

Cultivating Inclusive Cultures in Chemical Sciences: Catalyzing Change with People & Processes

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Diversity, Equity, and Inclusion in Chemistry and Chemical Engineering

A Virtual Workshop from the
Chemical Sciences
Roundtable



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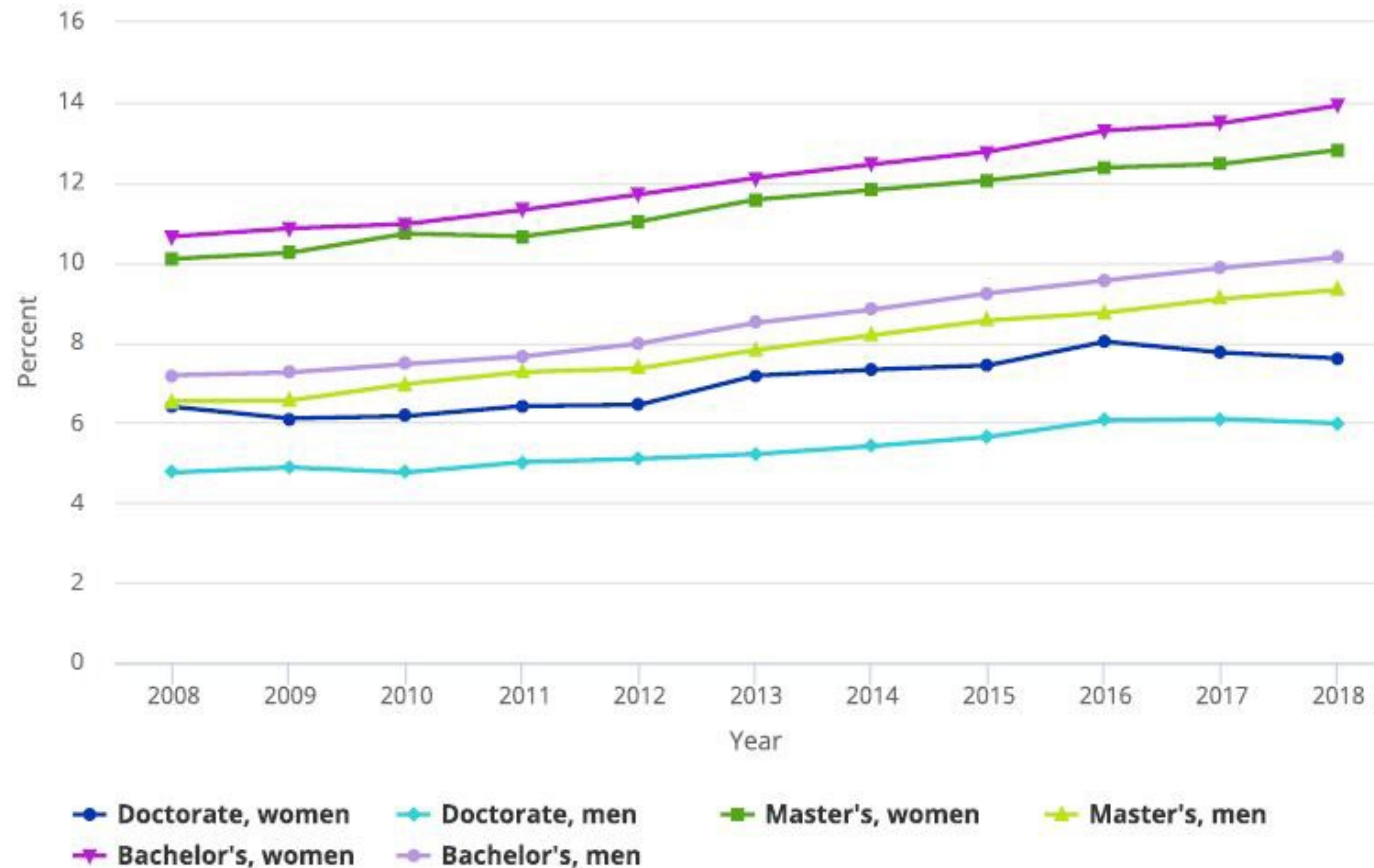
Senior Project Director



The Problem

Figure 23

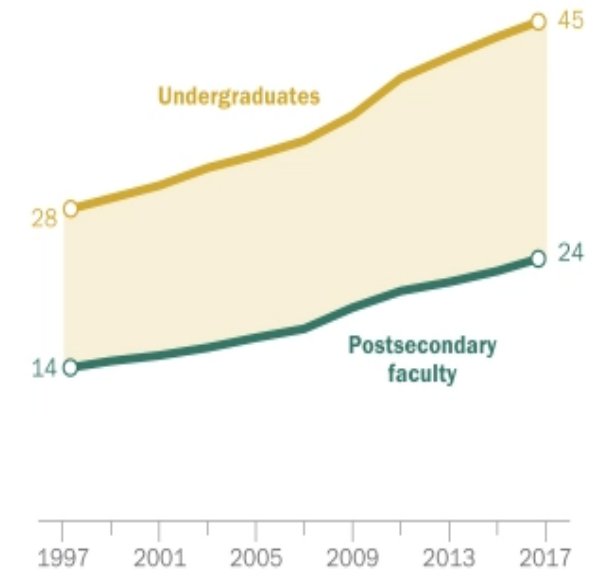
Science and engineering degrees earned by underrepresented minority women and men, as a percentage of all S&E degrees awarded of each degree type: 2008–18



Source: NCSES, NSF. (2021) Women, Minorities, & Persons with Disabilities in Science & Engineering.

U.S. college students still more likely than faculty to be racial or ethnic minorities

% of undergraduates and postsecondary faculty who are nonwhite



Note: "Nonwhite" includes blacks, Hispanics, Asians, Pacific Islanders, American Indians or Alaska Natives, and those of two or more races. Those categorized as "non-resident alien" and "race/ethnicity unknown" are not included in this analysis. Source: National Center for Education Statistics.

PEW RESEARCH CENTER



The Problem

**Comparison of Race-Ethnicity and Gender Representation by Field in PhD Production Data
From the Survey of Earned Doctorates (SED) at Top 50 Universities and Among Assistant Professors
in Our Data (in percentages)**

Variable	Biology	Chemistry	Economics	Education (Leadership/ Policy)	English	Sociology
Racial-ethnic shares						
Asian	13.7 [20.3]	9.8 [19.4]	16.8 [34.2]	10.3 [17.5]	5.3 [12.8]	12.2 [6.9]
Black	3.6 [0.4]	2.5 [0.9]	2.7 [2.4]	15.5 [15.9]	1.8 [8.6]	3.9 [13.7]
Hispanic	6.2 [3.6]	6.8 [6.5]	5.0 [11.0]	7.2 [4.8]	8.5 [4.3]	8.3 [11.0]
White	70.6 [75.8]	74.7 [73.2]	70.0 [52.4]	58.8 [61.9]	78.9 [74.4]	71.7 [61.5]
Other/unknown	5.9 [0.0]	6.2 [0.0]	5.5 [0.0]	8.2 [0.0]	5.5 [0.0]	3.9 [0.0]
Gender shares						
Female	53.7 [53.2]	38.3 [40.2]	29.9 [34.4]	63.1 [59.3]	54.3 [62.1]	63.8 [59.7]
Male	46.1 [46.8]	61.6 [59.8]	69.9 [65.6]	36.9 [40.7]	45.7 [37.9]	36.2 [40.3]
Unknown	0.2 [0.0]	0.1 [0.0]	0.2 [0.0]	0.0 [0.0]	0.0 [0.0]	0.0 [0.0]
<i>N</i>	3,506 [281]	1,020 [108]	581 [164]	103 [63]	525 [117]	290 [73]

Note. The first number in each cell is the SED percentage of degrees produced by field in 2013–2014 at top 50 universities; the second number, in square brackets, is the percentage of assistant professors in that field in our data from 2015–2016. The SED data are restricted to doctorate recipients who graduated from universities on the *U.S. News & World Report* “Best Colleges 2016” list of top 50 universities, inclusive of private universities.

Source: Li, D., & Koedel, C. (2017). *Representation and Salary Gaps by Race-Ethnicity and Gender at Selective Public Universities*. *Educational Researcher*, 46(7), 343–354. doi:10.3102/0013189x17726535



The Problem

- Representation in STEMM workforce doesn't match the US population
- Gender, race, and ethnicity intersect

U.S. (2017)

Resident Population (ages 18-64)

White women 32.3%

White men 32.2%

Latino men 8.1%

Latina women 7.7%

Black women 6.5%

Black men 5.9%

Asian women 2.7%

Asian men 2.4%

Other women 1.2%

Other men 1.1%

Science and Engineering Workforce

White men 47.5%

White women 17.5%

Asian men 13.8%

Asian women 6.0%

Latino men 5.2%

Black men 3.1%

Black women 2.5%

Latina women 2.3%

Other men 1.4%

Other women 0.7%

Prepared by Lindsey Malcom-Piqueux

Adapted from Guterl (2014).
Data Source: NSF (2019).



Existing Conversations About Challenges to Increasing Faculty Diversity

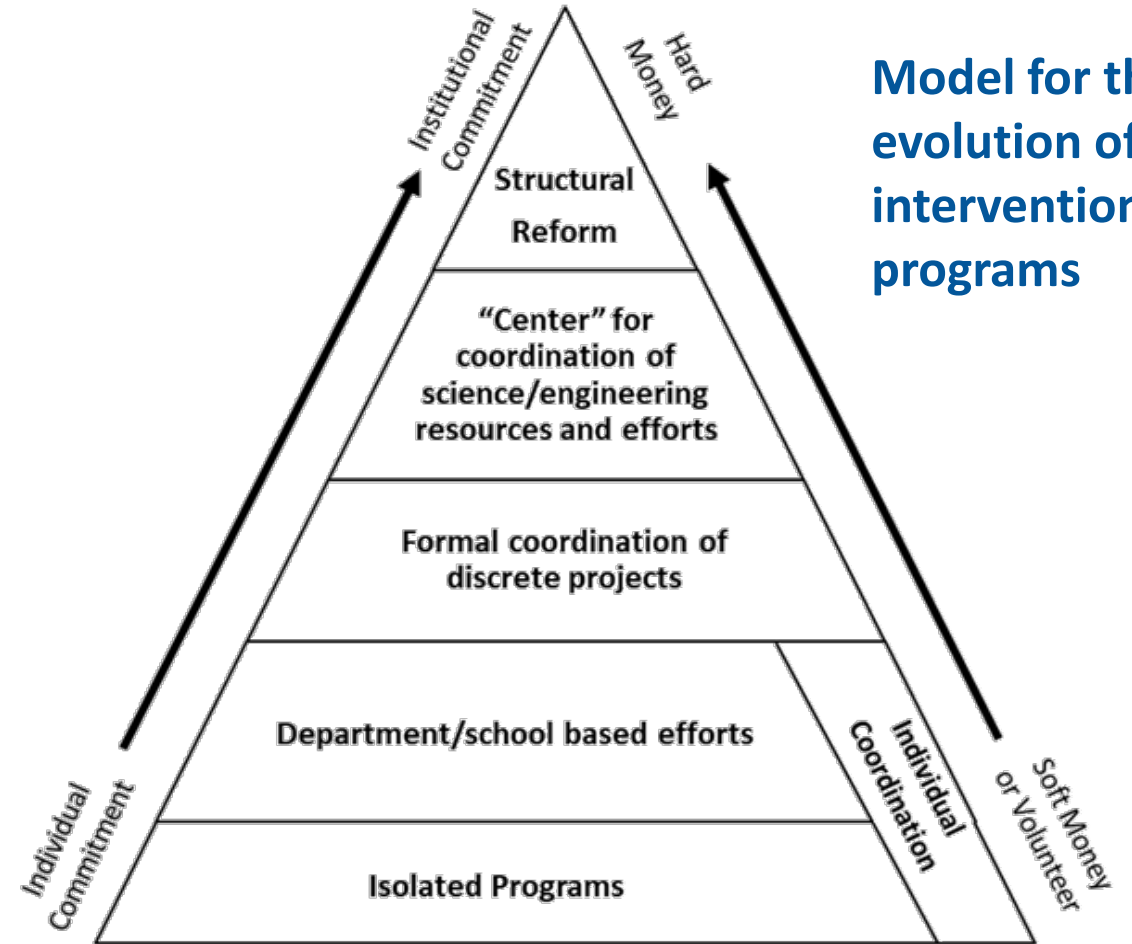
- **“It’s a pipeline problem”** – the number of people from underrepresented groups receiving STEM PhDs is too small (Eagan et al., 2014; Knowles & Harleston, 1997; National Academies, 2016)
- **“It’s a hiring problem”** – implicit bias, a lack of effort and commitment, and structural racism keep institutions from hiring faculty from diverse backgrounds (Hill, Corbett, & Rose, 2010; Kulis, Shaw, & Chong, 2000; Reuben, Sapienza, & Zingales, 2014)
- **“It’s a retention problem”** – faculty from underrepresented groups are less likely to get tenure and more likely to leave their institution and the professoriate (Jayakumar et al., 2009; Stanley, 2006; Turner et al., 2008)



Limitations of our Current Conceptions & Diversity Efforts

Why hasn't the needle moved?

- Faculty diversity discussions usually identify and focus on one of the three challenges (recruitment, hiring, or retention). These are singular strategies to addressing a complex problem.
- Challenges assumed to be due to individual will and ability outside of an institution's control
- Lack of faculty diversity is an institutional problem *and* a STEM problem; hard to generate institutional level solutions, especially without collaboration





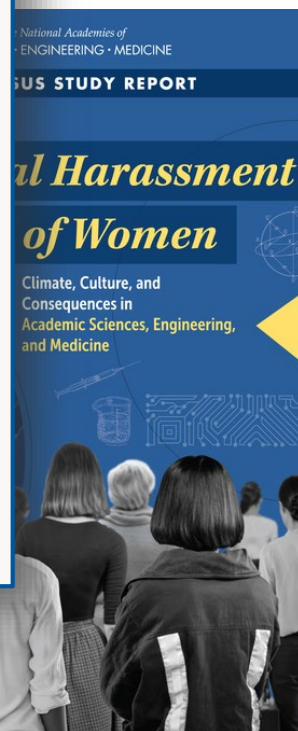
Barriers and Opportunities for 2-Year and 4-Year STEM Degrees

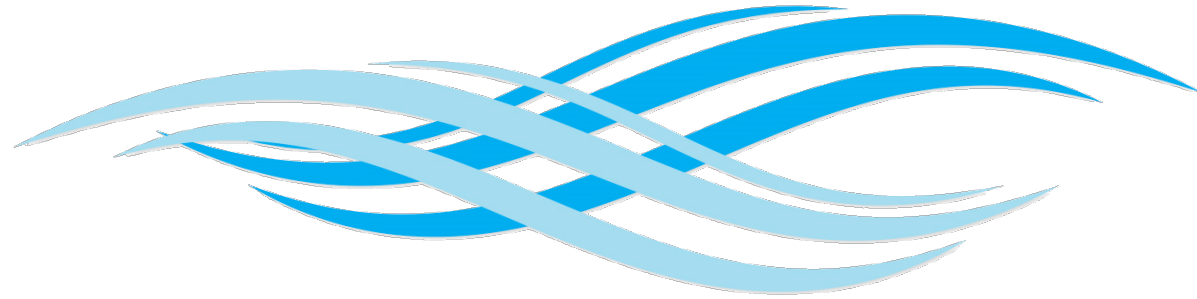
SYSTEMIC CHANGE TO SUPPORT
STUDENTS' DIVERSE PATHWAYS



RECOMMENDATION 9: Incentivize change.

- Academic institutions should work to apply for awards from the emerging STEM Equity Achievement (SEA Change) program.³ Federal agencies and private foundations should encourage and support academic institutions working to achieve SEA Change awards.
- Accreditation bodies should consider efforts to create diverse, inclusive, and respectful environments when evaluating institutions or departments.
- Federal agencies should incentivize efforts to reduce sexual harassment in academia by requiring evaluations of the research environment, funding research and evaluation of training for students and faculty (including bystander intervention), supporting the development and evaluation of leadership training for faculty, and funding research on effective policies and procedures.





SEA CHANGE

Making Diversity, Equity, and Inclusion
in STEMM the Norm

seachange.aaas.org



STEMM Equity Achievement Change

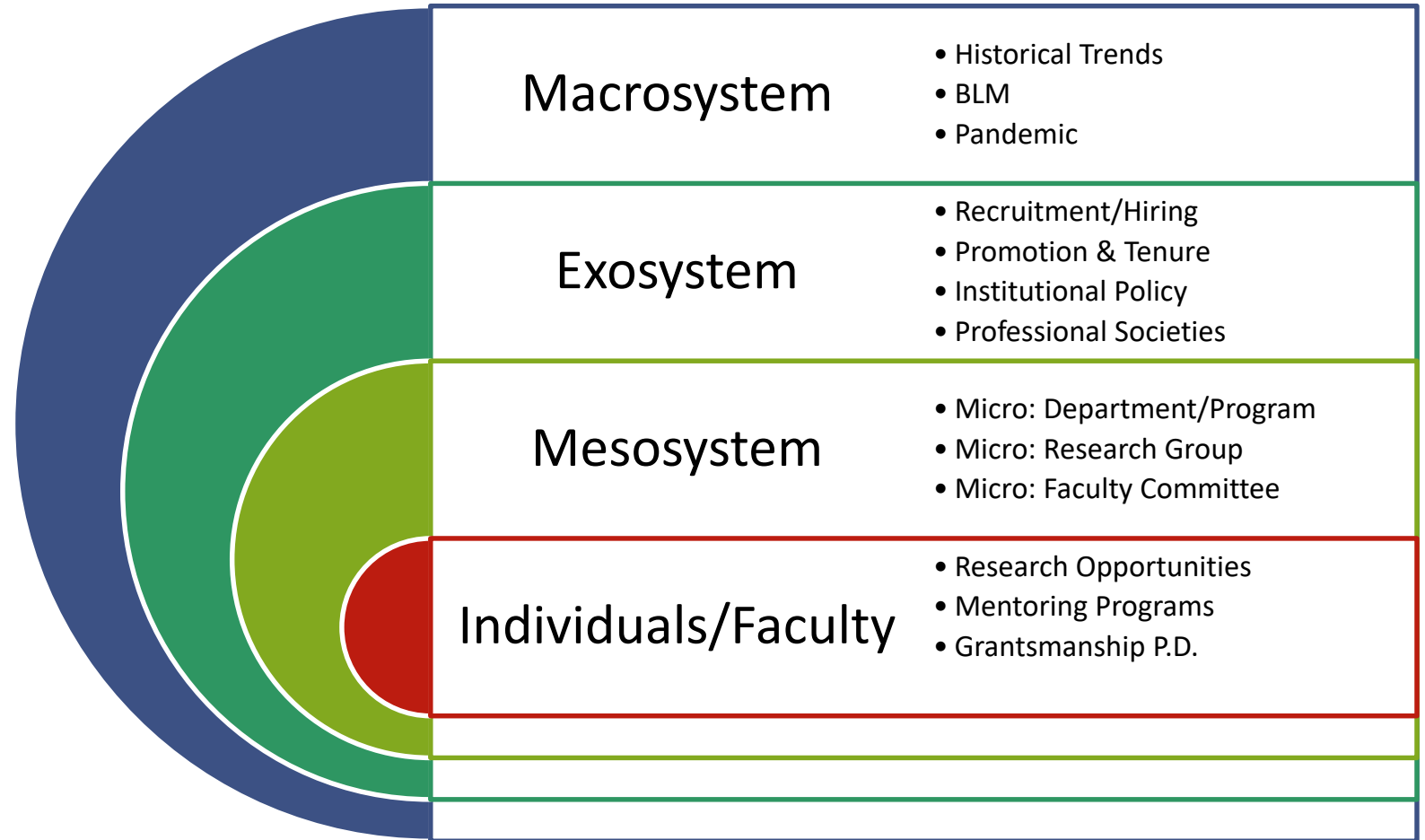
SEA Change provides the **scaffolding** to guide and support context-specific, **voluntary** change within institutions and departments that will result in **systemic transformation**, particularly in STEMM, in alignment with their own mission and that of AAAS

- Operates within the context of the United States
- Intersectional identities *must* be considered

Bronfrenbrenner's Ecological Approach

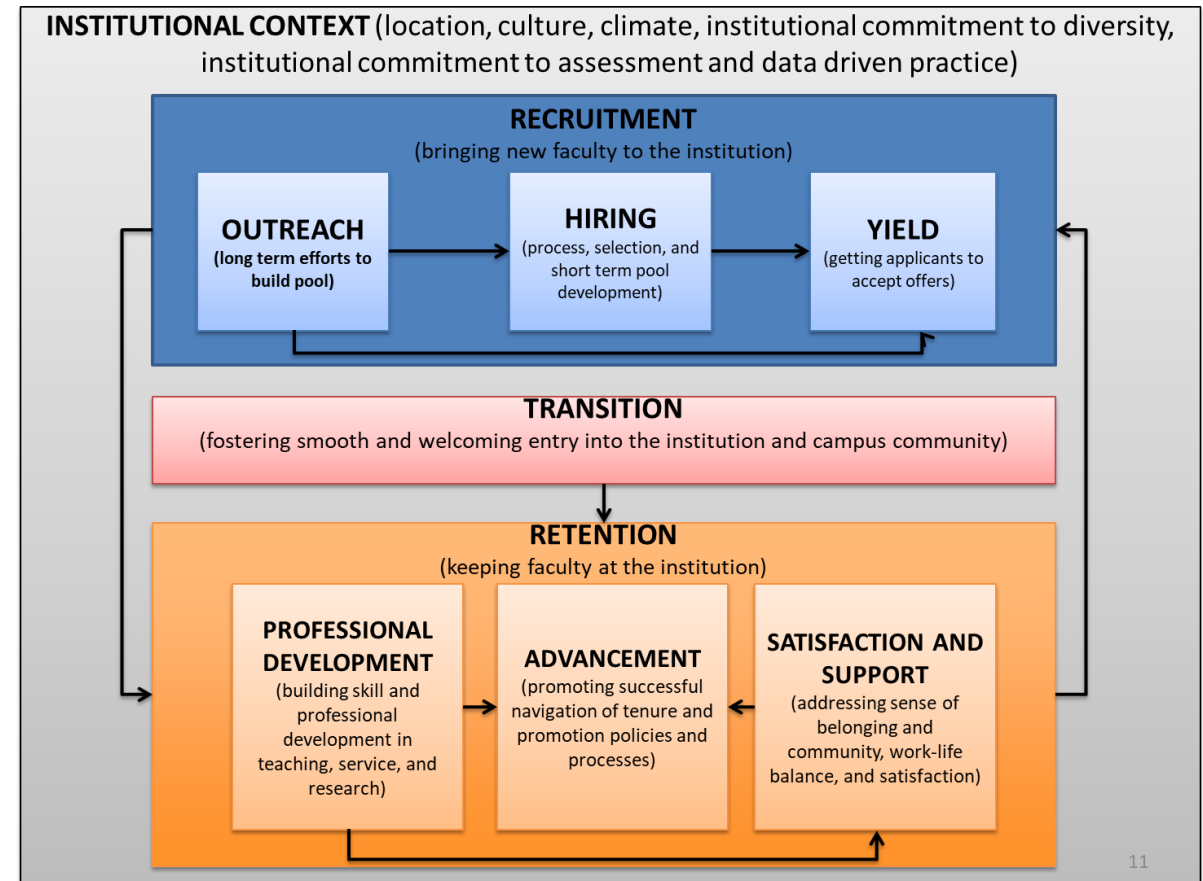
Two primary strategies to encourage inclusive decision-making within discretionary spaces:

1. Developing the capacity of individuals (e.g., professional development)
2. Developing the capacity of organizations (e.g., system checks)



Institutional Model for Increasing Faculty Diversity

This model offers a complex, multidimensional framework that helps institutions organize and understand the factors and forces that impact their ability to recruit and retain a diverse faculty ([Griffin, 2020](#)).



Real Change Requires a Long-Term Commitment

- Strategies to improve faculty recruitment, hiring, and retention have had very mixed results.
- Leaders often jump from awareness of a problem to implementing a strategy or initiative without deep understanding of the issue or set of issues.

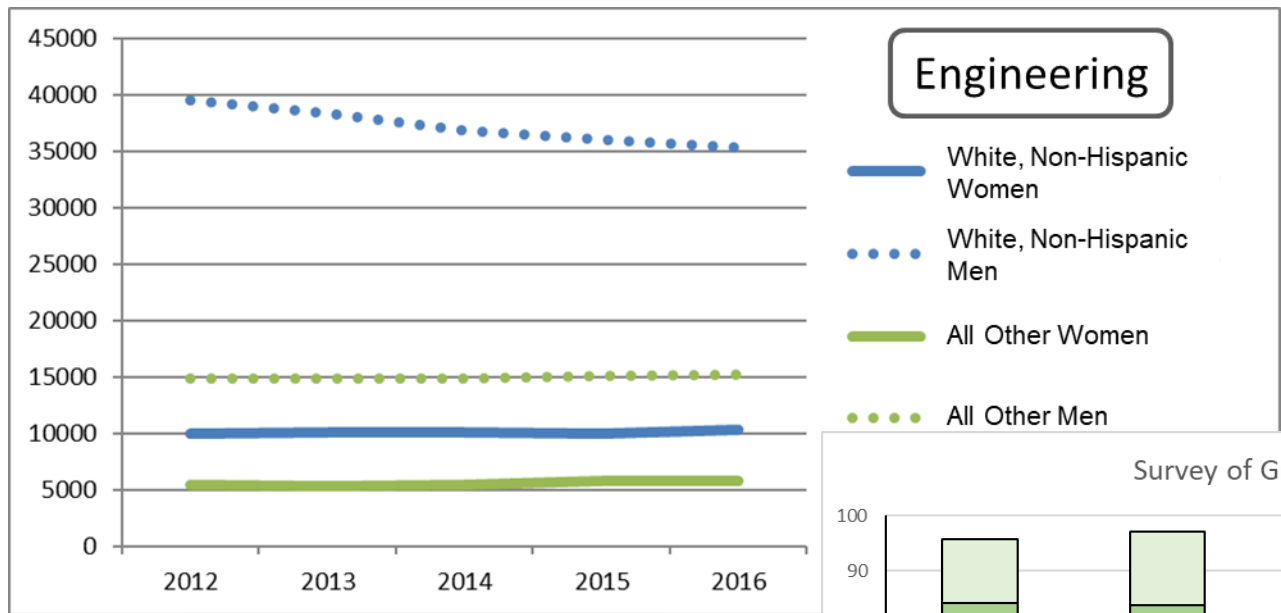
Change Trap - jumping from awareness to implementation without understanding.

- Laursen & Austin (2014) study of 19 ADVANCE institutions – found there are no “best practices” for increasing the gender equity of faculty across all campuses.

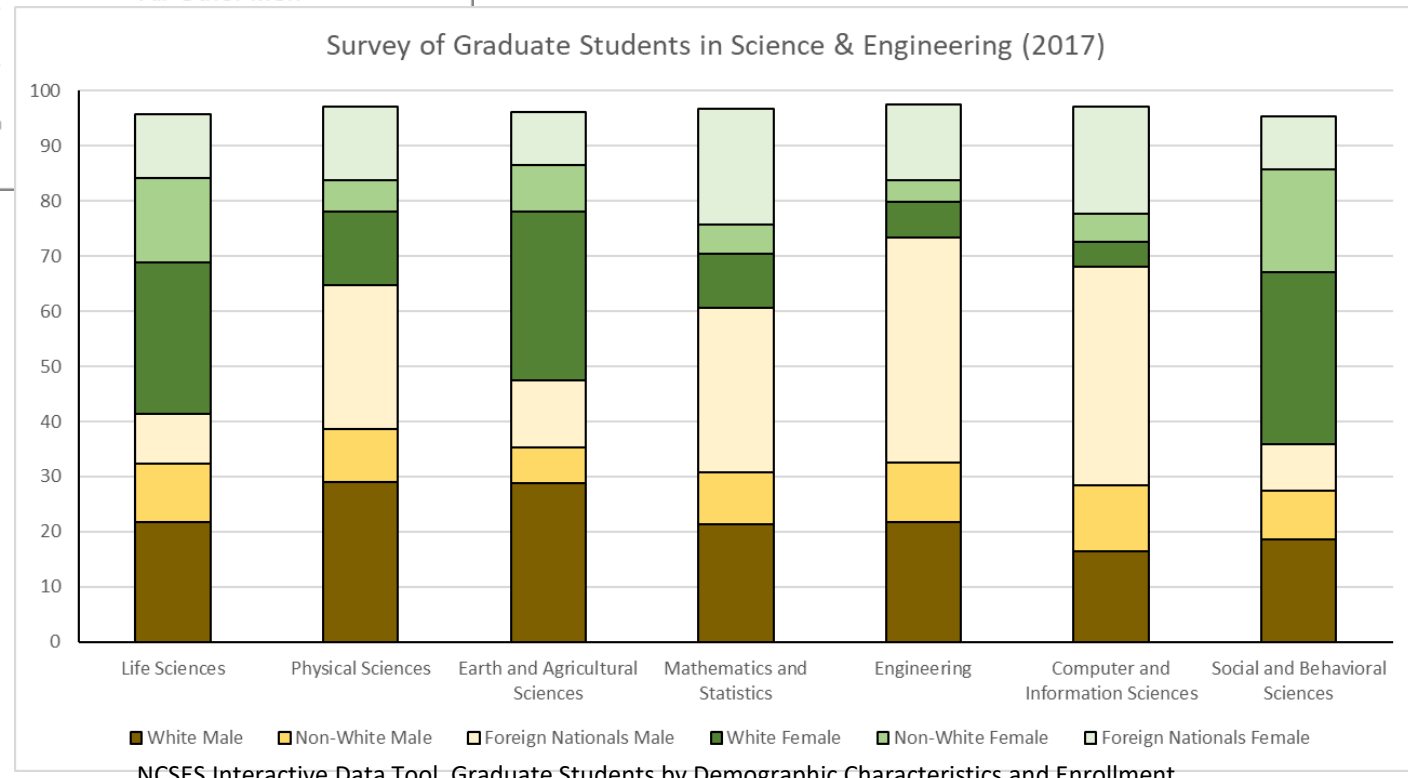
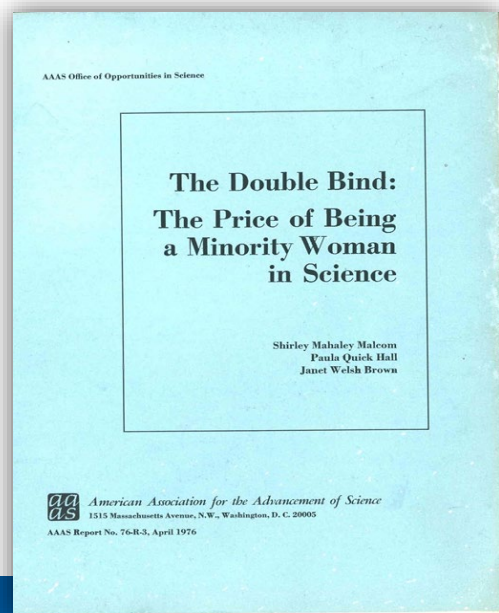
Four Frames Model for Creating Inclusive Organizations



CGO Insights, Briefing Note No. 1 - http://www.simmons.edu/som/docs/Insights_01.pdf



- ### KEY CONSIDERATIONS
- Intersectionality
 - Differentiation across STEMM Fields
 - Emphasis on Legal Consideration
 - Co-Construction with Institutions



NCSSES Interactive Data Tool, Graduate Students by Demographic Characteristics and Enrollment



Three Pillars of SEA Change



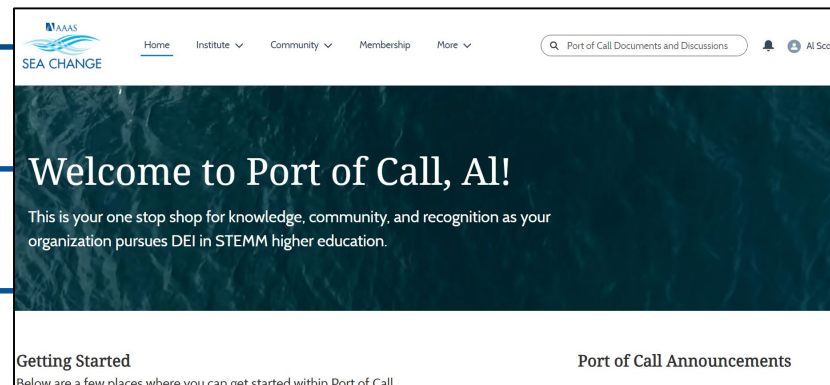
Community



Moderated Conversations

Communities of Learning
& Practice

Convenings



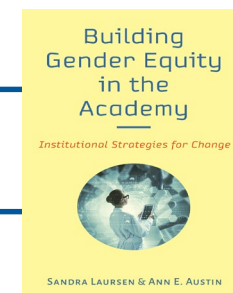
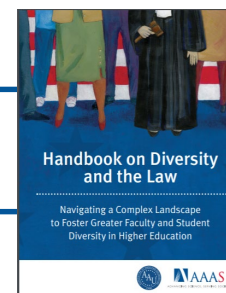
Institute



•Repository of resources

Trainings

Webinars



Awards



Bronze Award

Silver Award

Gold Award

	Bronze	Silver	Gold
A thorough self-assessment using qualitative and quantitative analyses	☒	☒	☒
Identifies key issues	☒	☒	☒
Actions in place to address key issues and carry the institution forward	☒	☒	☒
Demonstrates impact of previous activity and expands action plan to continue progress		☒	☒
Serves as a beacon in the sector and beyond			☒



Policy, practices, procedures,
climate across an institution



**SYSTEMIC
TRANSFORMATION**

AAAS
SEA CHANGE
DEPARTMENTAL
BRONZE AWARD

Policy, practices, procedures,
climate within a department

Institutional Awards

- Open to Member Institutions
- Recommend ≥ 13 months for self-assessment

Departmental Awards

- Co-created with committees of disciplinary societies
- Launching within the next 1-5 years, starting with



Biomedicine Awards

- Work with leadership of medical schools and academic health centers to co-create framework and metrics
- Pilot Bronze Awards in 2022



Future directions

- AAAS recently launched a pilot with other scientific professional societies to adapt the self-assessment framework for use in our own organizations
- In discussions with other similar programs to streamline and align processes for IHEs to maximize impact and minimize administrative burden (e.g., NSF INCLUDES Aspire Alliance)
- Frequent requests for membership and self-assessment opportunities from national labs and other FFRDCs, non-profits, and industry
- Anticipate adapting framework and membership levels for 2-year colleges within 5 years



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