculty position at UC Merced, with triad Partner Asmeret Asefaw Berhe and Sponsor Jill Karsten. She credits the Sparks for Change program and mentorship that came with it for helping her hit the ground running in combining her passion for DEI with her research at her new institution. She has focused on bringing diversity and inclusion into her research and teaching, strategically selects service opportunities to advance DEI ideals, and has successfully won two major NSF grants. A Sparks for Change ‘spark grant’ allowed her to bring an expert in DEI to speak on campus, immediately raising her profile with senior administrators while also helping to build a collaboration that would benefit her work. Her advice to other early career minority faculty wanting to advance broadening participation goals is to learn the ‘lay of the land’, identify advocates and allies within the institution, and realize that saying ‘no’ allows space for other new opportunities and growth.

## Theory

Faculty who invest significant time in diversity, equity, and inclusion work often have less time for traditionally rewarded efforts such as publications. Combining broadening-participation efforts with a portfolio of teaching, research, service, and publications is an enormous undertaking, and this burden is often disproportionately carried by early career and minority faculty. It can lead to burn-out, feelings of isolation and otherness, and often a change of career—abandoning the institution or even the field as a whole. We postulate that science departments are not actively opposed to this work, but that there is an institutional inertia resulting from the diffuse benefits of inaction towards diversity, equity, and inclusion efforts which leads to a lack of recognition and rewards for the work involved in broadening participation. These diffuse benefits include: not having to spend time in self and departmental reflection, followed by difficult conversations regarding who is valued within departments; the effort of changing tenure and promotion structures; the emotional labor of mentoring and challenging systemic inequities; and the advantage of letting “someone else” (in this case the URM faculty) do this work while you concentrate on your research. McGinnis and Ostrom (2007) found that while the diffuse benefits of inaction lead to institutional inertia that maintains the status quo, that inertia can be broken by small groups of concerted actors committed to pursuing a vision of change. Because our focus is institutional change, our small group theory reflects the specificity of the institutions and encourages participants to craft engagement around their own institutional structures.

The triad structure of Sparks for Change was especially designed to both confront institutional barriers and support the growth of early career faculty members, the ‘Sparks.’ Sparks participated in the program with a senior faculty member or dean from their own department. This senior faculty member, the ‘Partner,’ provided the triad with the institutional expertise and credibility to make change and to understand the institutional challenges unique to this department. The Partners also were able to internally advocate for the Spark and the work of broadening participation. An external broadening participation expert, the ‘Sponsor,’ added the third spoke to the triad,

## PARTICIPANT SPOTLIGHT



### JOSEPH ORTIZ – PARTNER

([HTTPS://WWW.KENT.EDU/GEOLOGY/PROFILE/JOSEPH-D-ORTIZ](https://www.kent.edu/geology/profile/joseph-d-ortiz))

PROFESSOR

KENT STATE UNIVERSITY

Joseph was already an acknowledged leader and mentor for DEI ideals when he attended the Sparks for Change Institute with new faculty member and Spark Jeremy Williams and Sponsor Terry McGlynn. As a result of his participation in the program, and in support of his existing efforts, he has focused on mentoring and supporting Jeremy's career progression while working together to recruit more minority students to their graduate program. Using a 'spark grant', they were able to connect with faculty at a minority serving institution, Jackson State University, and mentor a student in undergraduate summer research from that institution. Joseph also mentored a student from the University of Puerto Rico the following year as part of a program developed at Kent State. His advice to senior faculty looking to support early career minority faculty and change departmental culture to better value and reward diversity efforts is to make sure that your department has clear expectations for tenure and promotion that are well articulated to the tenure track faculty. When developing departmental programs to increase diversity, it's also important to find support through administrative offices in Academic affairs who are responsible for working with students in your intended target group.

bringing expertise, insight, and practical experience from a different institution or learning perspective and providing external accountability. The project brought the triads together in a small community that incorporated diverse institution types and expertise, creating a community of practice and a common vision for change.

The Sparks for Change workshop employed a range of active and team-based learning pedagogies. Strategies included discussion, self-reflection, pair/group share, gallery walks, and multiple opportunities for peer review and feedback. Specific, Measurable, Achievable, Relevant, and Time-Bound (SMART) goals and evaluator-supported logic-model-based action plans were used to design and structure future activities for each triad to implement in their own departments following the workshop.

## Learning Objectives

The goal of Sparks for Change was to activate leadership behaviors and help our small-group members change institutional culture to better support broadening participation efforts. As faculty members, each participant brings a diverse range of leadership behaviors, valuable expertise, and tools to the table. Therefore, we focused on activation rather than on learning. While some key learning objectives existed, a grounded-theory approach to the needs of the unique cohort, as identified by pre-workshop surveys and during-workshop discussions, allowed us to adapt learning objectives and tap into the wisdom in the room.

Key learning objectives included:

- A better understanding of the science of leadership and impact of institutional inertia in enacting culture change
- Identification and recognition of different types and means of leadership, as relevant to career stage and role in the department and triad. Key among these were adaptive leadership, transformational leadership, and a newly proposed solidarity leadership model
- Identification of the concerns and challenges of diversity, equity, and inclusion work, and recognition of these challenges as leaders in this area

- Understanding the role of conflict, including self-identification of preferred responses and the value of different responses in stepping into the “brave space” of leadership in broadening participation
- A better understanding of the challenges and opportunities that exist to support URM faculty
- The opportunity to share what is and isn’t working at other institutions

Adaptive and participant-led learning discussions included:

- Valuing Diversity, Equity, and Inclusion (DEI) efforts and overcoming biases (e.g. reward and tenure structures, thinking about biases that limit diversity and the ability to make change)
- Time and risk management (e.g. balancing science and broadening participation work, and the real or perceived risk to early career faculty)
- Building comfort in conflict (e.g. being willing to engage in the need for broadening participation efforts and challenging the status quo, even when there is push-back)

## Materials

We created and provided handout materials outlining different leadership styles and the behaviors associated with them, and a SMART goals-based action plan template. We also did an exercise called “Stand Your Ground” from the Kardia Group for participants to deduce how they deal with conflict based on the Thomas-Kilman Mode Instrument. Finally, we used Sharpie pens and sticky notes for gathering insights, organizing suggestions, and taking real-time feedback.

## PARTICIPANT SPOTLIGHT



**KATHARINE HUNTINGTON- SPONSOR**  
 ([HTTP://FACULTY.WASHINGTON.EDU/KATE1/](http://faculty.washington.edu/kate1/))  
 PROFESSOR  
 UNIVERSITY OF WASHINGTON

Katharine was invited as a Sponsor to the Sparks for Change Institute for her leadership in broadening participation, particularly for minority students and women in STEM. She worked with Kansas State University Spark Karin Goldberg and Partner Pamela Kempton to tackle underrepresentation of Hispanic students at their institution. She speaks highly of the Sparks for Change program for helping to see herself as a leader in broadening participation and inspiring her to step more fully into this role, and has used both the resources and the network she gained from her participation in the program in her DEI leadership. Her advice for leaders and future leaders in broadening participation in the sciences is keep moving! We are all at different places in the spectrum of awareness and competency with the issues and how we may experience or cause harm in different situations. Moving forward means that wherever we are on this spectrum, we embrace the discomfort and push ourselves, our colleagues, our communities, and our institutions to do better. This is not a solo sprint but a long-distance team event. So it helps to forget your pride, practice empathy, take care of others and let them take care of you.

## Educational Strategies

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The Sparks for Change program consisted of a fully interactive 2.5-day workshop, followed by monthly conference calls for ongoing engagement. Over the course of the workshop, we used a variety of learning strategies.

*Day One* was focused on understanding ourselves as leaders, cohort building, and sharing information. Activities included group norming, a silent “take a stand” activity, peer-share, short talks by program leaders, and small group discussions with reporting back to the group. Several activities involved moving around the room, for instance to learn about modes of conflict, while others encouraged internal reflection. Breakout groups were led by workshop participants.

*Day Two* moved the focus toward role-based leadership development and the development of action plans. Break-out groups, led by workshop facilitators, were used for leadership development, while the triad action-plan development included an overview of SMART goals and action planning by our evaluators, a physical action plan handout, and triad discussions. Reporting back on early ideas during this day allowed feedback and access to cohort expertise and collaboration.

*Day Three* continued the development of action plans and inter-triad sharing. Full-group discussions were used to identify future needs.

An important strategy of the workshop was connection—both within the bigger cohort and between triad members. DEI work is emotionally challenging and being part of a supportive community is essential to overcoming institutional inertia. This is especially true for minority faculty. As such, time to engage and share experiences was built into all of our programming. The workshop included all meals, and most of the participants stayed in the same hotel. We encouraged and facilitated the leadership of the participants themselves in the development and learning goals of the workshop. By design, the participants spanned a range of institution types, from minority-serving institutions (MSIs) and community colleges to R1 and national labs, and of expertise, from geoscience to organizational leadership to diversity. This led to a supportive and engaged cohort who shared wide-

ranging expertise and experience. The group itself was a very powerful demonstration of the value of diversity for tackling complex problems.

## Incentives Provided to Learners

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While no monetary awards were initially offered, participants in the workshop were supported with airfare, lodging, and all meals during the workshop. Letters of recognition were sent to the participants’ departments, and post-workshop certificates were sent out. Following the workshop, small “spark” grants were offered to the triads to help advance progress toward their action plans. In some cases, the grants were used as leverage for accessing institutional funds and in other cases for forging collaborations.

## Instructors

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**Robert Kirsch**, an assistant professor in leadership and interdisciplinary studies at Arizona State University, brought leadership and political science expertise, higher education teaching experience, and expertise in teaching diversity in organizations.

**Rebecca Batchelor**, director of the SOARS (Significant Opportunities in Atmospheric Research and Science) program at the University Corporation for Atmospheric Research, brought experience in atmospheric science research as well as expertise in a diversity-focused undergraduate-graduate mentoring-intensive program and experience in mentoring and facilitating workshops.

**John Crockett**, senior director of research advancement at San Diego State University, brought extensive experience in the academic administrative environment, leadership development for the “Partner,” and experience with department- and institution-level change.

**Sennai Habtes**, assistant research professor of biological oceanography within the Center for Marine and Environmental Studies at the University of the Virgin Islands, brought URM early career minority expertise and experience with successful broadening participation efforts.

**Brenee King**, assistant director of the Office for Undergraduate Research and Creative Inquiry and project administrator, Kansas Louis Stokes Alliance for Minority Participation, brought expertise in leading diversity-focused, university-wide initiatives for undergraduate students, university staff, and administrators, as well as experience with facilitating workshops.

The team met and collaborated through the NSF GOLD ideas lab and engaged with the ongoing support offered by the GOLD collaboration, including PI training and webinars.

## Delivery

The program was face-to-face during the workshop. This was complemented before the workshop with an online hub for introductions, posting literature, group discussions, and general information. After the workshop, the program encouraged ongoing collaboration with an email list serve, as well as holding approximately monthly Sparks Information Exchanges - regular video conference calls to maintain community and share successes and challenges.

## Environment

The workshop was held in a conference room at the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado, with breakouts in smaller conference rooms. All participants were lodged in the same hotel and encouraged to network and socialize on their own time. Action plans were then implemented in the home institutions of the Spark and Partner.

## Schedule

The Sparks for Change workshop stretched over two 8-hour days and a 4-hour half day. Plenary sessions for all participants averaged roughly 2 hours per day, with breakouts, group activities, and action-plan development taking the rest of the time.

This was a collaborative environment. Approximately 25 percent of the time was spent with instructors, 50 percent with self-directed and group learning activities, and 25 percent with large group activities and developing, refining, and presenting triad action plans.



## Planned Changes

The most important change that we hoped would occur as a result of Sparks for Change was redefining the importance and value of the work of broadening participation within the participants' departments. We recognized that this takes leadership. While all faculty have leadership skills and strengths, they may not see themselves as leaders. Thus, a planned change was the recasting of the participants' self-perceptions as leaders to tackle this problem. We identified that the form that this leadership takes should be different for different members of the triad, relative to their position in the department and field, and gave participants specific leadership training for their position. This is shown in Figure 1, with handouts provided for each of the leadership characteristics in Appendix 1.

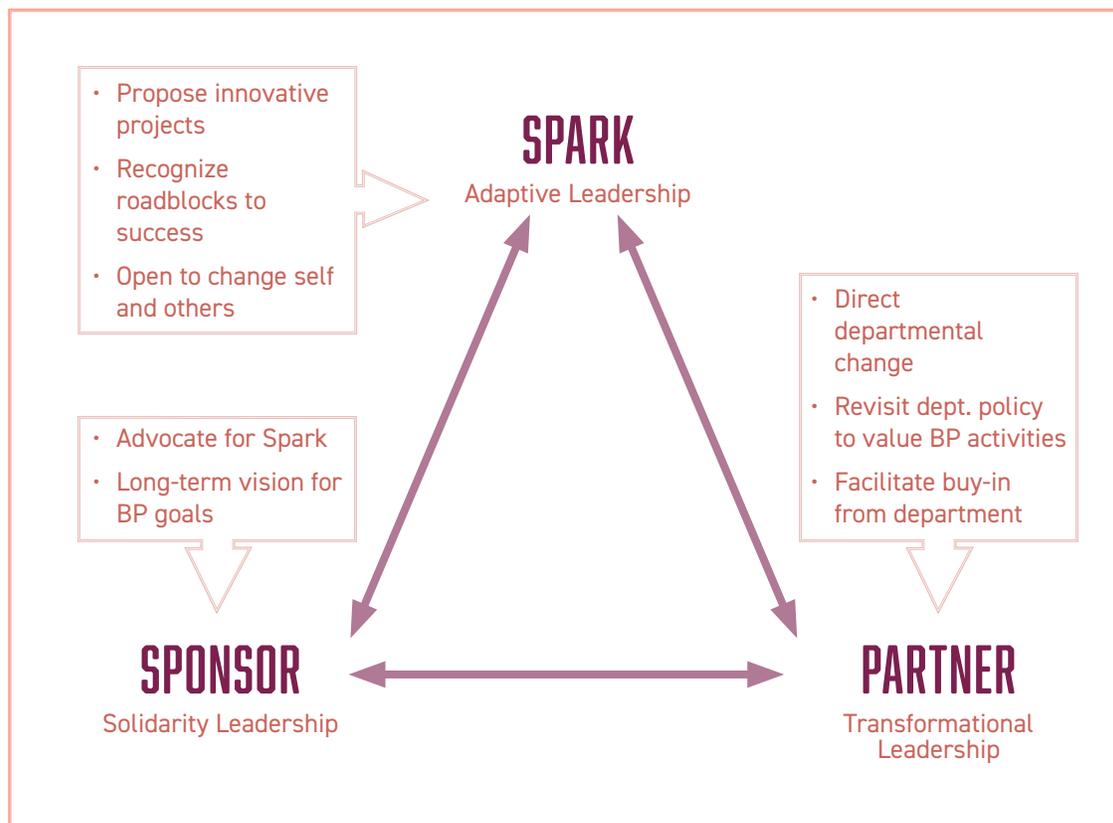


Figure 1. Sparks for Change triad structure, including leadership characteristics

Much of the burden of overcoming institutional inertia toward recognizing and rewarding broadening participation efforts should be placed on senior faculty members. They have both the institutional know-how and social capital to make change, and the security of being tenured. *Transformational leadership* focuses on the skills needed to create large-scale change and was the focus of the leadership training provided to Partners. In their role in the triad, senior faculty were challenged to advocate for the Spark and protect their time, encourage departmental buy-in, and throw their weight toward making large scale changes such as recognizing DEI work in tenure and promotion pathways. Examples in their action plans included working with human resources to diversify postdoctoral hires and advocating for broadening participation work to be valued in tenure packages.

Maintaining momentum in the face of institutional inertia can be challenging. The role of the Sponsor, an external leader in broadening participation, is to provide *Solidarity Leadership*. In this role, the sponsor provides experience, wisdom, and accountability to the Spark-Partner pair, and helps to connect departmental action plans to efforts to diversify the geosciences (or more broadly to STEM) as a whole. Examples of the work provided by the Sponsor included identifying funding opportunities that supported the Spark's career progression, including DEI work, and building partnerships between institutions.

For the Sparks who already are heavily invested in broadening participation work, tackling change to institutional culture should use adaptive leadership focused on changing values and inspiring confidence in others. Sparks were challenged to maintain momentum in their own career advancement specifically by thinking strategically about their service and DEI commitments so that they contributed to getting grants or connected them to valuable resources. Crucially, they were challenged to reframe their broadening participation work not as service but as leadership. This could take the form of ensuring that their broadening participation is highlighted in CVs and tenure reviews, and in motivating others to take on the work of DEI in the department. Action plans for Sparks included NSF-CAREER grant applications that highlight relevant broadening participation work and better alignment of existing broadening participation efforts with tenure and career needs.

## Unplanned Changes

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The biggest unplanned change during Sparks for Change was that Hurricanes Irma and Maria prevented several participant groups and one principal investigator from attending some or all of the workshop. Though the cohort size was reduced, this did not significantly affect the content of the intervention. With funds remaining after the smaller workshop, we were able to offer small 'spark' grants to our triads to accelerate momentum. These funds turned out to be useful for leveraging institutional funding (in some cases to the extent that the grants were not needed) and provided additional opportunity to build collaborations and continue progress.

A key programmatic change was that the PI team was encouraged during a master class for GOLD groups to understand ourselves to be participants as well as observers in the Sparks for Change program, and to reassess how we related to the study. This led us to step more fully into the ongoing post-workshop process, increasing check-ins and individual guidance, and developing the Sparks Information Exchanges—a roughly once-a-month conference call open to all participants, though not required. Maintaining momentum in the busy lives of faculty remained a challenge, and these regular check-ins provide a way of ensuring that the supportive cohort was able to continue outside of the workshop as a relevant community of practice.

An interesting but unexpected development was that our own team formation and performance showed itself as a worthwhile avenue for research. As a team, working in a similar small-group structure, we took on the same type of challenges in DEI in higher education that our participants were experiencing.

## Attendance

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Learner attendance had two phases; selection of participants and then participant attendance at the institute. Underrepresented faculty members from a geoscience department or national laboratory applied with a self-identified senior partner in their own department, in a common application pool monitored and selected from by the co-PIs. Identifying potential Sparks included tapping into the alumni networks of a number of successful mentoring programs aimed at students in the geosciences as well as promoting the opportunity on other minority-serving listservs. Broadening participation experts were identified and invited by the co-PIs to serve as Sponsors, and they spanned institution types and expertise fields.

## Outcomes

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Because the program is still running, data are still being collected. Initial reports show that participants self-report an increase in their leadership capacity, confidence in their ability to pursue DEI work, and appreciation for the mentorship and network developed through the program. Action plans are showing varied levels of success, but we maintain that this is ancillary to the Sparks' development as leaders and change agents. Several of the Sparks have successfully advanced their academic careers and built collaborations, acknowledging the support and collaboration of fellow Sparks for Change participants. An interesting development has been that some of our Sparks have moved from their positions, particularly the individuals whose funding and positions were somewhat uncertain when they participated in the program. These moves were to more supportive departments or to positions that better fit their interests. While certainly not a result of their participation in the program, the leadership development from the workshop helped them to evaluate themselves differently, and the supportive network of collaborators in many cases helped make the moves more successful. The value that these Sparks place on broadening participation efforts and their leadership in DEI has moved with them into their new roles, and while perhaps no longer in faculty positions, all remain in the broader geoscience field.

A key outcome that has already become apparent is the need to redefine the importance and value of the work of broadening participation. Our experience with Sparks for Change indicated that the broadening participation training and work that the triads are performing is important leadership development that benefits their career advancement and institutions. As such, we found it is imperative that both Sparks and Partners push for the recognition of service as leadership development equal in importance to that of management, grants, and research training on their own CVs and on promotion and tenure applications. This important realization also highlights the need for structural changes to current evaluations of broadening participation activities within the geosciences and across institutions.

## Challenges

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One of our central concerns upon embarking on the Sparks for Change program was overburdening of participants. Institutions may have difficulty retaining URM faculty because of the additional time devoted to DEI work as well as the disproportionate emotional labor involved (Porter et al., 2018). That is, URM faculty who want or are expected to do DEI work take on an extra burden beyond their core research and teaching responsibilities (Jiminez et al., 2019). Given the potential for participation in the program to be a further burden, we were very careful to remain flexible about time and requirements.

A key goal in building action plans at the workshop was to disrupt the institutional inertia that looks at DEI work as extra or not applicable to early-career faculty's science careers. To do this, we challenged the Partners and Sponsors to focus their efforts and departmental capital on distributing the work of DEI more broadly within the department, and to tackle tenure and promotion structures to ensure that this work was both recognized and rewarded. At the same time, we were as conscious as possible of not adding to the Sparks' professional and personal burdens. Instead of formal check-ins and learning outcomes determined by facilitators and evaluators, we created a learning community of scholars with discussions and objectives adapted to meet their needs. In this way we attempted to combine participant check-ins with building a supportive community of practice to share successes and challenges. While it is unlikely that this strategy completely avoided adding work to our Sparks' already full plates, we think this minimized the impact on their time while allowing us to continue to provide professional development and support.

It was challenging to maintain the focus on early-career faculty development, specifically retention of URM faculty members. Faculty are inclined to focus on students, and many of the action plans created by the participants focused on student recruitment. We emphasized the importance of faculty development, building leadership capacity, and department culture change as vital to their own professional development and success. It was stressed to the triads that protecting the Sparks and setting them up for retention and career progression should be the focus of any action plan that may involve students or recruitment.

Another challenge concerned our participants' self-efficacy as leaders. We took the point of view that our participants were *already* leaders, but that they perhaps did not see the skills or successes they brought to the workshop as leadership. Our task was to help participants recast their behaviors as leadership behaviors by providing a new vocabulary for thinking about leadership. We framed these behaviors and successes around specific styles of leadership, not as a way to instill those behaviors or rigidly place participants in categories of leadership, but to help participants utilize discourses on leadership to feel empowered to achieve their goals. We believe this work was successful. Many of our participants acknowledged that our identification of them as DEI leaders helped them to view themselves as leaders.

A final challenge that emerged was the emphasis on the action plan itself. Coordinators and participants did not view the action plans in the same way. From the coordinators' perspective, the action plan was a tool to spur the small group into action and build leadership capacity to effect departmental change. Through planning and implementation of their action plans, participants were supposed to see that they had the leadership capacity to pursue their DEI goals, change department cultures, and integrate DEI into their career success. We hoped to avoid the sense that DEI work is separate from participants' science careers. While we emphasized that we would not assess the implementation of the action plans and that the reason for the action plans was leadership development, we still encountered a strong adherence to action plan implementation and assessment. In hindsight, implementing the action plan was itself part of building leadership capacity, but the downside to this approach is that if an action plan is not being implemented well, then participants might pull away from the group. To counter this, co-PIs engaged the project listserv consistently, invited people to participate in the Sparks Information Exchanges, and continued to emphasize that leadership development and the career success of the Sparks was the project's most important goal.

## Lessons Learned

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While Sparks for Change received overwhelmingly positive feedback from participants, there are many takeaways for others looking to implement a similar program in their institution.

The biggest lesson learned was that as facilitators of the program, we have to be flexible and adapt to unpredictable life events. Beyond the hurricanes that limited participation in the workshop, in the years that followed, people moved, changed jobs, or had other challenges emerge. Researchers must be attuned to the human and social dimension of this work and design research objectives that will allow for life's events. Being adaptable and flexible in our project management underscores the fact that participants cannot be reduced to objects in an experimental protocol. Data collection is complicated in a project of this nature. Participants may have varying levels of engagement relative to their other commitments. That said, with constant engagement from principal investigators there is an opportunity for comprehensive, qualitative data gathering. We paid close attention to participants' attitudes and feelings because we are trying to illuminate pathways to change and to get a holistic view of the challenges and opportunities they face. We think that the challenges that our participants face in increasing the perceived value of their DEI and broadening-participation work aren't unique. Rather, they are embedded in academia generally. Our approach recognizes that all of our participants face different situations in their institutions and have different backgrounds and demands on their time.

We also learned that it is important for facilitators to reach out repeatedly and encourage engagement. While we are not willing to go so far as to say that facilitators should insist that participants keep to a predetermined schedule, it can be difficult to get participants to re-engage if they have gone some number of months without hearing from anyone. We surmise that outreach and building a strong community of practice is an important element of a successful intervention.

More generally, we learned that the scope or ambition of the action plan and its impact on leadership development do not seem to have a relationship. That is, even if the action plan was relatively modest in its scope or ambition, that was often enough to propel the triad members to report gains in perceptions of themselves as leaders that could set the stage for further DEI projects to change department culture. We found that it did not take much to spur confidence and empowerment of our Sparks, especially when bolstered by Partners and Sponsors advocating for them at institutional, professional, and social levels. We learned that being part of a community of like-minded scholars interested in DEI emboldens participants to lead change initiatives.

## Recommendations and Best Practices for Those Seeking to Create Similar Programs

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1) *Your cohort matters.* A strength of our cohort was the wide-ranging expertise members brought to the table. We successfully included different institution types, disciplines, social and physical sciences, and diversity in individuals. We believe this is the ideal scenario. However it may also be valuable to recreate similar workshops in the context of an individual college. In this model, Sparks and Partners could be recruited from different departments within the college and Sponsors could be recruited from areas outside the college, depending on the expertise needed. If individuals with expertise in diversity, equity, inclusion, social justice, leadership, and other research areas are not present in engineering or STEM communities, then collaborations can be formed with other colleges and units. This would also help build a supportive network for participants across campus.

2) *Time is a precious commodity.* For all participants, the time commitments for the project should be laid out in advance, and the emotional labor required for long-term success of DEI work should be discussed.

3) *Opportunities for ongoing engagement and growth should be provided.* Each participant will encounter different situations and experiences based on various factors, such as academic role, background, and time demands. Being able to monitor those experiences, share successes and challenges, and have mechanisms to process and discuss them is essential to participation, cohort engagement, and institutional progress. We recommend regular, flexibly scheduled check-ins. Monthly check-ins have worked well for us.

4) *Action plans* are a valuable way to focus efforts and spark change, and provide a clear structure for moving ideas out of the workshop and into the department. Action plans should focus on supporting URM faculty members and changing departmental culture to better value and distribute the work of broadening participation. Sharing the action plans within the group provided excellent feedback to our participants and is highly recommended. If applicable, action plan outcomes could be written to align with any college-level diversity, equity, or inclusion goals and/or metrics.

5) *Flexibility is vital.* Professors are extremely busy people. Life happens, circumstances change, and for many of our early-career faculty, funding is insecure. Being willing to adapt to meet the needs of your participants and supportive when progress is slowed or halted is essential to continued involvement. That said, faculty are also extremely knowledgeable. Make space for the wisdom in the room to be shared.

6) *Defining success is challenging.* As scientists and engineers, we are used to being able to control variables and form conclusions. In this work, criteria for success are much more ill-defined, and that can be frustrating. The time scales for progress are long, and impacts may not be immediately obvious. Look for leading indicators, such as changes in self-identity, different types of DEI engagement, collaborations, and connections. Provide opportunities for self-reflection, and celebrate small successes.

7) *Don't be afraid to engage and grow with the participants.* As scientists, we found our own tendency was to hold back and not “interfere with the experiment.” However, we were challenged to change that mind-set and in doing so, we learned that by engaging deeply and adapting and learning from our participants, our program became much stronger. As a PI team, we have all learned a lot and become much better leaders in broadening participation because of our participation in Sparks for Change.

## Recommendations for Chairs and Departments

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1) Broadening participation work is *time- and emotionally-intensive*. If faculty are hired with the intention for this to be a part of their responsibilities, or encouraged to do so after hiring, *appropriate release time should be provided and tenure and promotion should value and reward* these efforts. A budget for DEI may also be appropriate, especially for ongoing engagement with a supportive learning community.

2) If faculty are not hired or expected to engage in DEI job responsibilities, *protecting their time for research activities is important*, as broadening-participation service responsibilities such as mentoring and serving on hiring committees can quickly add up and contribute to overload and/or failure to meet tenure requirements. Distributing broadening participation and DEI work widely across the department, rather than concentrating it on a small number of URM faculty, not only supports the faculty member's career progression, but also helps build a culture of inclusion in the department.

3) *Early-career faculty need mentoring, especially adjuncts and those whose positions are funded by grants and other funding that is not part of their institutions base budget (soft money)*. Having a more senior faculty member actively paying attention to and advocating for early-career faculty members is vital, and insider expertise can help prioritize funding, teaching, research, and service responsibilities. An external mentor with complementary expertise provides an extra benefit for their success, especially those investing heavily in broadening-participation work where internal

expertise may be limited. Many of our URM faculty members have come through successful student mentoring programs and are well placed to make the most of supportive mentoring relationships and build inter-institutional collaborations. Senior faculty members can also benefit from this expertise in broadening participation and inclusion.

4) Since publishing, attending conferences, and engaging in collaborative activities are an essential part of being part of the scientific community, broadening-participation practitioners *benefit from being part of an academic, research-based DEI community*. Presenting, publishing, and participating in ongoing professional development in this area should be supported and recognized for their scholarly value and for the contribution these efforts make toward diversifying higher education and the STEM workforce.

5) That said, *DEI work is inherently human*. Progress in this area often looks different from a controlled scientific experiment or solution-based engineering challenge. It is a place of emotions, individuals, and conflicting ideas and experiences. As scientists and engineers, we can learn from experts in the social sciences and organizational leadership, and include them in our efforts to better identify indicators of success.

6) One final idea came from one of our Sparks for Change institutions that we believe should be shared widely: *Consider the value of recognizing service as leadership*. The service work that faculty do is, in fact, leadership—and it is vital for the success of a department and the careers of the people within it. Reframing service as leadership changes the value that we put on this work and will help to spark cultural change to better value and distribute the work of broadening participation.

## Acknowledgements

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## CHAPTER 4 - CONCLUSION

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The GOLD Project grantees developed knowledge that the National Science Foundation and the American Society for Engineering Education anticipate will be useful to efforts to increase the participation of underrepresented groups in the geosciences. The participants' accomplishments and challenges are not unique to them, and their experiences are applicable to similar efforts in other STEM fields. In considering the grantees' experiences in implementing their projects, a few key themes and lessons learned emerge:

1. **Collaboration is crucial.** Increasing participation of underrepresented groups in geoscience is inherently collaborative work and will require the efforts of a great many scientists and administrators. It is not something that individuals can do in isolation. The GOLD grantees demonstrate several different models of how to carry out this collaborative work, whether it's the collective action of Sparks, Sponsors, and Partners launched by the Sparks for Change Initiative or the collaboration between scientists and actors that the GeoDES project initiated.
2. **Diversity is difficult work.** Diversifying the geoscience fields will be hard. It will make people in positions of power uncomfortable and be inconvenient for people who are not used to being inconvenienced. Established ways of selecting geoscience talent will need to change, in many cases radically. The GOLD grantees grasped this through their experience and handled it mindfully. As the Sparks for Change Initiative revealed, being a Spark for Change in the geosciences is emotionally demanding, and Sparks faced some very steep odds of success at their institutions. GeoDES participants learned that even simulated efforts to make the geosciences a more inclusive enterprise can be very uncomfortable.

3. **Science Isn't Always Science.** The question of who gets to practice science and under what conditions is not answered using the scientific method. Science is an inherently human enterprise, and we make decisions about who can practice science using the same attitudes and feelings that we apply to our other activities. The GOLD grantees' experience provides models for how to acknowledge those feelings and attitudes and begin to steer them in directions that will help improve the geoscience professions.

Our society faces a complex and daunting array of problems and opportunities that the geosciences have an important role in addressing. In order to address these problems, the United States cannot afford to tap only part of the full spectrum of scientific talent that is potentially available. Diversifying and making the geoscience professions more inclusive of people who have not traditionally been engaged in geoscience would enable Americans to apply our collective knowledge to make our world a healthier, safer, and more harmonious place.

# APPENDIX 1 - RESOURCES FOR CULTURE CHANGE- HANDOUTS AND POSTERS FROM SPARKS FOR CHANGE

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## Adaptive Leadership

The fundamental takeaway from the adaptive model of leadership is two-fold:

1. To build confidence and a capacity for action that includes others
2. To develop a prescriptive approach that highlights: where change is needed, its embedded complexity, how it will improve the department, and creates room for people to participate

These are some characteristics or behaviors that we think might make for effective adaptive leaders:

- **Focus on adaptive, not technical, challenges.** Adaptive challenges are usually fundamental, communal, and are questions of values – and that can stir up peoples’ emotions. By contrast, technical challenges are problems you can overcome using your own expertise (Heifetz et al, 2009). Adaptive challenges might be, for instance, pointing out the gap between an institution’s stated values and their actual behavior.
- **“Get on the balcony.”** Try to find a vantage point to a challenging situation that lets you see the complexity of the issue, and how it’s interrelated. Sometimes seeing the big picture is itself enough to see paths forward (Heifetz and Laurie, 1997). It also lets potential collaborators know that you’ve thoughtfully considered possible impacts of what you want to do.
- **Be bold.** You’re working with people who are in a position to help you and are going to be advocating for you. If you have an idea that is adaptive, and worth pursuing, even if difficult, it’s worth strategizing with your partner and sponsor about it. Not every idea you have will go well; not every idea will be implementable. Use the expertise of the people working with you.
- **Be open to change.** It stands to reason that if your department undergoes a culture change, that you, as part of that culture, will also change. As you adapt, be mindful of the ways in which you are participating and being shaped by the change that your department is undergoing.
- **Maintain disciplined attention.** You’re pursuing departmental level change, and there will undoubtedly be bumps and other frustrations along the way. Maintaining your attention is a matter of self-confidence that you do good science, and part of that is pursuing DEI projects.
- **Recognize roadblocks.** Relatedly, when you encounter a roadblock that requires an adaptive response, think of how your triad or your broader community of colleagues can help.



## Solidarity Leadership

The fundamental takeaway from the solidarity model of leadership is to accomplish two things:

1. Solidifying networks of BP advocates at departments by providing experience, wisdom and accountability
2. Connecting departmental action plans to the bigger conversation of diversity and inclusion in the geosciences

These are some characteristics or behaviors that we think might make for effective solidarity leaders that can help achieve those goals:

- **Facilitate the transformational leadership of the Partner and the adaptive capability of the Spark.** Literature suggests that high levels of solidarity among colleagues can enhance, and is in fact necessary, for transformative potential (Sanders & Schyns, 2006). Sharing your past successes and wisdom with the other members of the triad can build that solidarity.
- **Provide accountability within the group.** Small groups do great, but having accountability from a group member who is external is even better (Hiller & Day, 2003). You'll be talking to the Spark and Partner about their action plan after the institute, and you can hold them accountable to that plan. Doing so is an important part of breaking institutional inertia.
- **Give practical advice.** Again, since you have a wealth of experience doing BP work and focusing on the benefits of DEI, you are in a position to guide the action plan of the Spark and Partner's institution with insights concerning the recruitment, retention, and promotion of underrepresented minority faculty.
- **Facilitate communication in the triad, and beyond.** Part of building solidarity is not only within the triad, but helping the triad communicate the necessity and importance of DEI to their own departments as they pursue change. Experiences of solidarity come from effective communication, where life stories and circumstances shape the motivations and aims for institutions (Jäger et al, 2012). Solidarity leadership has a humanizing effect from communication of lived experience that might be needed in geoscience departments.
- **Offer mentorship for Sparks.** An important role you have with the Spark is to provide mentorship that is squarely focused on their own advancement. This is not to say Partners don't mentor, but they do have to look out for the interests of the department at large. You can provide mentorship that is not enmeshed in those institutional demands.
- **Provide long term vision.** Your sustained commitment to principles of BP undoubtedly have you considering what is good for the geosciences as a field. The Spark and Partner may have different horizons for their vision. You can help synthesize the more immediate needs or institutional needs into a broader sense of what's good for the geosciences.



### Transformational Leadership

The fundamental takeaway from the transformational model of leadership is to leverage your position as a department chair or senior faculty and use that position to effect change at the departmental, administrative, or structural level of the university.

These are some characteristics or behaviors that we think might make for effective transformational leaders:

- **Utilize your position.** Some of you are department chairs, but even if not, use your position as a senior faculty member to pursue your goals. Being post-tenure allows you to pursue bold projects without employment precarity. Chun and Evans (2015) finds that the chair can be a uniquely transformative actor for pursuing diversity efforts in non-diverse faculty, mostly because of the hierarchical position.
- **Use resistance as an opportunity to try something new.** We know that many of you have voiced frustration over some peoples' unwillingness to change if similar efforts didn't go well in the past. A transformational leader says what's new and contextualizes current efforts to make it clear it's not a repeat of past efforts.
- **Don't be afraid to make a normative case.** This doesn't mean we want you to ignore the practical case; it's important to know that having a diverse faculty can yield a diverse population, and fosters good collaboration and team science (see for example "The Benefits and Challenges of Diversity in Academic Settings", and references within). But if we think that BP is the right thing to do, saying so can be very powerful to raise the level of morality in others (Burns 1978).
- **Be an example.** Model the department culture you want to see. If you want a department culture of innovation and empowerment, where people are encouraged to try new things and freely discuss new challenges or opportunities, you can be a role model for that kind of behavior.
- **Resist the Status Quo.** Part of being a transformational leader is being willing to step into the unknown. It might help to foster an attitude that trying innovative things, even if they fail, is preferable to adhering to the status quo. It's a risky proposition, and won't always be met with success, but you're in a position to assume some risk.
- **Implement a Shared Vision.** You and the rest of your triad might be in different places in terms of what's good for getting tenure, and what's good for the geosciences as a whole. You might be thinking about what's good for your department or research group within the broader structure of the university or lab. Take in the vision of the Spark and the Sponsor and practice communicating the positive benefits to pursuing the benefits of BP from these perspectives (as well as your own!)

# SO, YOU'RE IN CHARGE OF A DEI CULTURE CHANGE PROGRAM ON YOUR CAMPUS. WHAT NOW?

## YOUR COHORT MATTERS

BUILD A NETWORK OF COLLABORATORS WITH EXPERTISE IN DIVERSITY, EQUITY, INCLUSION, SOCIAL JUSTICE AND LEADERSHIP ACROSS CAMPUS

## TIME IS PRECIOUS

LAY OUT TIME AND EMOTIONAL LABOR COMMITMENTS FOR THE WHOLE DEPARTMENT IN ADVANCE

## DEVELOP AN ACTION PLAN

THEY ARE A VALUABLE WAY TO FOCUS EFFORTS AND SPARK CHANGE

## FLEXIBILITY IS VITAL

BE WILLING TO ADAPT TO MEET THE NEEDS OF YOUR PARTICIPANTS AND BE SUPPORTIVE WHEN PROGRESS IS SLOW

## ENGAGE AND GROW

BY ENGAGING DEEPLY AND ADAPTING AND LEARNING FROM PARTICIPANTS, THE PROGRAM BECOMES STRONGER

## CELEBRATE PROGRESS

PROGRESS CAN BE SLOW. LOOK FOR INDICATORS LIKE CHANGES IN SELF IDENTITY, DEI ENGAGEMENT, COLLABORATIONS AND CONNECTIONS



This material is based upon work supported by the National Science Foundation under Grant No. 1645453

# SO, YOU JUST HIRED AN UNDERREPRESENTED FACULTY MEMBER. HOW CAN YOU SUPPORT THEM IN BROADENING PARTICIPATION?

## BP WORK IS TIME AND EMOTION-INTENSIVE

IF THIS IS PART OF THEIR RESPONSIBILITY, PROVIDE TIME AND REWARD THESE EFFORTS

## DISTRIBUTE BP WORK

HAVING EVERYONE IN THE DEPARTMENT CONTRIBUTE SUPPORTS URM FACULTY SUCCESS AND BUILDS A CULTURE OF INCLUSION

## SUPPORT BP RESEARCH

REWARD PRESENTING, PUBLISHING AND PARTICIPATING IN RESEARCH-BASED BP COMMUNITIES

## MENTORS SHOULD PROTECT

HAVING A MORE SENIOR FACULTY MEMBER ACTIVELY PAYING ATTENTION AND ADVOCATING DEPARTMENT BP VALUES IS VITAL

## BP WORK IS INHERENTLY HUMAN

LEARN FROM SOCIAL SCIENTISTS AND ORGANIZATIONAL SCHOLARS. PROGRESS WILL LOOK DIFFERENT FROM A CONTROLLED SCIENTIFIC EXPERIMENT

## SERVICE IS LEADERSHIP

REFRAMING SERVICE AS LEADERSHIP CHANGEST THE VALUE WE PUT ON THIS WORK AND HELPS SPARK CULTURAL CHANGE



This material is based upon work supported by the National Science Foundation under Grant No. 1645453

# APPENDIX 2 - LEADERSHIP FOR BROADENING PARTICIPATION PODCAST TRANSCRIPT

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## Leadership for Broadening Participation Podcast Series

### LBP Podcast Introduction

Hosted by [Diana Kardia, Ph.D.](#) and [Kelly Mack, Ph.D.](#)

Visit the [Kardia Group website](#) to listen to more episodes in this series.

Welcome to the Leadership for Broadening Participation podcast. This podcast is part of the NSF-funded GOLDEN project, Geosciences Opportunities for Leadership in Diversity and Equity Network, supporting the post-award training and development for [GOLD PIs](#).

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**Kelly:** I'm [Kelly Mack](#). I am the Vice President for Undergraduate STEM Education and Executive Director of Project Kaleidoscope at the [Association of American Colleges and Universities](#). I've been in this role a little over five years.

I was formally a Professor of Biology at the University of Maryland - Eastern Shore. The native discipline is physiology, so I taught physiology, I taught endocrinology and biology. My favorite was endocrinology by far.

**Diana:** And I am [Diana Kardia](#), founder of [Kardia Group](#) and a scholar practitioner focused on leadership and change in academia, and the ways that academia benefits from and contributes to the power of diversity.

Together, Kelly and I have been working with the [NSF Geosciences Directorate](#) on an innovative program they launched to promote leadership for broadening participation. It's called [NSF GOLD - Geoscience Opportunities for Leadership in Diversity](#).

In this podcast series, we share what we learned from working with this group, and from interviews we conducted with GOLD project leaders.

This episode introduces you to NSF GOLD and the nine leaders who shared their stories, reflections, and expertise with us to advance our collective understanding of this endeavor.

To begin, it helps us understand what broadening participation means. Here is Kelly on that topic.

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**Diana:** What is broadening participation?

**Kelly:** Yeah, so that's a big question, because I don't know if everybody agrees. I don't know if we agree that broadening participation is the strategy or the end goal.

As a strategy, it would be ensuring that anybody who has an interest in pursuing STEM, as a major, as a career, is able to do so. As an end goal, it is seeing that those who are engaged with STEM represent the diversity of our nation.

So when I think about broadening participation, I think about creating the structures in which everybody who chooses STEM has the opportunity to fully pursue it.

*Next, there is a concept of leadership for broadening participation. As it turns out, this is an evolving question that we'll return to many times throughout this podcast. For now, though, here is Kelly and me describing the scope of what we mean by this term.*

**Diana:** I see at least three levels when we're talking about leadership for broadening participation. There's leaders who are responsible for everything, and how are those leaders contributing to broadening participation.

There's leaders who formally take on a task or a project that's focused on broadening participation, and who are they, what do they need, and how can they be successful.

And then there's leadership that is the everyday "I'm doing something that's moving the ball forward. From wherever I am, from whatever situation I'm in, I might fail at it someday, but those days I take stock and learn from it, so the next day I'm doing it better."

All three of those definitions of leadership are necessary, but the answers of what they are and how to develop them are fundamentally different.

**Kelly:** Yeah. In Project Kaleidoscope we talk about the big "L" and the little "L." The big "L" is when you've got the formal position, you've got responsibility, oversight, or the environment, the tone, etc. And then there's the little "L," which is every day, making it better. Every day, making a small change. And not an insignificant change.

And you're right, they are two entirely different approaches. I think for this kind of work, everybody has to focus on the little "L." Even the big "L"s have to focus on the little "L".

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(4:38)

*So that describes the focus of NSF GOLD at a simple level, but there are a few more things you need to know about this program to fully appreciate the projects and people that define it.*

*NSF GOLD is not just the latest in a series of funding opportunities focused on broadening participation efforts in STEM. The NSF GOLD call was an inspired commitment to change the course of broadening participation efforts.*

*Here is Kelly, who was once an NSF program officer herself, talking about the need for a program like GOLD.*

**Kelly:** I can relate to the frustration of having made significant investment in diversity and broadening participation programs, and seeing little return on the investment. And seeing the same people engaged, time after time, after time, after time.

I also hear program officers talk about “the formula.” When you write a proposal, it starts off by talking about how bad things are, and we've got the answer, and it involves a couple of different kinds of activities, many of which are workaround activities aimed at fixing the student. And it is frustrating to see, and you can become very impatient, at just the glacial pace at which real change happens.

My understanding is that this is some of the sentiment that these program officers were experiencing, and also seeing that the individuals who were leading these initiatives themselves were not as in-tune to, aware of, critically conscious of, everything that needed to go into running a broadening participation program.

*So the geosciences directorate shifted the focus from changing students and student access to a focus on changing faculty and institutions.*

*While other NSF programs, such as [ADVANCE](#) and [INCLUDES](#) have also set their sights on institutional change, these program officers also wanted more. They wanted to invest in the development of leaders, and the cultivation of a community that could transcend the limits of individual efforts and accelerate the pace of change.*

*With this in mind, they turned to an unusual model: the [Ideas Lab](#). This funding mechanism emerged out of an idea conceived by the UK's Engineering and Physical Sciences Research Council in 2003, to inspire more innovative, and multi and interdisciplinary research proposals.*

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Leadership for Broadening Participation Podcast Series  
Transcript for LBP Podcast Introduction

*Designed and facilitated by [Know Innovation](#), an international company dedicated to accelerating scientific innovation, the NSF Ideas Lab model is a 5-day residential program aimed at cultivating a shared understanding of a research program within a multi-disciplinary gathering of scholars, and generating novel, risky, and cutting-edge proposals. While this model had been used by NSF before, it was unusual to use it in this way.*

**Kelly:** And what was different about it was that it would be focused on broadening participation. And this hadn't been done before. Ideas Labs had typically been used to generate innovation within the discipline itself, not broadening participation within the discipline.

*For NSF GOLD, the Ideas Lab brought together 30 scholars and practitioners from 29 institutions of various sizes and types, and a wide range of fields, ranging from atmospheric science, oceanography, ecology, and evolutionary biology to civil engineering, political science, educational psychology, and educational leadership and policy studies.*

*This was in March of 2016. This is also where Kelly and I met. Kelly was the Ideas Lab director, and I was one of four mentors who served as resources during the five days of problem definition and project development.*

*Five GOLD projects were funded from this effort. For more information on the five projects, you can go to the GOLD website, hosted at UCAR: [cpaess.ucar.edu/GOLD](http://cpaess.ucar.edu/GOLD).*

*But while the projects themselves are exciting and important, and deserve lots of attention, this podcast is about what it takes for those projects to succeed. Here, Kelly and I talked about how the Ideas Lab laid the ground work.*

**Diana:** The Ideas Lab was really a wonderful opportunity because it was multiple days in a row, because it was focused on innovation and creativity, and breaking the traditional norms of interaction to allow something new to happen.

And because it was a room full of really passionate, willing, committed, sometimes in over our heads, sometimes scared, but really everyone in that room brought something and was willing to keep bringing it.

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Leadership for Broadening Participation Podcast Series  
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**Kelly:** I think an activity like that can go wrong if there aren't the right kinds of structures and supports in place to move people through whatever are their personal barriers, let alone the discipline barriers, but the personal barriers have to be managed in a very careful kind of way.

And I think fortunately, we recognize that as directors of the Ideas Lab, as people who had had experience with this kind of work before, and leading others through this kind of work.

To do this kind of work we're drawing from everything that we know. Absolutely every experience, every theory we've learned, every framework we know, we draw from everything, and bring it to bare, to walk others through this process, or to walk others through their own journey.

*After the Ideas Lab and the formal funding process to establish the five GOLD projects, Carolyn Brinkworth and [UCAR](#) submitted a new proposal, NSF GOLDEN, to extend the support and development that began at the Ideas Lab.*

*Kelly and I have led the professional development activities of GOLDEN, including monthly virtual learning community meetings, consultations with project teams, and mastery classes on developing leadership and making and evaluating change. The interviews you'll hear in this podcast series are also a product of GOLDEN.*

*Here is Kelly and me talking about the logic model of GOLDEN.*

**Diana:** We added GOLDEN partly as a technological space, that's the piece that UCAR is taking a lead with, so that there's a place for these disparate strategies to still be one effort and one community, and a place to harness the synergies, because that's what this kind of change requires.

We can't just silo, we can't just divide and conquer. Yes, each small team needs to pick the things it's going to focus on, but there needs to be that learning from each other's work, and backing each other up, and gaining perspective together.

And you and I saying, okay first of all we've got individuals who are doing a very hard task. There's not enough understood about leadership for broadening participation, it's far too few places that achieve social science and science collaborations, so let's support them in that work.

Then on top of that, they're not just leaders in broadening participation, but they are leaders of leaders, which is an even harder task. And so, how can we support them in that?

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And then, the third motivation for GOLDEN is that most academics know how to work as a project leadership team, but few PI teams actually know how to be a team. They'll work together and divide up the work and have meetings, but the kind of team experience that is needed to lead broadening participation, to gain the trust, and to make the mistakes together so you can do the work, it's rare, in my experience.

And so, I'm really excited that the geosciences directorate was interested in providing more support for these teams to achieve a higher level of functionality, basically, as a research team.

**Kelly:** And it makes so much sense, you know, when, as a funder, you have made an investment and you trust an individual to be able to deliver on that investment, and to give them the support that they need to be successful, only makes your portfolio that much more successful.

You know I see it as a different kind of model for funding. And I think it's especially necessary for these kinds of projects. If it's about one doing research in his or her own area, where somebody is alone, and in the laboratory, and your only influences are the natural world, acts of God, I think that's a different model than when you are depending on someone to change hearts and minds.

And that's a different way of thinking about how success is going to actually be achieved.

What has emerged from that are, what I think we would both agree are sound projects, with strong leadership, with individuals who can take the heat as a change agent; they're grounded in themselves, they can read the room, they are compassionate for those who don't get it, they are not risk-adverse, they don't mind using their privilege when they have to... It's rare to find this big a group with that in common, who hasn't been doing this for over a long period of time.

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(14:46)

*We wish we could introduce you to all 30 of the Ideas Lab participants, plus the other mentors who worked with us there, as well as the PIs and senior personnel who have joined GOLD projects since then.*

*Instead, we have nine GOLD leaders who happened to be available when we were conducting these interviews, who were inclined to go into the rabbit hole of examining their own capacity for leadership for broadening participation, and who were brave enough to answer a whole host of questions that Kelly and I were only just learning to ask. Here are those nine leaders.*

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**Grady:** I'm Grady Dixon. My current job is I'm the Chair of Geosciences. A small department on a small university in Western Kansas, Fort Hays State University, Department of Geosciences.

Prior to this, I worked for nine years at Mississippi State University, also a geoscientist, but my training is all meteorology and climatology. That's where all my research has been, all my graduate students that I've mentored. My graduate degree is in Geography and Meteorology.

Prior to this, no formal experience in any sort of DEI efforts.

**Darrin:** I'm Dr. Darrin Pagnac, I'm an associate professor, paleontologist at the South Dakota School of Mines and Technology in Rapid City. And I'm the Lead PI for the FIELD project (Fieldwork in Inspiring Expanded Leadership in Diversity) where we are examining inclusivity and diversity in field geoscience settings.

**Carolyn:** My name is Carolyn Brinkworth, I'm the Chief Diversity, Equity, and Inclusion Officer for the [University Corporation for Atmospheric Research](#). So, we manage the National Center for Atmospheric Research, which is a federally-funded research and development center, an FFRDC, mainly funded by the NSF.

My background is pretty unusual for this kind of work. My PhD is actually in Astrophysics. And so, I ended up working for NASA for ten years, worked for the Spitzer Space Telescope, based at Cal Tech.

So I was on a post doc there in astronomy for two years. I moved on to it as a staff scientist, and then I got very much into education and outreach because I realized I didn't want to be a research scientist, that just wasn't my bag.

I started out as the education and outreach scientist for Spitzer, then kind of became the education and outreach scientist for the IPAC, and then deputy lead for public affairs, for the public affairs team there.

But during those eight years or so, I realized that I really needed some formal education in how to be an educator, so I went back to school at Claremont Graduate University, and I got my Master's in Education, at Claremont Graduate University.

**Mary:** I'm Mary Hubbard, I'm a Professor of Geology and Department Head for the Department of Earth Sciences at Montana State University. And I'm a structural geologist; I study how mountains are formed.

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I've taught at universities across the country, starting in Maine, into Kansas, and then Utah, and here in Montana, and they've largely been departments and even universities that lack a lot of diversity.

And so, I was attracted to the GOLD project in its bigger scope just because of the need to address that, and again, to make the environments user-friendly.

I've certainly experienced some things personally because of my gender, but there are people that we are trying to include now that could be discriminated against by three or four different counts. And so, that's just not acceptable and we need to make change.

**Corey:** My name is Corey Garza, I'm a professor of marine science at California State University at Monterey Bay. So I teach across our marine science program, our biology program, we have a graduate program in marine science. I also run a number of grant-funded education and research programs.

So I run our Research Experiences for Undergraduates program, it's an ocean science training program for undergraduates funded by the National Science Foundation. Also, I'm our campus principal investigator for the NOAA Cooperative Science Center, it's a pretty fun program to run.

And then on my other hat, I'm a research scientist too, so I do that as well. I do a lot of work with marine protected areas and marine scientists, and I use a lot of spatial tools, things like geographic information systems, spatial statistics, trying to understand the basic dynamics of why certain species associate with certain habitats.

That's what I call my "gee whiz science", like "oh gee, that's pretty cool that they do that," but then how do you take that "gee whiz science" and turn it into something more applied?

**Kathy:** My name is Kathy Quardokus-Fisher, and I'm an assistant professor at Florida International University. I have a split appointment between the Department of Earth and Environment that houses our geology, meteorology, and environmental studies, and sustainability, and another 50% appointment in the STEM Transformation Institute.

And my research expertise is in geoscience education research. So I usually think about how students are learning about meteorology and also about change in higher ed.

So the other part of my STEM Transformation Institute is thinking about why faculty teach the way they teach, and how we might design programs to help them teach better.

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Transcript for LBP Podcast Introduction

**Jason:** I'm Jason Chen, I'm now going to be, starting in the academic year of 18 to 19, an Associate Professor of Educational Psychology at the College of William and Mary, which is in Williamsburg, Virginia.

I teach a lot of classes on sort of the foundations of teaching, and the learning process. My research focuses specifically on adolescence and science and mathematics motivation and engagement, particularly how we can leverage technologies to direct students' motivational and cognitive resources toward certain pathways.

**Wendy:** Xaadan 'láa is (*good people*)

Díi gudangáay 'láagang. (*I'm happy to be here with you today*)

Díi uu Xaat'á aGanG (*I am Haida*)

Gaa ts'áak gúust uu díi k'wáalaagnag (*I am of the Eagle moiety*)

Díi Hlanggwáay tla k\_íiya 'la'áaygaagang (*I am an observer of the world*)

K'ah Skáahluwáa hínuu díi Kya'áang (*My Haida name is K'ah Skaahluwaa*)

Wendy Smythe hínuu díi Kya'áang (*My English name is*)

Higdáa Gándlaay (Hydaburg) st'ootl iijang (*My people are from Hydaburg, Alaska*)

So I said, good people I'm happy to be here with you today. I am Haida, of the Eagle moiety, and I introduced myself as an indigenous scientist. So I said I'm an observer of the world, not to separate one as being indigenous or scientist, but both.

My Haida name is K'ah Skaahluwaa, which means "laughing lady." My elders named me that because they hear me laugh, and they say it brings them joy. My people are from Hydaburg, Alaska.

And I'm a geoscientist, oceanographer, and I also do a lot of work in my tribal community, coupling our traditional knowledge and language with geoscience and the needs of the community.

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Leadership for Broadening Participation Podcast Series  
Transcript for LBP Podcast Introduction

**Eric:** I'm Eric Kaufman, I'm a [Virginia Tech](#) associate professor and extension specialist. So, officially, my master's and doctorate are agricultural education and communication.

I did, in grad school, specialize more in leadership studies with that. It was in an agriculture education department, so a little bit more leadership in community volunteer settings. Prior to that I taught high school agriculture, my bachelor's degree was in agriculture education.

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21:50

*You'll hear a lot more from these leaders over the course of this podcast. Their voices and experiences will help us access broader truths that apply across many types and styles of leadership for broadening participation.*

*But it is not just this content or the individual insights that motivate this podcast.*

*Diversity, above all, is about the nature of our interactions. Broadening participation is a practice of enriching, enlivening, and elevating those interactions, so that a shared space can exist, and within that shared space, we can do more than we could ever do alone.*

*Here, Kelly talks about how that happened for her, during the course of these interviews.*

**Diana:** Will you just reflect for a minute on why you were glad to do the podcast, what you felt like the purpose of these interviews was? What the gains were?

**Kelly:** I'm laughing because I didn't want to do them. And only because I don't like listening to my voice. Of course, I know many people don't, but that was not going to be fun for me.

And I didn't think I could be profound enough, to have enough soundbites in five or ten-minute segments that would be enlightening for anybody who would be listening. But it was what you wanted to do, and I trust you, and so I followed you.

And then I was just amazed at what I learned, and how good it made me feel to have the kinds of conversations that we had, to hear their stories. And I did a lot of growing.

For me to be able to sit and listen to a white man like Darrin talk about his struggle - because I look at Darrin and I think, "There's no way. There's no way you had it hard."

But to have had the opportunity to sit with him and listen to his story and hear him talk about it in ways that were so similar to how I would have talked about my own experience was remarkable, and a remarkable opportunity for me.

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There aren't many instances where a white man would sit down with me and say, "Kelly, let me tell you how hard my life is." And where I would be open to listening to him and believing that he really did struggle.

So I think that was an incredible gift that you gave to me, to be able to do that. And it has softened, in many ways, my outlook, and allowed me to lead with compassion first. And that's something that I had naturally done with students, something I naturally do with young people, not necessarily something I do with grown people.

**Diana:** And yet, such a theme that we heard throughout the interviews, when we ask people to reflect not in what they were needing to develop, but what they already knew, and what they already did, again and again, it came back to that compassion. I too, feel really lucky for doing it.

**Kelly:** I really do.

*And so, we want to welcome you to our podcast on leadership for broadening participation. We're confident that you, too, will feel lucky for the opportunity to listen to these stories and reflections, and consider for yourself the meanings, motivations, and criteria of this kind of leadership.*

*The next episode features what we call 'origin stories', the source waters from which leadership for broadening participation is born. Feel free to move on to that episode now; you know all you need to know as a background for the episodes to come.*

*Or, if you'd like, stick with this episode for a bit more and listen to Kelly and me each tell something of our origin stories, and the motivations we have for doing this work.*

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(26:09)

**Kelly:** So I've been thinking about when did inclusive pedagogy become important to me. And I keep coming back to this one story in my life, and it was seventh grade. And we had this assignment, we had to read something, write an essay, and I did the assignment, wrote the essay, and—

I went to Catholic School, right? So after you ate lunch at your desk, then you could go outside for recess. And the teacher, when I was about to go out, she grabbed my arm and she pulled me back into the classroom. And I didn't know what I had done.

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And she said, "You have to write this essay." And she's like, holding my paper. I said, "I wrote it." She said, "No, you didn't write this, somebody wrote this for you. Who wrote this for you?" I said, "I wrote it." She said, "You didn't write it, because you're using words like this. Do you even know what this word means?"

So I'm just really confused right now, and the word that I used was 'enhancement'. I was 11 years old, I used the word enhancement in an essay, and that led her to believe I hadn't written the essay.

And so, I couldn't put it all together at that point, but I can now. I can understand, now, what it means to have an instructor, teacher, professor, someone guiding your research, to have biases about what your capacity is, and to limit, really limit, what you can learn. Because it limits what they're willing to teach you.

And so then there are instances, all along, from high school to college and beyond, where I can point to specific periods, specific instances, circumstances, that have taken me all the way back to seventh grade and made me feel like that little 11-year-old girl. Like, what did I do? I did write it. And it comes in so many different forms.

So then, leading up to graduate school - and I think I told you this story before - I am like-- seeming impossible to get out. And what I promised God was that if I got out, I was going to make sure a whole lot of other people made it through this process.

And part of what I do now, even today, is still tied to that promise that I made when I was 23, 24 years old, just trying to get out of this really, really difficult situation that I was in, and not wanting anybody else to have to go through this ever again.

I mean, it wasn't the course work. And probably the same for you with statistics, I loved to do and loved to learn about... It was all the other stuff. And I was in a program, at HBCU. So the issues weren't about race, it was about gender, and it was about age.

I came there right out of college, so I was 20. And the next youngest person in our program was 30. I didn't have any contemporaries. Everybody was 30-something, 40-something, and they had been there for forever, it seemed like. And so, I was vulnerable in a whole lot of different ways, just as a woman, as a petite woman, and as a 20-year-old woman, at that.

And so, all of that kind of compounded to make it more difficult than it had to be. It had nothing to do with the course work. It had nothing to do with the research. I had really great mentors when I was there. I had a really great advisor.

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But it's like what we talk about today. We can't have a really enlightened department with respects to inclusive activities, when the whole campus is hostile. So the comparison is I had a really supportive lab that I was in, but the rest of the department was so hostile towards women, that it made the experience quite difficult, quite trying.

And so recently we had-- my advisor passed away, and we were at the funeral. And our old professors were there, right? And it's like... I still remember. I just, I still... I remember what you said. I remember what you did. I remember what you tried to do. I remember.

And after all that time, I thought I had let it go. I moved on to something else, but I still remember it.

**Diana:** Yeah, like it was yesterday. If you turn the right combination on the lock, suddenly, it's right there. When you were talking about seventh grade, that's part of what happened. Suddenly, I remembered being in science class, I think it was fifth grade. I had to do a presentation on the planets. And I think ours was on Saturn.

There were two of us working together on this project; me, and a guy. They videotaped it, and then we played it back. And when I was presenting, I was smiling a lot. In part because I loved school, I loved science, I loved being in front of people as well, I later did theatre and things like that.

So as we were playing the videos, the teacher points out how much I'm smiling, and starts mocking me and making fun of me. I literally climbed under my desk in order to deal with the hilarity going on in the classroom, because this male teacher chose to use his power to make me smaller.

I hadn't thought about that in a long time until you were describing your seventh grade. And in part because it doesn't matter how much I now know about gender, and race, and power, and sexual orientation, and all of the rest of it. At the time, he said it was about my smile.

And so I, for decades, whenever I told this story, it was just with this kind of self-consciousness about how I smile a lot, and I have a big mouth and big teeth, right? And I smile in an obvious way. I didn't even get it, what was happening. Honestly, Kelly, I don't think I got it fully until I'm telling the story now in this context.

You know it's a funny thing telling these stories because I know that my stories have meaning to me, but I hesitate sometimes to tell them because, in the telling them it can seem like, "Oh, this is what makes me special, or this is what is unique about me..."

It can sound like I don't know how many other people are experiencing those things. And then it really is true, there's something important in the stories as well.

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**Kelly:** And it gives other people license to know that it's okay to share theirs. And you know, we talk about it all the time, how isolated you feel when you go through these things. And part of what feeds into that is we don't talk about it. Either they're embarrassing, or they're just so hurtful.

They're so hurtful. How do you put it into words when you felt something but you don't know, you didn't say anything, but you just felt something. It was the way he looked at you, something so abstract, but you felt it.

And when you're young and these things are happening for the first time, how do you-- who do you call? How do you even know who to trust? And what do you say, even if you have someone to trust?

**Diana:** One of the challenges is that we're constantly working against an alternative narrative. So, if I think back to my fifth-grade classroom, I bought into the narrative that this was about me and my smile. And so, that overwrote any of the other awareness's or any of the other stories that I could have been aware of. So sometimes, that happens.

When the male graduate student said to me I got in because of affirmative action, I knew, first of all, that he had no idea what affirmative action was, he was making up a definition in his mind. I knew what my own GRE scores were. I knew him and what it was like to be in class with him, right?

So I wasn't caught in his narrative, but there were so many flaws in his narrative, where do you even begin? And, even if I could slice and dice, and dismantle his narrative, he was representing so many people who were thinking the same thing. And you can't get at them all.

**Kelly:** Yeah. And do you have the energy, or do you want to use your energy on him? Or not? And it's a daily choice, moment by moment by moment. And I think even in STEM reform, who gets to say what is cutting-edge about STEM reform is exclusionary, very exclusionary?

And the way, in this community, we make others feel. Because you're not working on what I'm working on, or you're not involved in the movement that I'm associated with, or you don't subscribe to the intervention or strategy that I use, or the approach that I use, then your choice is just 'less than'.

It's like there's not enough room for all of us to have a different approach to the same end, it must be my approach, it must be that you do it this way. And it's as if we have borrowed from the culture that we're both talking about, and infused it into the reform culture, even when we're talking about reform toward inclusion.

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*Who do we need to lead broadening participation? What stories need to be told? How do we create a reform culture that transmutes our experiences with exclusion to truly create diverse, equitable, and inclusive efforts in the geosciences, STEM, and beyond?*

*Join us as we explore these questions and more across this 10-episode podcast on leadership for broadening participation.*

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Thanks for listening to this episode of Leadership for Broadening Participation.

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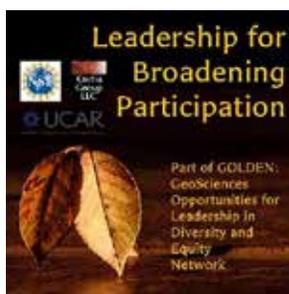
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Kardia Group is a unique resource for leadership development, diversity and inclusion, and organizational change in academia, focusing on deep transformation of the culture, functionality, and success of the academic endeavor. Since its formation in 2004, Kardia Group has collaborated with faculty advisors, university administrators and staff, organizational experts and institutional transformation programs (e.g., NSF'S ADVANCE) to address the unique and challenging realities of academic institutions and faculty careers, with a particular emphasis on research intensive institutions.

Kardia Group services include:

- **Coaching** to support and facilitate individual leadership skills and abilities through providing timely and pertinent resources for the challenges, projects, tasks, and situations that faculty, staff, and academic administrators face on a daily basis
- **Consultations and Conflict Resolution** to assess and develop departments, projects, policies, and institutions, including the development and facilitation of strategic retreats and other organizational intervention strategies
- standard and customized **Seminars, Retreats, and Presentations** related to the skills and strategies necessary for success in the academic environment
- **Strategic Partnerships** with leaders and leadership teams responsible for creating effective, inclusive, successful, and satisfying departments, schools, colleges and universities for all students, staff, and faculty
- **Survey Design and Analysis** aimed at promoting a collaborative and informed basis for decision-making, strategic thinking, meaningful discussion, and culture change
- **Policy Analysis and Report Writing**, working in collaboration with executive committees and task forces, to assess institutional policy and recommend change

