



# Scientific Workforce Diversity Seminar Series Proceedings

How Does Diversity Impact Innovation in Team Science?

March 13, 2024

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# Executive Summary

This document captures the proceedings of the seminar “[How Does Diversity Impact Innovation in Team Science?](#)” The National Institutes of Health (NIH) Chief Officer for Scientific Workforce Diversity (COSWD) hosted the event on March 13, 2024, as part of its [Scientific Workforce Diversity Seminar Series](#) (SWDSS).

Moderated by Marie A. Bernard, M.D., COSWD, and Karen N. Salt, Ph.D., UKRI, an international panel of

subject matter experts reviewed and discussed diversity in team science practice and workforce leadership, based on research findings from the United States and the United Kingdom.

This document summarizes the speakers’ presentations and subsequent question-and-answer session. The [seminar recording](#) and [panelists’ presentation materials](#) are available on the COSWD website.

## The seminar featured the following panelists:



**Kelly Vere, M.B.E.**

Director of Technical Strategy, University of Nottingham



**Tung Nguyen, M.D.**

Associate Vice Chancellor for Research for Inclusion, Diversity, Equity, and Anti-Racism, University of California, San Francisco



**Zanthia Wiley, M.D.**

Associate Professor, Division of Infectious Diseases, Associate Vice Chair of RYSE (Diversity, Equity, and Inclusion Initiatives), Emory Department of Medicine, Emory University School of Medicine



## Opening Remarks

Marie A. Bernard, M.D., NIH COSWD

Dr. Bernard highlighted COSWD's collaboration with UKRI, welcoming Dr. Salt, UKRI's Trusted Research and Innovation Portfolio Director, who joined her to co-moderate the seminar. Evidence from team science research indicates that including diverse perspectives in scientific endeavors benefits individual scientists and the entire scientific enterprise. Such findings offer valuable insight into strategies to enhance diversity, equity, inclusion, and accessibility (DEIA) in team-led research.

Dr. Bernard noted that the discussion would focus on the evidence underlying the impact of diversity in team science and leadership in the scientific workforce, including outcomes of such work. The seminar also focused on recommendations for future research related to various populations and specific innovation sectors.

She acknowledged her NIH colleagues' work as integral to team science, including:

- The National Cancer Institute's [Science of Team Science Initiative](#) advances understanding of effective team science approaches and offers resources to support team-based research, such as the [Team Science Toolkit](#).
- [The National Center for Advancing Translational Sciences](#) leads the [Clinical and Translational Science Awards Program](#), which supports research and fosters collaborations among academic institutions that aim to improve processes for improving human health.

Dr. Bernard polled the attendees to learn about their teamwork experience. In response to the question, "Pick your top two ways to foster inclusive teamwork," the top two answers were the importance of everyone having a voice (75%) and active listening (60%). Encouraging candid feedback (40%) and preparing for meetings (25%) were the other responses.

Next, attendees were asked: "In general, how many members do you think make the most successful teams?" A team of five to six members was the top response (40%), followed by three to four members (35%). Respondents also suggested teams of six to seven members (12%), followed by eight to 10 members (8%), and teams of 10 or more (5%).



## Opening Remarks

Karen N. Salt, Ph.D., Portfolio Director,  
Trusted Research and Innovation, UKRI

Dr. Salt stated that addressing research challenges requires teams of people with different perspectives, support structures, and roles from various fields and sectors whose contributions enhance dynamism and creativity. UKRI is focused on creating an inclusive research and innovation system where everyone can thrive. UKRI's work includes exploring how to create environments that bring together diverse people and crosscutting teams to address global challenges.

Dr. Salt shared examples of UKRI's work related to team science. A core UKRI-funded government institute, the [Medical Research Council Laboratory of Medical Sciences](#) has [enshrined team science](#) into its research strategy. UKRI is investing in new approaches to inclusive teamwork, research, and impactful leadership through [Thrive](#).

Two other UKRI-funded councils support larger and longer consolidated grants and are considering how to fully integrate team science approaches into their research programs to address strategic importance.



## How Does Diversity Impact Innovation in Team Science?

Kelly Vere, M.B.E., Director of Technical Strategy,  
University of Nottingham

Dr. Vere emphasized that research and innovation endeavors require a collaborative team approach to tackle critical challenges. Technical staff are a key part of the teams that drive research. Dr. Vere defined the technical community as the research technicians, specialists, and managers who perform diverse, essential roles in research and innovation. Dr. Vere began her career as a technician and noted that through this experience, she found a lack of opportunities and recognition for the contributions of the technical community. Data support this observation,<sup>1,2,3</sup> which has led to additional challenges facing technical professions in the U.K. and elsewhere.<sup>4,5,6</sup> The issues include:

- An identified shortage of technical skills and roles, combined with an aging U.K. workforce.
- Not investing enough in a new generation of technical talent.
- Barriers to diversity and inclusion, combined with difficult-to-navigate career pathways and a lack of initiatives that help technicians advance in their careers.

Dr. Vere discussed the [Technician Commitment](#), a pioneering initiative launched in 2017.<sup>7,8,9</sup> The initiative

invites higher education and research institutions to dedicate their efforts to advance the technical community's visibility, recognition, career development, and sustainability. The program has stimulated progress in several ways. It published a nationwide sector report to bolster an objective understanding of the U.K.'s technical workforce and deliver recommendations. It has attracted support from organizations, including learning societies, who have become more inclusive and engaged with funders to examine and implement policies that are more inclusive of technical staff, technologists, and methodologists. In addition, it has generated new research and policy insights in technical roles, skills, and careers and developed new career pathways for various technical levels. Dr. Vere noted that in seven years, the initiative had attracted the participation of over 120 institutions and unlocked more than 11 million pounds in funding to support the technical community.

Another critical accomplishment in terms of progress and impact is the [UK Institute for Technical Skills and Strategy](#), formed in August 2023 and funded by UKRI, which is now the home of [Technician Commitment](#). Each of the Institute's four work hubs—Insight, Influence, Innovation, and Integration—addresses specific challenges and opportunities for technical professionals.

Dr. Vere stressed that research and innovation are team-driven, and it's vital to collaborate across disciplinary boundaries. Technicians are essential to this work, so the scientific enterprise must develop this community and learn from its experiences.



## The Case for Diversity and Innovation

Tung Nguyen, M.D., Associate Vice Chancellor for Research for Inclusion, Diversity, Equity, and Anti-Racism, University of California, San Francisco

Dr. Nguyen noted that the definition of team science diversity must go beyond different scientific disciplines to include research identity and varied expertise. People often ask what is the evidence that diversity leads to more innovation? Instead, the question should be whether the lack of diversity is good for innovation. He noted that the first question reveals certain assumptions, structures, and goals. It also asks underrepresented researchers to prove their worth, making it challenging to achieve equity.

Dr. Nguyen discussed a study that examined gender and racial and ethnic diversity among U.S. doctoral recipients.<sup>10</sup> The study found that although underrepresented scientists produce higher levels of innovation, those innovations were taken less seriously, a phenomenon called the diversity-innovation paradox. The implication is that academia discounts diversity's role in innovation. Another study indicates that gender-diverse teams produce more novel and impactful scientific outputs,<sup>11</sup> similarly indicating that the contributions of underrepresented groups are undervalued.

Dr. Nguyen critiqued pipeline training programs, a traditional diversity intervention. Such programs rely on a deficit approach and a climate that doesn't foster inclusion. He also urged colleagues to rethink the approach of fixing the "leaky" pipeline, which reinforces deficit framing. Instead, Dr. Nguyen asserted the need to value and quantify nontraditional research skills and perspectives to allow trainees to take different pathways toward success. Dr. Nguyen introduced a set of principles to approach structural work: accountability, engagement, individual-centered institutional change, opportunity, and unity.

Dr. Nguyen discussed [NIH's Clinical and Translational Science Awards Program](#) (CTSA); he is on the CTSA DEIA Enterprise Committee, which created a learning

system to guide institutions. CTSA's focus areas include programmatic, institutional, community, and social and environmental work.<sup>12</sup> In addition, a DEIA survey was implemented across CTSA to identify focus areas; a paper is forthcoming.

Institutions must create partnerships, particularly with institutions serving populations underrepresented in the biomedical and behavioral sciences. These institutions know how to create inclusive and equitable environments and invest in helping underrepresented trainees succeed. However, interventions led by high-resource institutions to hire these graduates are insufficient—there must be structures that enable trainee success. For example, through [SF BUILD](#), funded by NIH and led by San Francisco State University and the University of California, San Francisco (UCSF), Dr. Nguyen and his colleagues work with faculty to address stereotype threats, microaffirmations, and other challenges. Their team also supports individual students by teaching science and research in ways that align with communal values and build on each student's assets. SF BUILD has experienced positive student outcomes, and UCSF has committed to extend SF BUILD when NIH funding ends.

Dr. Nguyen mentioned that UCSF experienced a decade-long decline in diversity that began in 1997 when affirmative action ended at California public colleges and universities. As a result, UCSF initiated a three-phase institutional intervention that (1) made DEIA an institutional priority at the top level and created structures to do that, (2) engaged faculty, staff, and trainees with university leaders to develop institutional interventions, and (3) shifted from traditional DEIA approaches to addressing structural racism. As a result, UCSF has doubled the proportion of its faculty and students from underrepresented racial and ethnic groups.



## Team Science: The CROSS Way

Zanthia Wiley, M.D., Associate Professor, Division of Infectious Diseases, Associate Vice Chair of RYSE (Diversity, Equity, and Inclusion Initiatives), Emory Department of Medicine, Emory University School of Medicine

Dr. Wiley discussed team science through the lens of a research project, COVID-19 Characteristics of Readmissions and Outcomes and Social Determinants of Health Study (CROSS). Dr. Wiley and her colleague Nicole Franks, M.D., both physicians, initiated CROSS at Emory University Hospital Midtown in Atlanta, Georgia, during the COVID-19 pandemic. CROSS studies COVID-19 disparities and social determinants of health in Atlanta; it is a model for inclusive team science.

In assembling the CROSS team, Dr. Wiley and Dr. Franks sought to include many forms of diversity to create a research group that reflected the diversity of their patients. The CROSS team was predominantly women and people from underrepresented groups, with broad diversity in career levels, roles, and expertise. When assembling the team, Dr. Wiley and Dr. Franks polled the team members to determine how they wanted to contribute to the research and to build on individual strengths.

In addition to publications highlighting disparities in health outcomes, the CROSS team published a paper on how research teams can harness diverse perspectives.<sup>13</sup> The team initially disseminated its findings in a 2022 publication.<sup>14</sup> Team members also gave presentations and participated in Emory's 2021 Health Equity Day and other conferences. To date, the CROSS team has published five manuscripts, each with different first and senior authors. The team also prioritized engagement with Black and Latin American communities in Atlanta. Internally, research the "CROSS way" meant a consequential focus on building community within the research team by holding weekly meetings and celebrating joint and individual achievements.

Dr. Wiley highlighted a study demonstrating the impacts of diversity on team science.<sup>15</sup> The authors examined the relationship between research impact and five classes of diversity: ethnicity, gender, discipline, affiliation, and academic age. The author's analysis of 9 million papers and 6 million scientists suggests that more diverse research teams produce more impactful research.

Dr. Wiley noted that the study recognizes the inclusion of diverse perspectives as a catalyst for creating and applying innovative solutions.



## Question-and-Answer Session

### **Q. With the differences in the U.S. and the U.K., what lessons can be adapted across both continents?**

**Dr. Vere:** There are some interesting parallels in medicine—for example, the relationship between doctors and nurses and how that’s evolved. We have nurses in the U.K. who are nurse practitioners, working hand in hand with doctors. We also have relationships between academics and their technician/technologist colleagues. This has become increasingly professionalized to the point where these colleagues are rightly being included as coauthors on papers. With many roles in health care, the Technician Commitment Program has seen great engagement from the clinical trial management community, who are also essential to research in this space.

**Dr. Nguyen:** I think team principles are applicable across multiple societal issues. And I like that all three of us talked about the expansion of team science when we include, for example, staff, which is a beautiful example. One of my colleagues received a genius-level award, and that’s great, but it’s an emphasis on the individual when the team is making everything work. Since Dr. Wiley talked about clinicians becoming researchers, we have to push the boundaries of what we consider diversity. We must constantly look at the hierarchies we have created in our research funding and promotion systems, particularly about what counts as a good scientist. Accountability principles are also generalizable.

### **Q. With the need in the U.S. system to be the first or senior author in papers to be able to get tenured, how does this mesh with team science concepts in the U.K. and team concepts in the U.S.?**

**Dr. Nguyen:** In terms of tenure, our system is set up for individuals—first author, last author, etc.—not the team. NIH has tried the multiple-investigator approach, while

journals are looking at co-first authors. But each institution has to push its promotion criteria differently. My institution is starting the conversation to account for team science in the promotion package. Although we already have a diversity statement, we’re pushing beyond how many first-author papers and R01s faculty have to understand how well they work in a team. One must focus on performance on teams and demonstrated evidence of teamwork. You must make efforts at the institutional level, and NIH’s [Clinical and Translation Science Awards](#) are set up to do this.

**Dr. Wiley:** I agree with my fellow panelists. For researchers, a demonstration of teamwork is what institutions look for. Changes have to expand our thinking beyond first and senior authors, so at my institution, teamwork is being pushed during evaluations for promotion. When listing our publications on our CVs, we’re asked to underline our mentees. Therefore, when your promotion package goes up for consideration, the mentees are important—not just the number of publications.

We can’t all be first or senior author, and the only way to expand opportunities, especially for assistant professors and people of color, is to say someone else must be the lead. Sending this good energy out there comes back to you. When members of my team are first authors, they’re willing to say you helped me, so “can you be part of our project, as well?” It’s easy for me to say share, but we have to share these opportunities with our mentees.

**Dr. Vere:** An important innovation through UKRI is the narrative resume, which differs from the traditional academic CV. As part of the funding application, they ask you about your contributions to technologies, methodologies, the development of others, and contributions to the research community. This is a fantastic way to drive culture change. These resumes allow you to tell your own truth rather than fall back on various metrics you might use.

## Question-and-Answer Session

**Q. We have international audience members who don't have the same laws, might have different terminology, and might have different sets of folks from different backgrounds who may not be a minority. They could be the global majority or various permutations. Could our panelists help us think about, from a team science perspective, what are the benefits to questions of diversity and inclusion?**

**We also have people trying to increase diversity and inclusion in their team or institution—maybe they're just starting out and don't have a CROSS-type team yet. Dr. Wiley, what are some ideas about what they could do or start to do?**

**Dr. Wiley:** I am happy we have an international audience here because thinking about diversity in Atlanta, Georgia, is different than thinking about it in West Africa. To all researchers on teams, I ask you to consider when you look at the people on your team. If everyone looks like you, you don't have a diverse team. It could be all African American women, or everyone is a man who identifies as male. These are not diverse assemblies.

We need to change the narrative, at least in the U.S., beyond saying that diversity is just adding a Black person to a team. What's important is—and we've talked about the science of this—you want a diverse team because you want diverse science. It is about having different ideas and including community partners to fill in where I can't presume to know everything, such as about the Latino community or gender-fluid persons. If I have someone on my team to be a representative, that's important.

When I look at PubMed, I can see this is resulting in better science. I would love people to equate diversity with excellence rather than we should “have a woman on the team” for diversity.

**Dr. Nguyen:** I come from the perspective of a population scientist. The population is local, as you define it. If you

are serving a certain population, such as hypertension in women, a team of all men isn't really performing science for the population. You also have to push the boundary of the definition because you may define it one way while others define it differently. My thought is my team can never be and isn't going to be diverse enough, but that's our aim. To get there, we continually engage with people different than ourselves. Although I want to be cognizant of laws that make things difficult, it's our job as scientists to courageously ask these questions.

**Dr. Vere:** From my perspective, it's critical to have protected and other characteristics to ensure representation on teams. However, we don't have data, so that's why we have done a lot to understand the demographics of the U.K.'s academic community. I come from the technical community, and we're so invisible. Although we've made a dent by producing a report presenting some demographics of the technical community, we recognize we have DEI challenges with a lack of representation, such as of women in management and minorities and persons with disabilities, generally. Therefore, it's critical to think globally—our U.K. technician project is the only one I know of—and yet focus on each team member.

**Dr. Salt:** There are corollaries to be found in participatory approaches that include the public and involve social and community organizations, such as nonprofits in the United States, that do research and engagement. Grassroots enterprises should also get the attribution to recognize their work. Lots of things could be learned about citizen science and we could start to link these up, so I'll leave this thought as a carrot.

**Q. For all three panelists: Since we are part of evidence-based organizations, how do you measure the impact of team science? What are the best methodologies for measuring impact? How do you determine the return on investment for the endeavors in which you are engaged?**

## Question-and-Answer Session

**Dr. Nguyen:** Ultimately, it's about our impact on health outcomes. If we are not advancing health and health equity, we need to look at our metrics. I consider health equity to be part of, not separate from, health. The whole scientific enterprise must be treated this way. The problems we are trying to solve in health are complex, structural, and multidimensional. An individual cannot solve them alone, nor can one scientist understand all the systems involved in health. An individual-based approach (e.g., getting a patient to take a test) doesn't lead to a significant impact unless the systems are considered.

**Dr. Wiley:** I agree that the way we measure this is through outcomes, such as the diversity of our research participants. Since we have minority representation on our research team for an observational study with diversity as an outcome, we recruited a group of participants with over 50% Black individuals. One of my passions is making sure study participants reflect our communities. The only way we do that is to have team members that represent the community, including principal investigators, clinical coordinators, and technicians, as Dr. Vere mentioned.

**Dr. Vere:** We appreciate the need for return on investment, but we live in a culture where it's about how many papers you publish. There's a real need to diversify research outputs and devise outputs differently. For example, a research software engineer may write code for one study that could have an impact on performing other studies. From the example of UKRI's next program iteration, it's important to think about people, culture, and environment to influence activity within our institutions.

**Q: Our participants have been listening, reflecting, and sometimes challenging us. To better help this learning process, what is your sense of direction for the future of team science, particularly touching upon the hurdles to doing this work and communicating its benefits?**

**Dr. Vere:** My takeaway is to reflect upon the team's composition and make sure you're truly seeing everyone, which also means giving everyone visibility. In looking at

[the COSWD website](#), the third of the three COSWD goals really resonated with me. We must act on the evidence we build and disseminate it by asking, "What are we going to do about it?" Let's not just talk about it; let's tackle these challenges.

**Dr. Nguyen:** Our ambition as smart scientists is to cure diseases, so we should be ambitious about other things, too. I have learned over the decades to focus on the macro-outcomes or the answer to why we do this work. The big picture can push us through the frustrations. Within the microclimate, diversity is the best part. If you're hearing unexpected things from your trainees, staff, and communities, you're learning new things. This is what propels me forward.

**Dr. Wiley:** If you notice your team looks like you, there are exact things you can do to diversify. Be intentional about reaching out to find a local community leader who could serve as an advisory board member who is fully integrated into your team. I would not be where I am in my career without mentorship. Almost everywhere, there is a promising student or candidate you can take under your wing, whether it's a woman, a person of color, or someone gender diverse. Diversity equals excellence.

**Dr. Salt:** I have appreciated this exploration of teams and their contributions to brilliant discoveries sparked by the panelists. What's more, I want to acknowledge the work you do every day to lift others up and hold yourselves up. Addressing society's challenges, such as death and morbidity, can be difficult, particularly when working in challenging environments. My plea is for you to know how exciting and motivating it is to see people out here continuing to do this work. That's the beauty in all of this.

**Dr. Bernard:** I thank all the panelists, and my co-moderator, Dr. Salt, for a vigorous discussion. This adds to the accumulating evidence about the impact of diverse perspectives on creativity and innovation in science. We hope that all will review the references provided by our speakers and use these data as you move forward with your scientific endeavors.

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