Olin College of Engineering

Promoting Diversity, Equity and Inclusion in Engineering

- NSF ERC Planning Grant Workshop
- September 27, 2021

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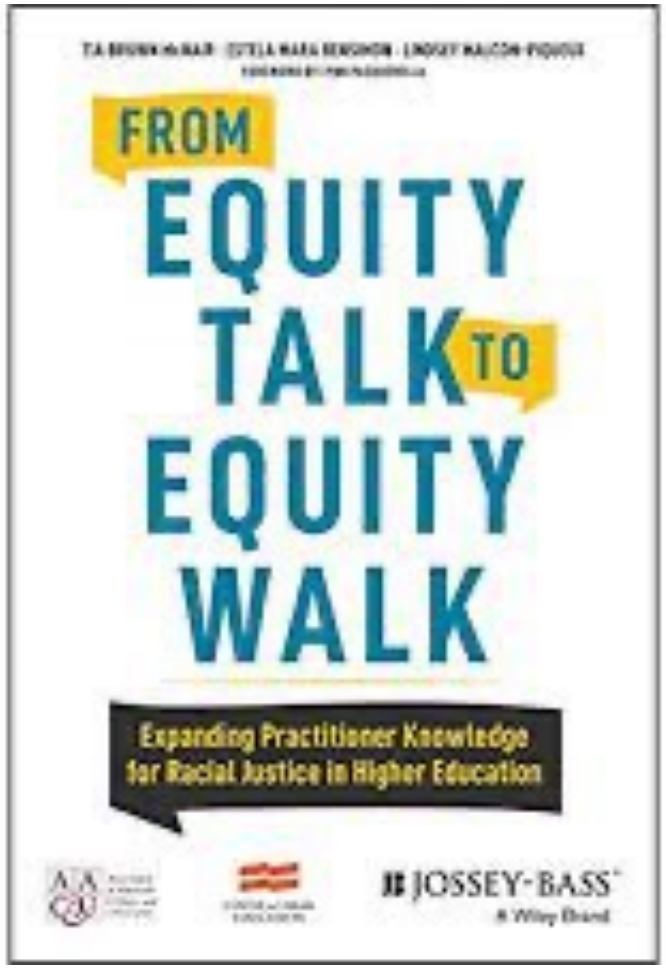
*"**Not everything** that is faced can be **changed.** But **nothing** can be **changed** until it is faced."*

– James Baldwin

It's Time for Change: Call to Action



- Defining and committing to equity and inclusive excellence
- Building an equity-minded culture
- Using and communicating data as a tool to advance equity
- Aligning strategic priorities
- Building capacity

What are the assumptions?

Challenging Assumptions and Changing the System

- Presumed shortage of talent
- Presumed meritocracy
- Presumed diversity, equity, and inclusion

- Multi-faceted approach to addressing systemic barriers to equity of opportunities

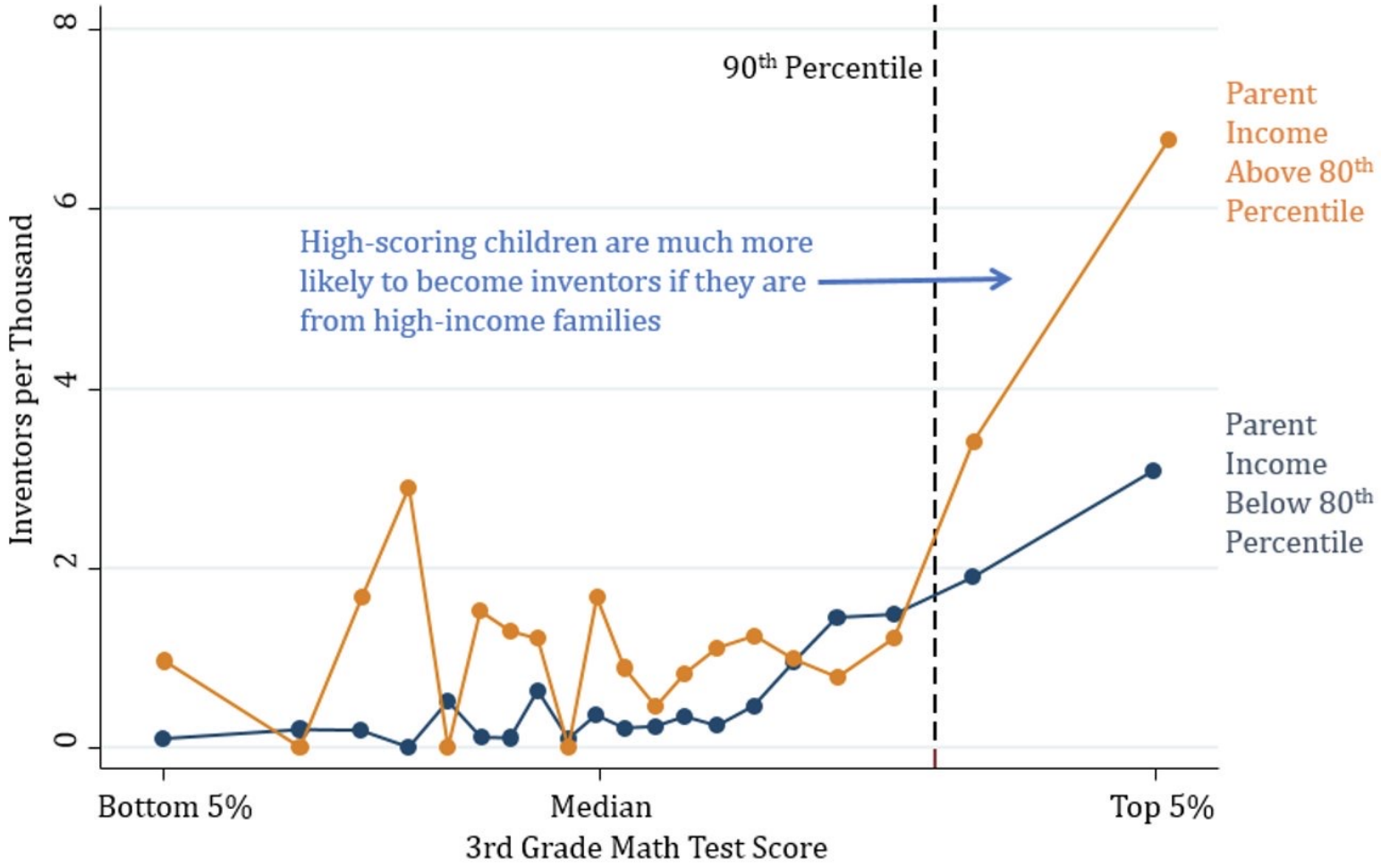
Inequity in Opportunities (not shortage of talent)

- No difference in early interest in STEM for URM same as for non-URM
- 2x Black graduates with CS degrees as hires (USA Today, 2014)
- 2009-2019, Black engineering faculty 2-3 % of total (ASEE, 2019)
- Need to “let opportunity meet talent” – John Slaughter

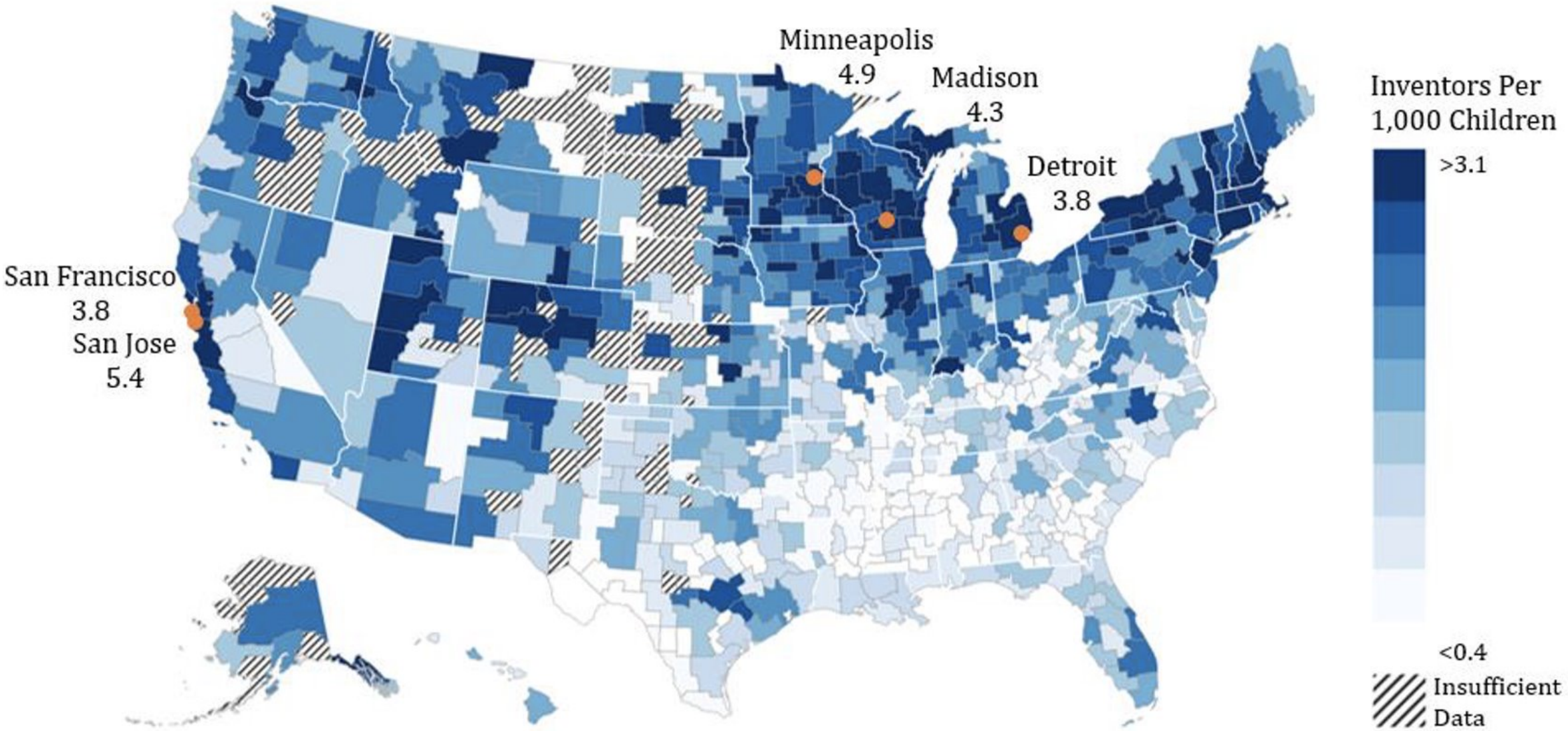
Missing Einsteins / Missing Millions

- Innovation in U.S. could be 4 times higher if women, underrepresented minorities and those from low-income families became inventors at the same rate as men from high-income families (Bell et al, 2018)
- Children from families in the top 1% of earners were 10 times more likely to be inventors than those from families in the bottom 50% (Bell et al, 2018)
- NSB estimates that for the S+E workforce to be representative of the US population by 2030, the number of women must nearly double, number of Blacks must double, and number of Latine must triple the number in the 2020 S+E workforce (NSB Vision 2030)

Patent rates vs. 3rd grade math test scores for children of low- vs. high-income parents



Source: The Equality of Opportunity Project, opportunityinsights.org



Source: The Equality of Opportunity Project, opportunityinsights.org

Myth of Meritocracy

- False impression that advancement is solely based on merit
- Disadvantages members of underrepresented groups
- Exacerbated by growing inequalities

Lenses

- Diversity / Equity / Inclusion

Diversity, Equity and Inclusion

- **Diversity**: “the broad spectrum of experiences, cultures, and physical attributes within a community, including, but not limited to, race or ancestry, national origin, religion, age, ability, gender, gender identity or expression, sexual orientation, socioeconomic status, and perspective.”
- **Equity**: “the absence of barriers, biases, and obstacles that impede equal access, fair treatment, and opportunity for contribution by all members of a community.”
- **Inclusion**: “a culture comprising a framework that allows an individual to effectively engage and thrive in a community. The framework includes social policies and processes that provide access to opportunities and information, the capacity to influence accepted institutional norms and behaviors, the security in the organization to fully express inherent skills and talent, and the ability to exercise one’s own informal or formal power.”

  - National Research Council, 2021

Conceptualizing Diversity

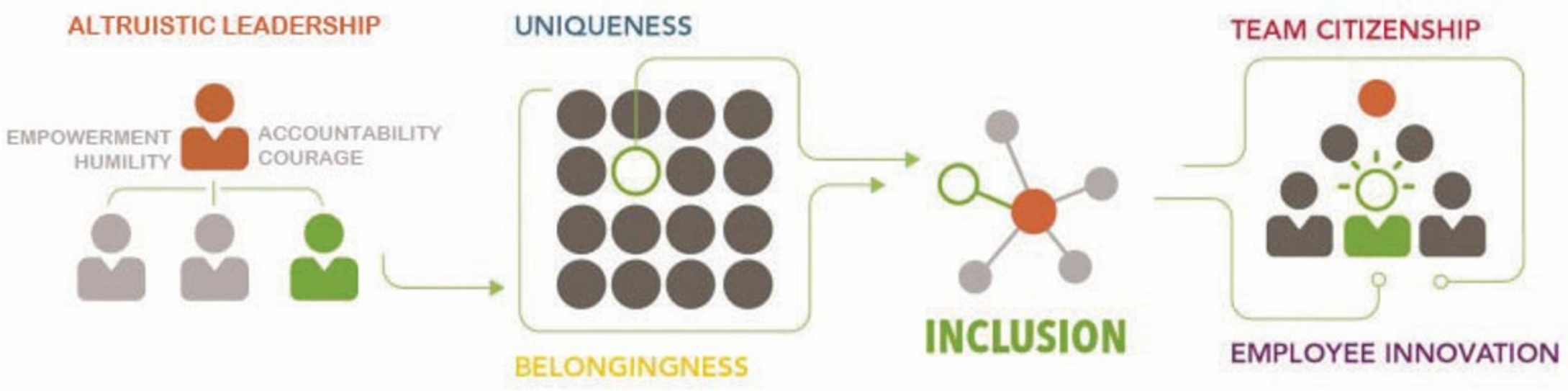
- Viewing diversity – not in isolation – but as part of a complex system
  - Student diversity linked to faculty diversity
  - Enhancing educational and research experience for ALL
  - Enriching S&E enterprise
- Institutionalization of policy and programs to enhance diversity
- Recognition that excellence comes in all flavors and different packages
- Recognition that representation is not the same as diversity

Conceptualizing Equity

- **Equity (at individual, group, institutional and societal levels)**:
  - Equitable distribution of opportunities
  - Just and fair inclusion
  - Matched needs and resources

Conceptualizing Inclusion

- BELONGINGNESS + UNIQUENESS = INCLUSION



Source: http://www.catalyst.org/knowledge/inclusion-matters

Belonging or being fully human means more than having access. It means having a meaningful voice and being afforded the opportunity to participate in the design of social and cultural structures. Belonging entails being respected at a basic level that includes the right to both contribute to and make demands upon society and political institutions.

UC Berkeley Haas Institute for a Fair and Inclusive Society

Identity and Inclusion

- Recognition
- Role models
- Structural and interactional diversity
- Persistence associated with ability to identify with chosen profession
- Sustained culture of support and collaboration
  - Move toward inclusive excellence (include women and underrepresented minorities in collaborations, leadership, scientific discourse)

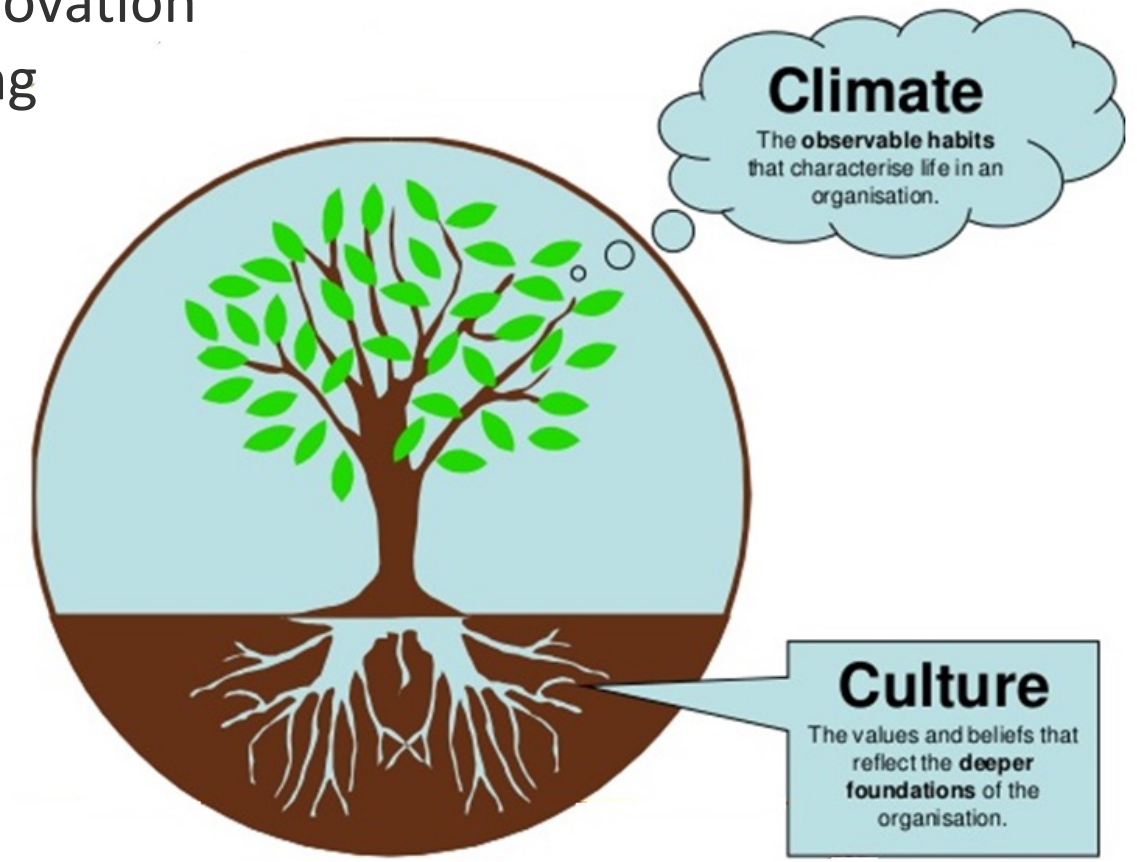
Culture of Science

Science is socially constructed, is social and organizational, and is a social process – a system of communication, interaction and exchange (Kuhn, 1992; Merton, 1996; Fox 1991)

Social factors influence who participates and who has status in science

Culture and Climate

Design and innovation
Problem Solving
Teamwork



Racism and sexism
Myth of meritocracy

Racism and Sexism

- Emotional tax
- Stunted growth
- Isolation, marginalization and exclusion related to stereotypes and structural impediments
- Untapped and uniquely positioned talent
- Persistent underrepresentation

Cultural Shifts

- Deficit-minded **to** asset-based and equity-minded
- Inequalities in status, recognition and resources **to** equitable status, recognition and resource allocation
- Exclusion/bias **to** inclusive environment devoid of bias
- Collaboration
- Empowerment

Identity, Diversity and Inclusion in Education and Research Settings

- Recognition – In noting the work of Pearson (2005), Ong wrote, “the public performance and recognition of superior work can aid in overriding others’ preconceived notions about the scientific competence of students of color, and aid in reconciliation of seemingly contradictory identities”
- Restructured labs that ensure inclusivity, provide a supportive community for learning and functional mentoring, foster team-based approaches and collaboration
- Informed and culturally competent faculty possessing an understanding of how lived experiences shape identity (racial, gender and science) and impact learning and an understanding of how behaviors and attitudes of their own and of members of their lab set the tone for inclusive excellence

Research Setting as a Place of Enactment

Narrations of Race in STEM Research Settings: Identity Formation and Its Discontents

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Received 29 May 2007; revised 20 December 2007, 18 June 2008; accepted 30 June 2008

DOI 10.1002/sce.20307
Published online 4 September 2008 in Wiley InterScience (www.interscience.wiley.com).

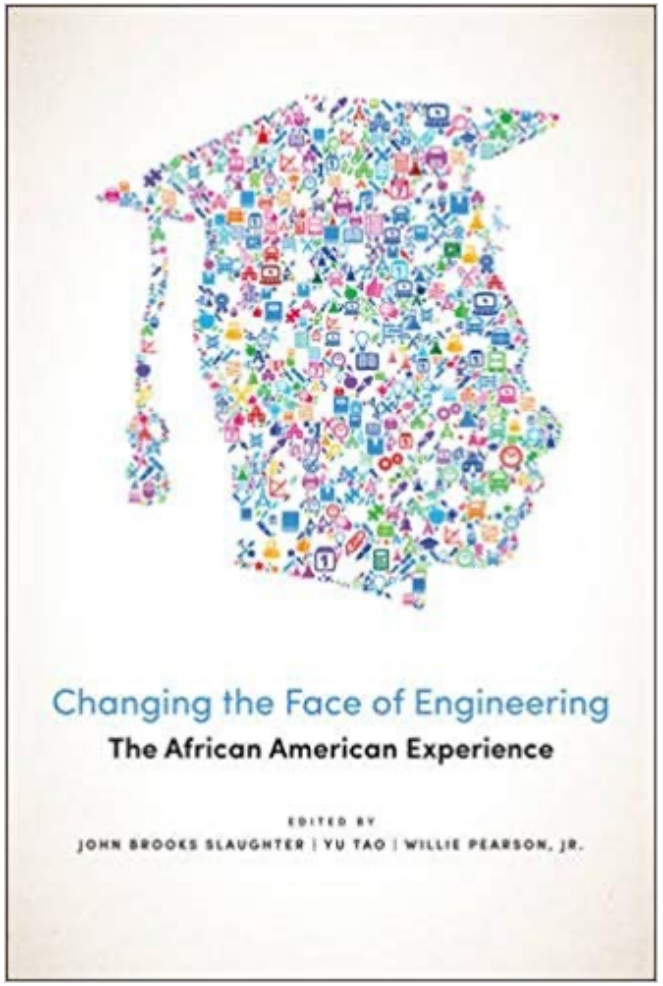
Research Setting as a Place of Enactment

- Community life of lab is natural site for socialization and evolving development of science identity
- Structure and activities in lab often result in exclusion that renders members of underrepresented groups invisible – racialized and gendered environment impacts daily interactions
- Dissonance between the culture and norms of a research lab and the culture and norms related to race/ethnicity and gender has significant implications
- How one is mentored and how one is or is not part of the lab impacts knowledge production and persistence

Research Settings as Mentoring Environments

- Are specialized in terms of hands-on cooperative learning, lines of authority, styles of communication, and student-student and faculty-student interactions
- Are differentially experienced by minorities and women
- Play critical role in controlling knowledge creation and transmission
- Can promote student learning through identity development

Socialization



- "*Socializing African American Female Engineers into Academic Careers: The Case of the Cross-Disciplinary Initiative for Minority Women Faculty*," Cheryl B. Leggon and Gilda A. Barabino (chapter 9)
- Lessons Learned
  - Importance of mentors, sponsors and champions
  - Importance of communalism, community and community building - and creating a sense of belonging
  - Importance of contextual and longitudinal data (disaggregated by race/ethnicity and gender)

Promoting Career Advancement in Engineering

- Socialization, professional development and leadership development
- Recognition
- Informed and culturally competent faculty and administrators
- New models and styles of mentoring and advocacy based on effective and tailored strategies
- Adjusted evaluation and reward systems to value and recognize activities that support advancement of diverse groups
- Restructured environments that ensure inclusivity, provide a supportive community for progression and functional mentoring, networking and collaboration

Promoting Diversity, Equity, and Inclusion

- Acceptance of the authenticity of the message
- Open dialogue followed by meaningful action
- Equitable adherence to policies and practices
- Recognition of contributions - viewing individuals from diverse groups as creators and holders of knowledge
- Cultural competence
- Proactive stance on righting wrongs
- Fostering a sense of belonging and socialization
- Leadership, Intentionality and Accountability

Models for Inclusive Excellence in Engineering through DEI Lens

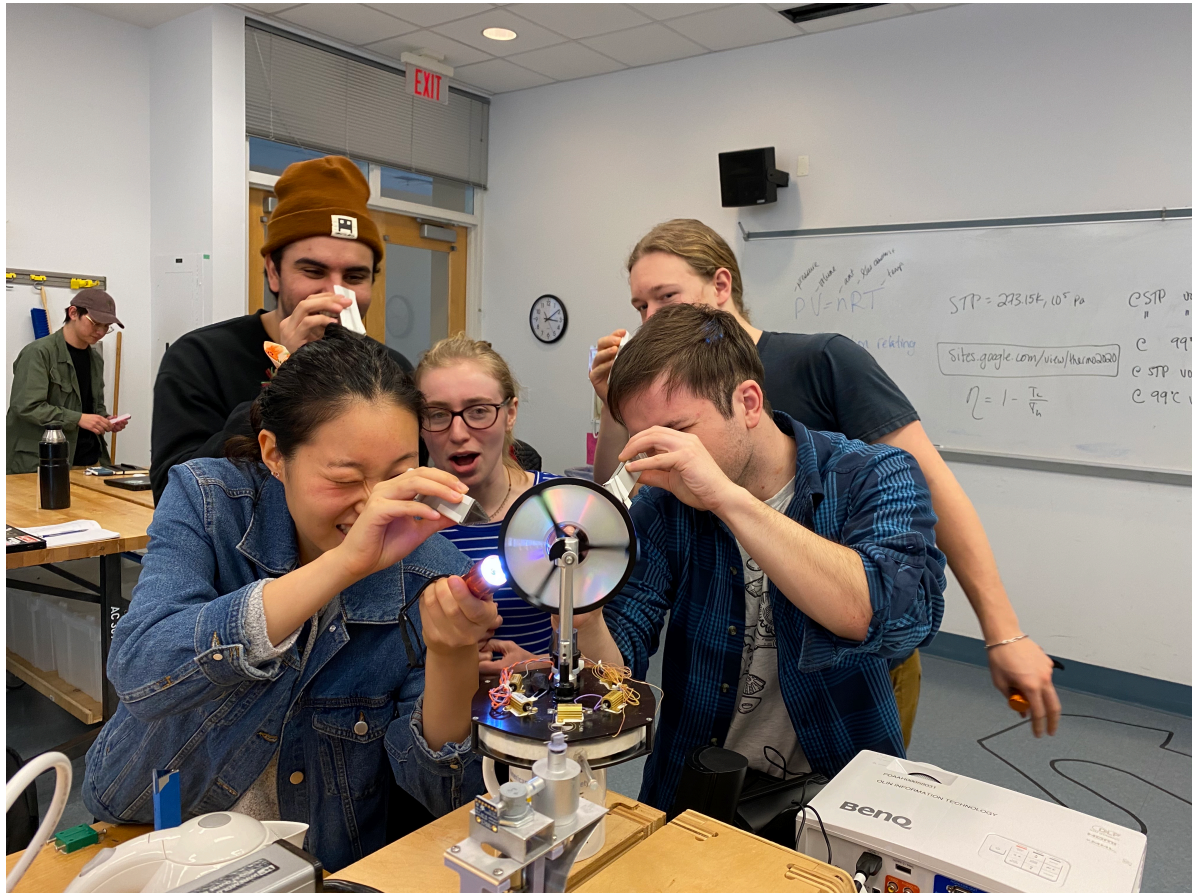
engage.olin.edu

Engineering for Humanity

- Engineering problem solving beginning with understanding client needs
- Working with senior citizens to identify and define project
- Drawing on empathetic and ethnographic methods

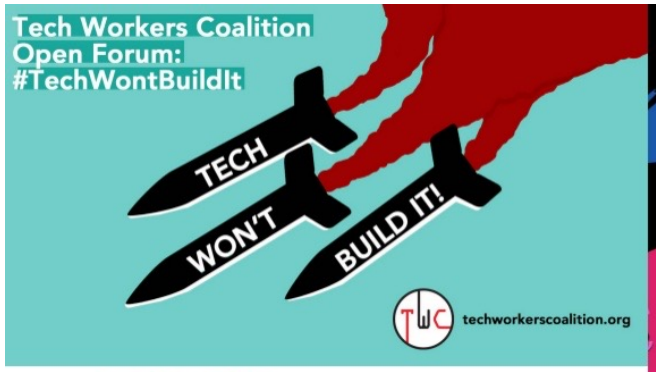
Affordable Design and Entrepreneurship

- Experiential social entrepreneurship
- Working with people around the world to address challenges endemic to poverty and democratize opportunity
- Mixing design and entrepreneurship skills to combine business and technical models to impact outcome of social venture



“Design Refusal”

- Community engagement projects assessed by students in terms of responsible use of technology
- Student team rejection of project that failed responsibility test
- The responsibility to not design as a learning opportunity and part of civic professionalism



DEI-related Motivations Attracting Members of Marginalized Groups to Engineering

- Equity ethic
- Desire to give back to their communities/communal goals
- Opportunity to solve complex problems facing humanity

Black, Brown, Bruised: How Racialized STEM Education Stifles Innovation. McGee, 2021

inclusive engineering starts and ends with people

Thank you!

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