

What Can Leadership Do?

Effective practices within organizations
to retain and advance women of color in STEM.

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April 8, 2020

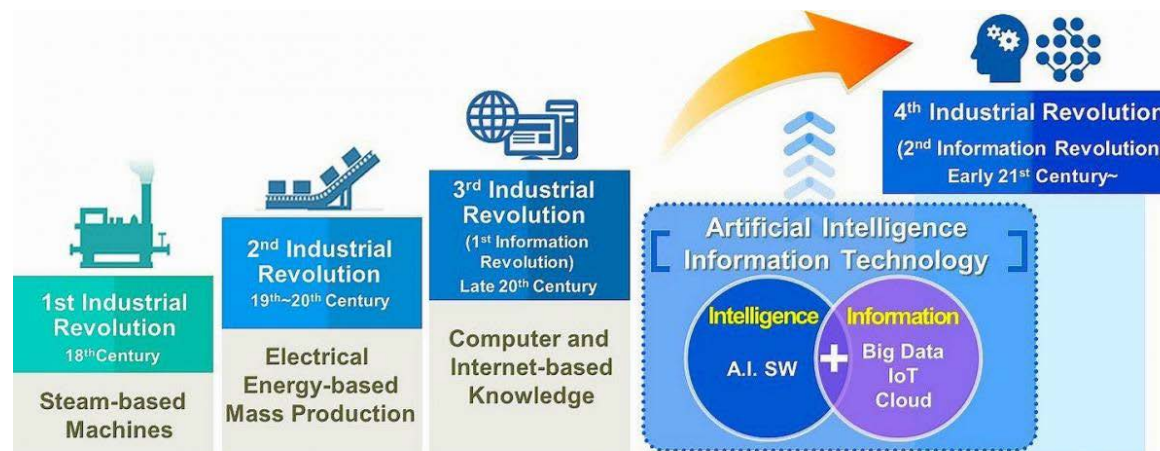
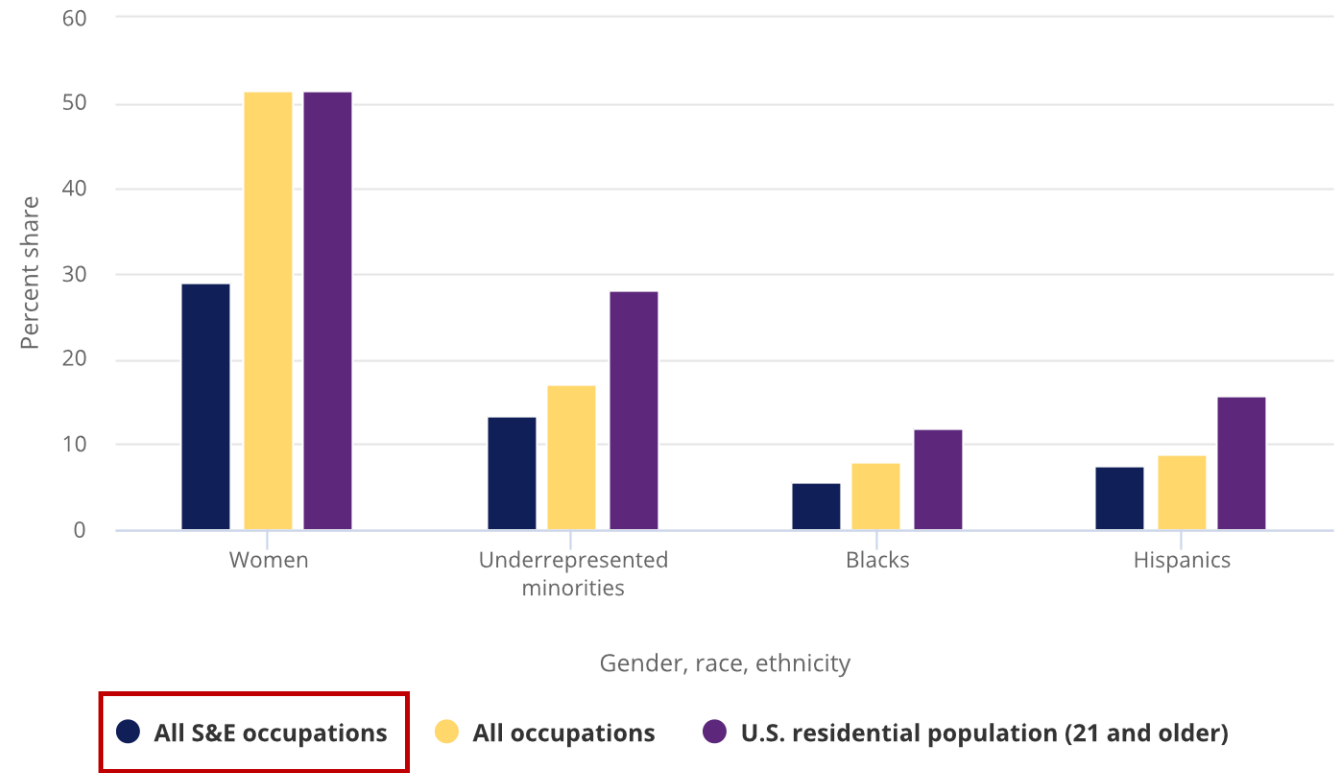


FIGURE 6

Women, underrepresented minorities, blacks, and Hispanics in S&E and all occupations: 2017



Note(s)

Underrepresented minorities includes individuals who are black, Hispanic, or American Indian or Alaska Native. The S&E and all occupations data are for those with a bachelor's degree and above. The U.S. residential population data are for those at all education levels.

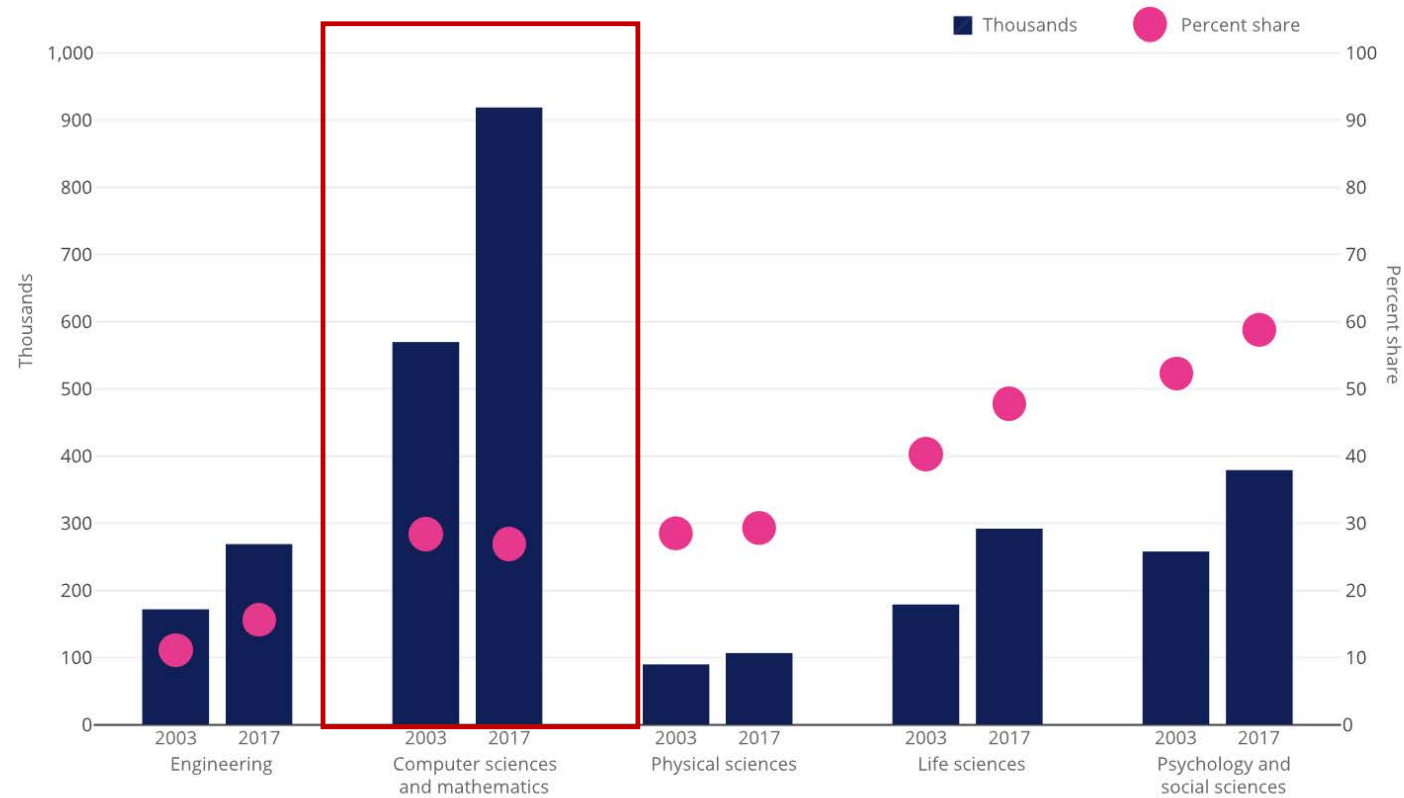
Source(s)

NCSES, 2017 NSCG; Census Bureau, 2017 ACS public use microdata.

Indicators 2020: Labor Force

FIGURE 7

Women in S&E occupations, by broad occupational category: 2003 and 2017



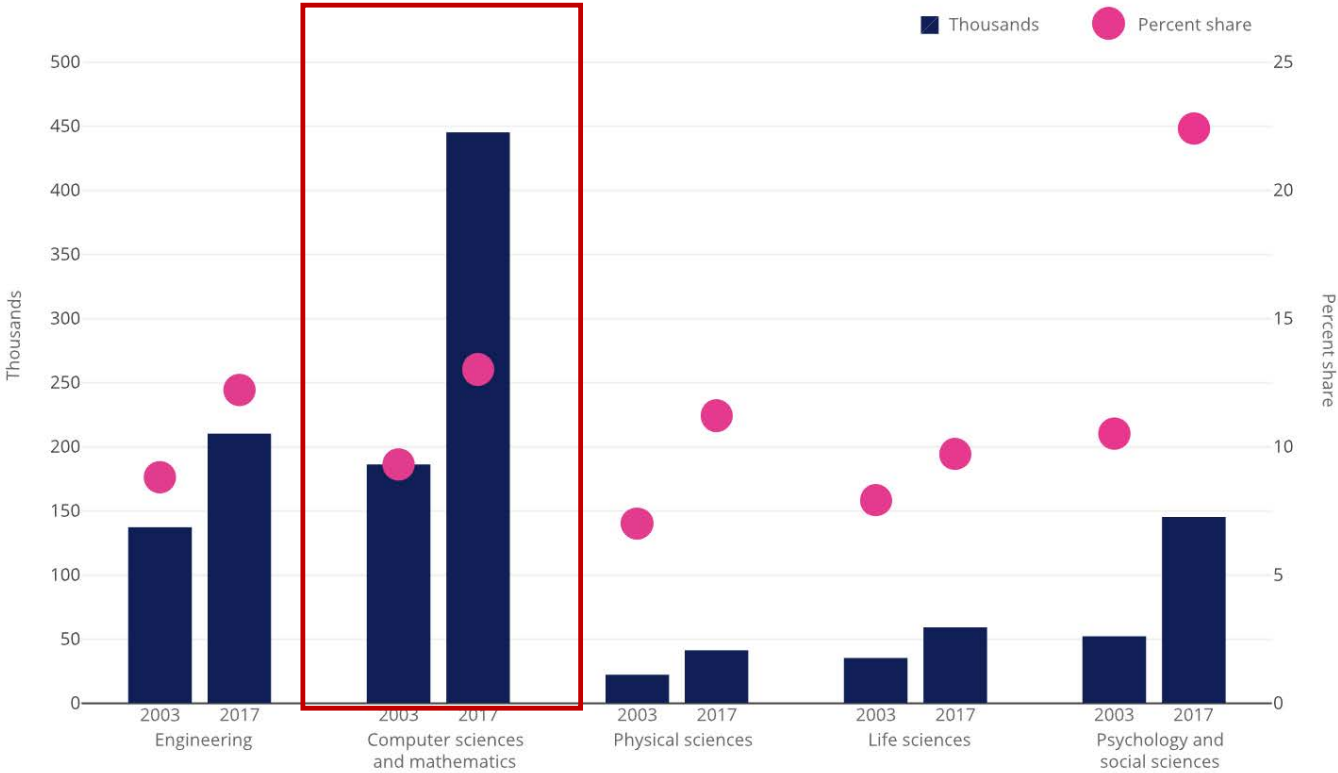
Source(s)

NCSES, 2003 SESTAT and 2017 NSCG.

Indicators 2020: Labor Force

FIGURE 8

Underrepresented minorities in S&E occupations, by broad occupational category: 2003 and 2017



Note(s)

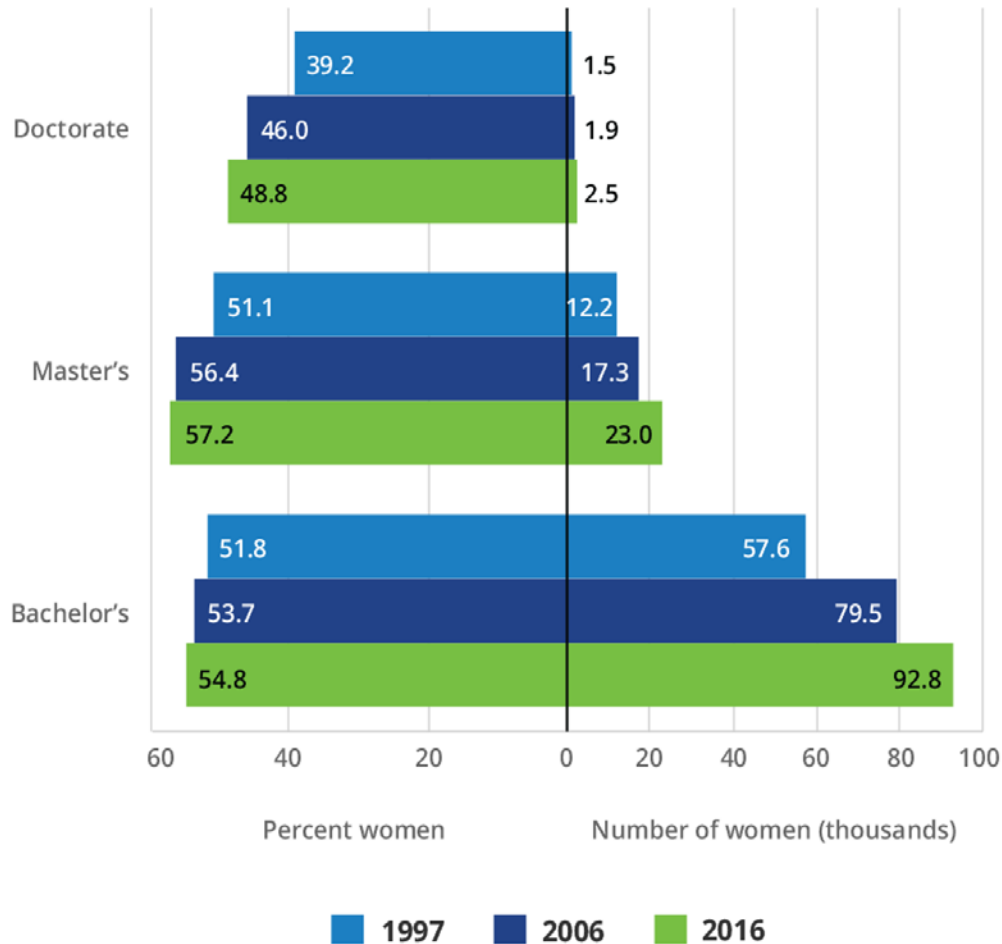
Underrepresented minorities includes individuals who are black, Hispanic, or American Indian or Alaska Native.

Source(s)

NCSES, 2003 SESTAT and 2017 NSCG.

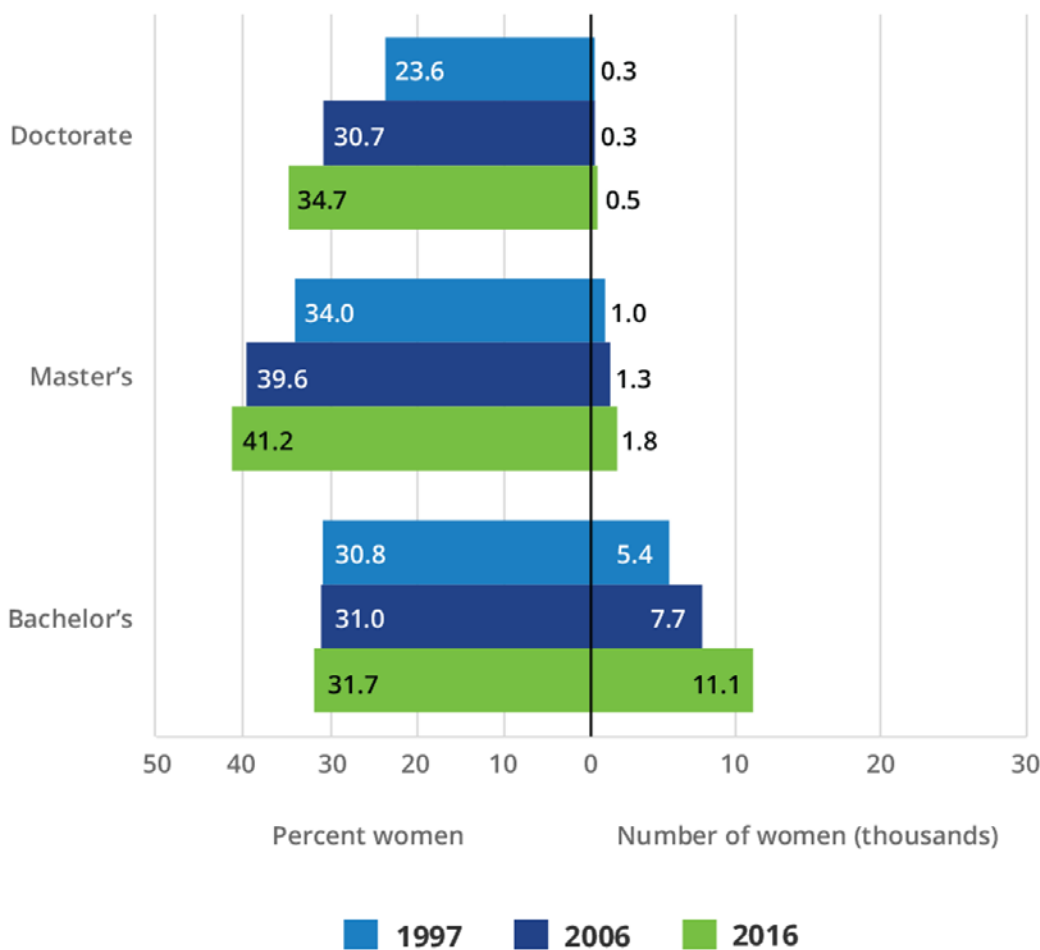
Indicators 2020: Labor Force

FIGURE 2-A
Degrees awarded to women: Social sciences, 1997, 2006, 2016



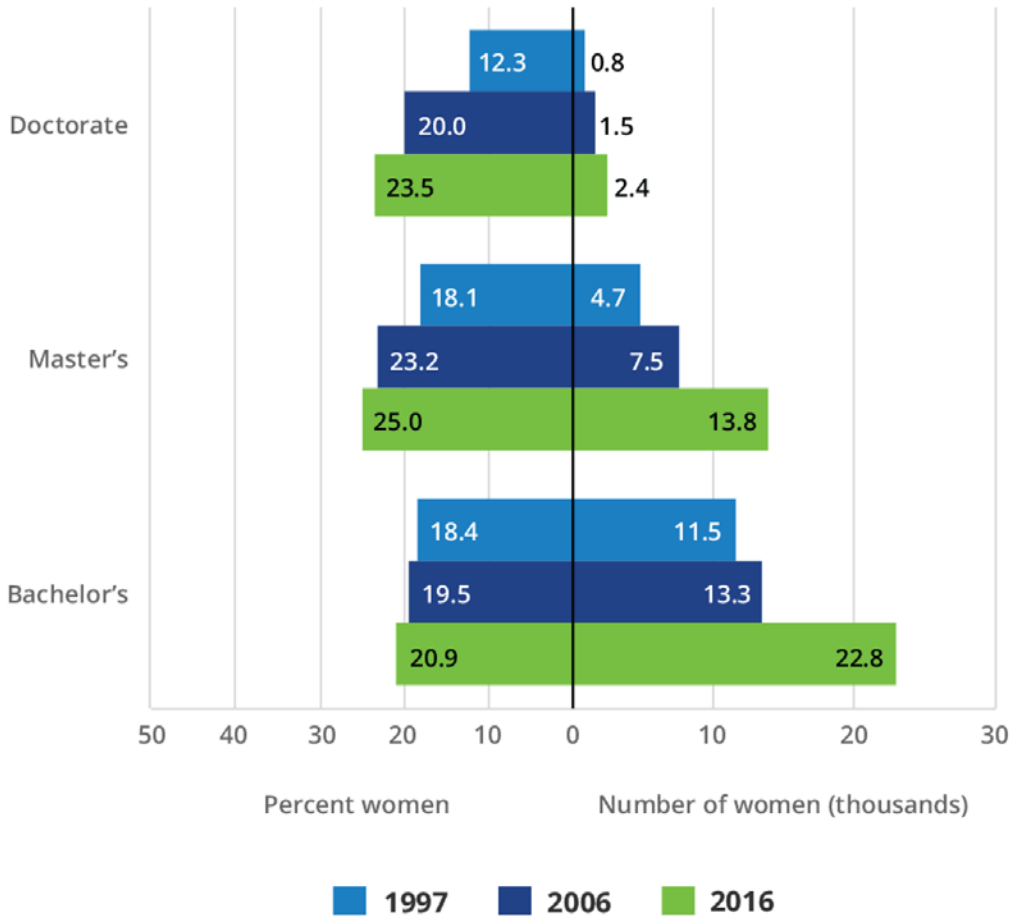
Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, unrevised provisional release data, various years. Related detailed data: WMPD table 5-2, table 6-1, table 6-2, table 7-1, and table 7-2.

FIGURE 2-B
Degrees awarded to women: Economics, 1997, 2006, 2016



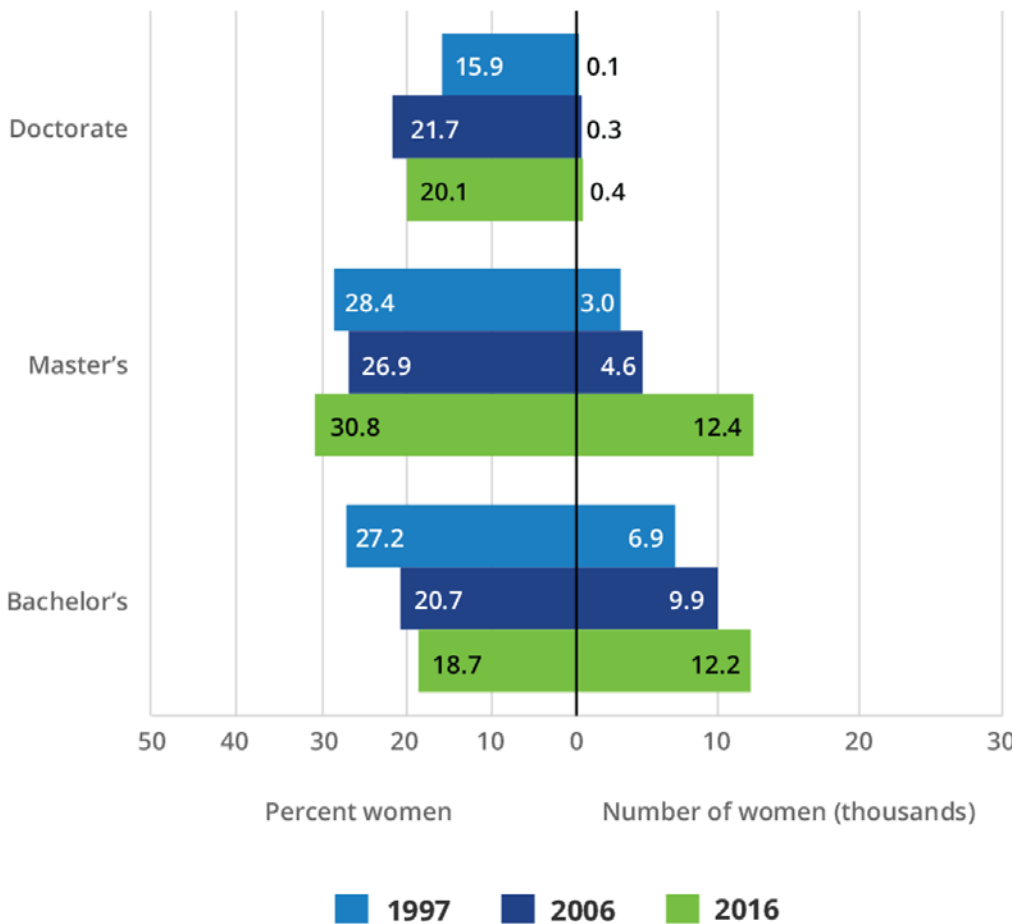
Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, unrevised provisional release data, various years. Related detailed data: WMPD table 5-2, table 6-1, table 6-2, table 7-1, and table 7-2.

FIGURE 2-D
Degrees awarded to women: Engineering, 1997, 2006, 2016



Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, unrevised provisional release data, various years. Related detailed data: WMPD table 5-2, table 6-1, table 6-2, table 7-1, and table 7-2.

FIGURE 2-C
Degrees awarded to women: Computer sciences, 1997, 2006, 2016



Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, unrevised provisional release data, various years. Related detailed data: WMPD table 5-2, table 6-1, table 6-2, table 7-1, and table 7-2.

Table 1

Representation Ratios* for Biologists, Chemists, and Medical Doctors

Professional group	White males	White females	African Americans	Hispanics	Asian Americans [†]	American Indians [‡]
1968–1989						
Biologists	1.28	0.72	0.37	0.65	1.93	0.60
Chemists	1.49	0.34	0.64	0.94	1.74	0.39
Medical doctors [§]	1.40	0.28	0.48	1.33	2.57	— [¶]
1990–2009						
Biologists	1.09	0.88	0.52	0.56	2.09	0.95
Chemists	1.44	0.51	0.76	0.47	2.10	0.56
Medical doctors	1.36	0.49	0.62	1.06	2.04	0.93
Percentage change, from 1968–1989 to 1990–2009						
Biologists	−0.15	0.22	0.42	−0.15	0.08	0.58
Chemists	−0.03	0.53	0.18	−0.50	0.21	0.45
Medical doctors	−0.03	0.77	0.29	−0.20	−0.21	— [¶]

*All ratios are significant at the 5% level, two-tailed test, except those in italics.

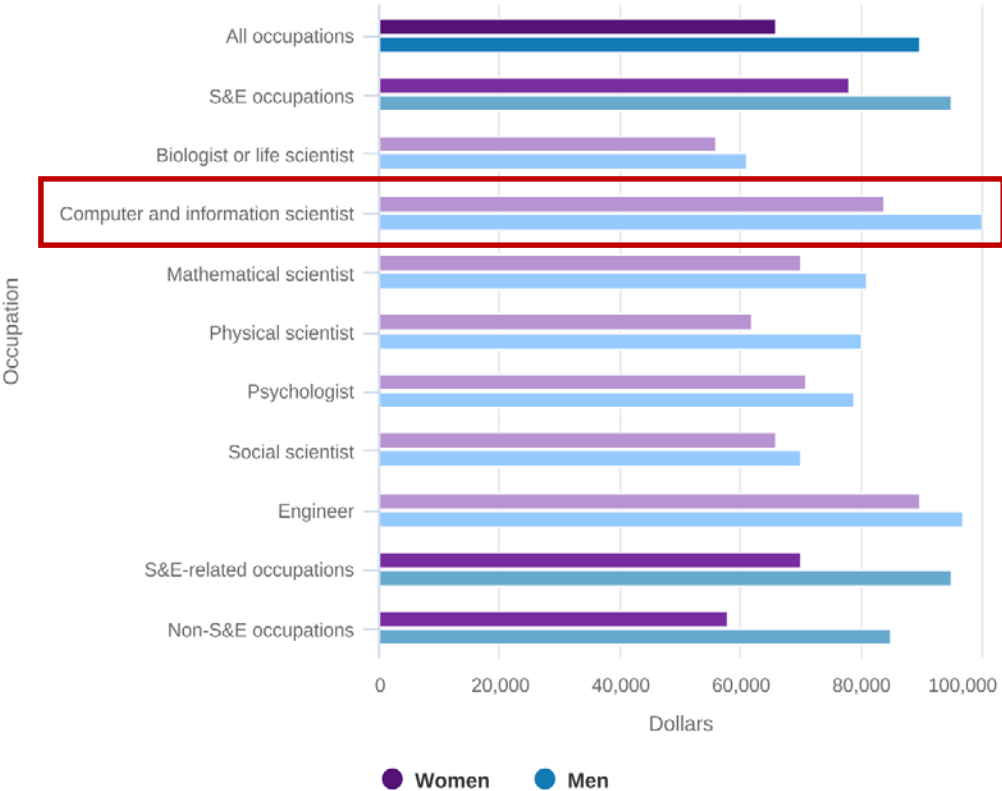
[†] Data available from 1986 to 2009.

[‡] Data available from 1988 to 2009.

[§] Data available from 1972 to 2009.

[¶] Too few observations to compute three-year moving averages (or, therefore, percentage change).

FIGURE 6-B
Median annual salary of scientists and engineers employed full time, by sex and broad occupation: 2017

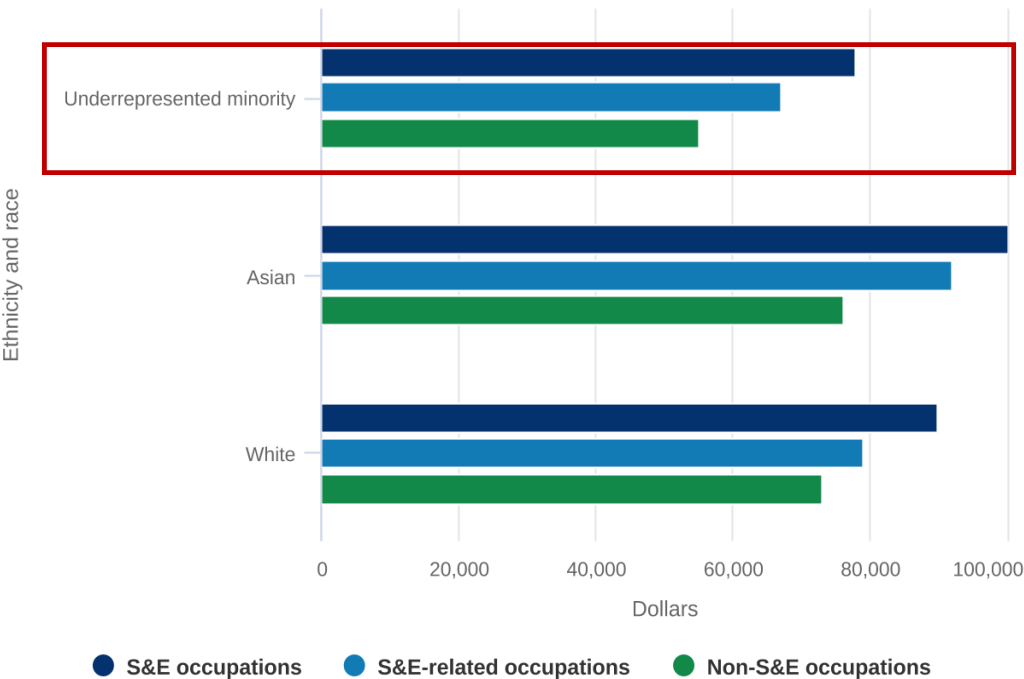


S&E = science and engineering.

Note(s)
Salaries are rounded to nearest \$1,000. S&E occupations include S&E postsecondary teachers. S&E-related occupations include health occupations. Scientists and engineers are individuals under the age of 76 who have a bachelor's or higher degree, are living in the United States, and have an S&E or S&E-related degree or occupation.

Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates, 2017. Related detailed data: WMPD table 9-17.

FIGURE 6-C
Median annual salary of scientist and engineers employed full time, by ethnicity, race, and broad occupation: 2017



S&E = science and engineering.

Note(s)
Salaries are rounded to nearest \$1,000. S&E occupations include S&E postsecondary teachers. S&E-related occupations include health occupations. Underrepresented minority groups include black or African American, Hispanic or Latino, and American Indian or Alaska Native. Scientists and engineers are individuals under the age of 76 who have a bachelor's or higher degree, are living in the United States, and have an S&E or S&E-related degree or occupation.

Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates, 2017. Related detailed data: WMPD table 9-17.

What is the nature of the challenge/problem, opportunity?

- **Disproportionality**
 - By type of organization (public, academic, private)
 - By type of occupation
- **Lack of upward movement/retention**
 - Is it self selection?
 - Is it climate?
 - What else?
- **Promotion shares fall off steeply**

What is the nature of the challenge/problem, opportunity?

- **Demand-side obstacles**, even if supply-side approaches are successful
- **Scalability**
 - Regionally
 - Different sectors
 - Different organizational sizes
 - Different occupational needs
 - Different social and economic networks
 - Different institutional frameworks and cultures
- **Effective policy and political processes**
- **Effective incentives**

Evaluation Criteria for Effective Initiatives (Leggon, 2018)

Program level:

- Clearly defined goals, objectives, priorities and outcomes
- Education, training, and socialization—“rules of the game”
- Networking and community building—sense of belonging
- Mentor-protégé programs
- Formative evaluation and continuous improvement
- Longitudinal tracking
- Bridge mechanisms—one program to another, level to the next, across sectors

Institutional level:

- Institutionalization—Sustained commitment, bottom-up and top-down
- Integrated organizational strategy—embedded into the basic structure, strategy, and standard operating procedures of the organization
- Management accountability and evaluation

Initiatives enhance both the participation and qualitative experience of the target group (referenced from Leggon & Barabino, 2015).

Example: DEI Strategy

1. Shared responsibility for building, maintaining & improving an inclusive school **climate**
2. **Communicate** plan & opportunities to highlight & expand the university's efforts
3. Equip students with DEI knowledge that they can put into service—
*****Revised curriculum*****
4. Drive local-to-global **community engagement** & collaboration on shared DEI values
5. **Recruit & retain students**
6. **Recruit & retain faculty and staff**
7. Increase the quantity & impact of **research** related to DEI

Adapted from the Humphrey School of Public Affairs, U. Minnesota,
“Equity and Inclusion Strategy & Implementation Plan, 2018–2019.”

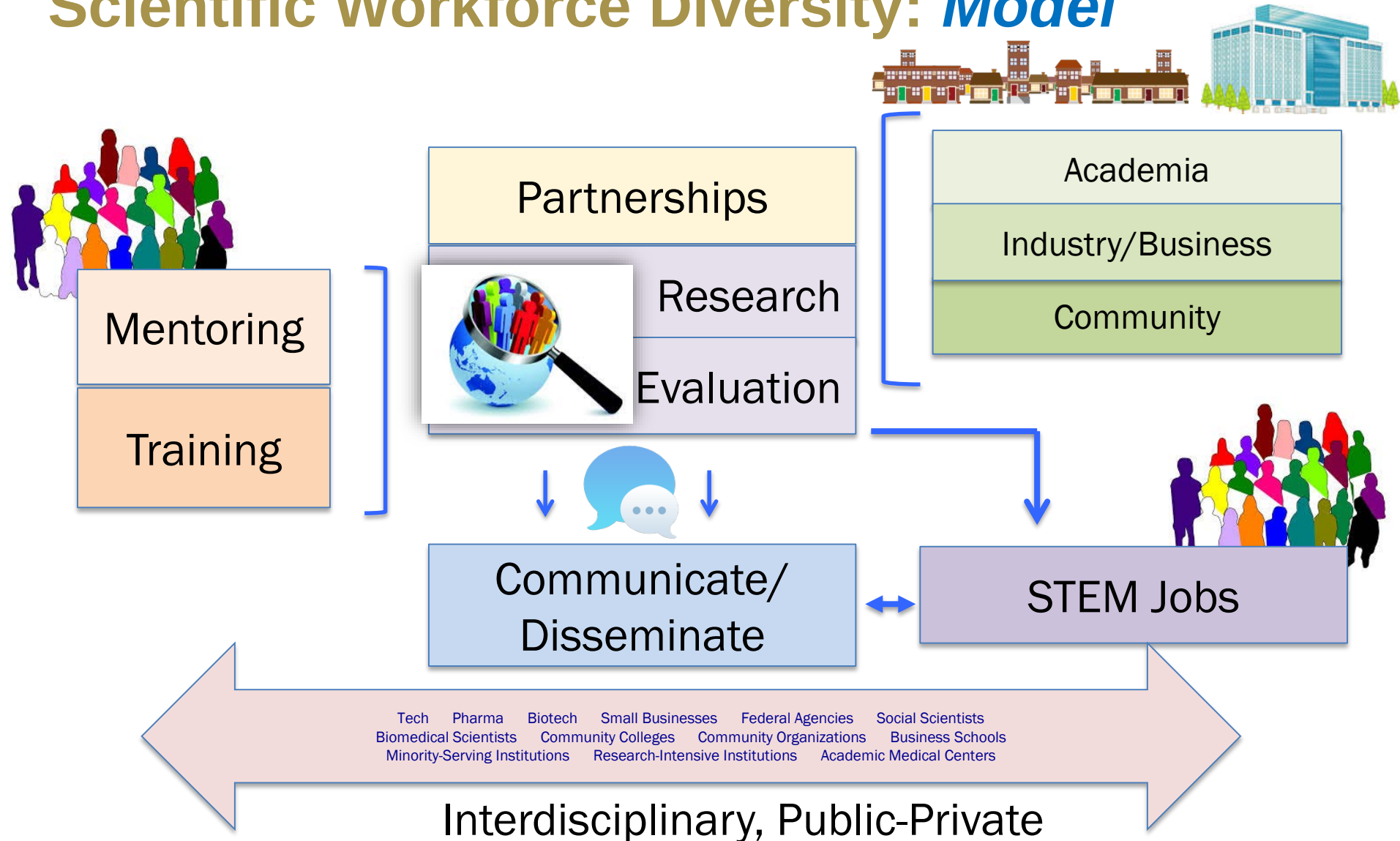
Example: Leadership Responsibilities

Identify key personnel and working groups for each focus area

Focus Areas

- Climate
- Communication
- Curriculum
- Community Engagement
- Recruitment & Retention – Faculty and Staff
- Recruitment & Retention – Students
- Research

NIH Hubs of Innovation and Research in Scientific Workforce Diversity: *Model*



Science of Broadening Participation (SoBP)

- ...despite the vast relevant literature, there is a lack of coherent, consistent, comprehensive, and curated knowledge and data for use in broadening participation in STEM educational attainment and related workforce development and mobility.

McNeely, C. L., & Fealing, K. H. (2018). Moving the needle, raising consciousness: The science and practice of broadening participation, *American Behavioral Scientist*, vol. 62(5), p. 555.



SoBP Research Agenda

Frameworks

- Curated knowledge from various areas of study related to understanding and assessing underrepresentation in STEM fields.

Education

Curated knowledge from various areas of study assessing educational attainment, contextualizing educational access, opportunities, and outcomes, and identifying critical causes of underrepresentation in STEM fields.

Measures

- Curated data, metrics and statistics from various areas of study related to assessing underrepresentation in STEM fields.
- Curated knowledge from various areas of study for identifying workforce dimensions and dynamics, contextualizing occupational access, opportunities, and outcomes, and investigating recruitment, retention network inadequacies leading to underrepresentation in the STEM workforce.

Workforce

(Source: Fealing & McNeely, 2016; NSF Awards 1551904 & 1551880)

What are some concrete interventions?

Factors to consider:

- Thresholds
- Initiatives
- Leadership
- **Research methods**

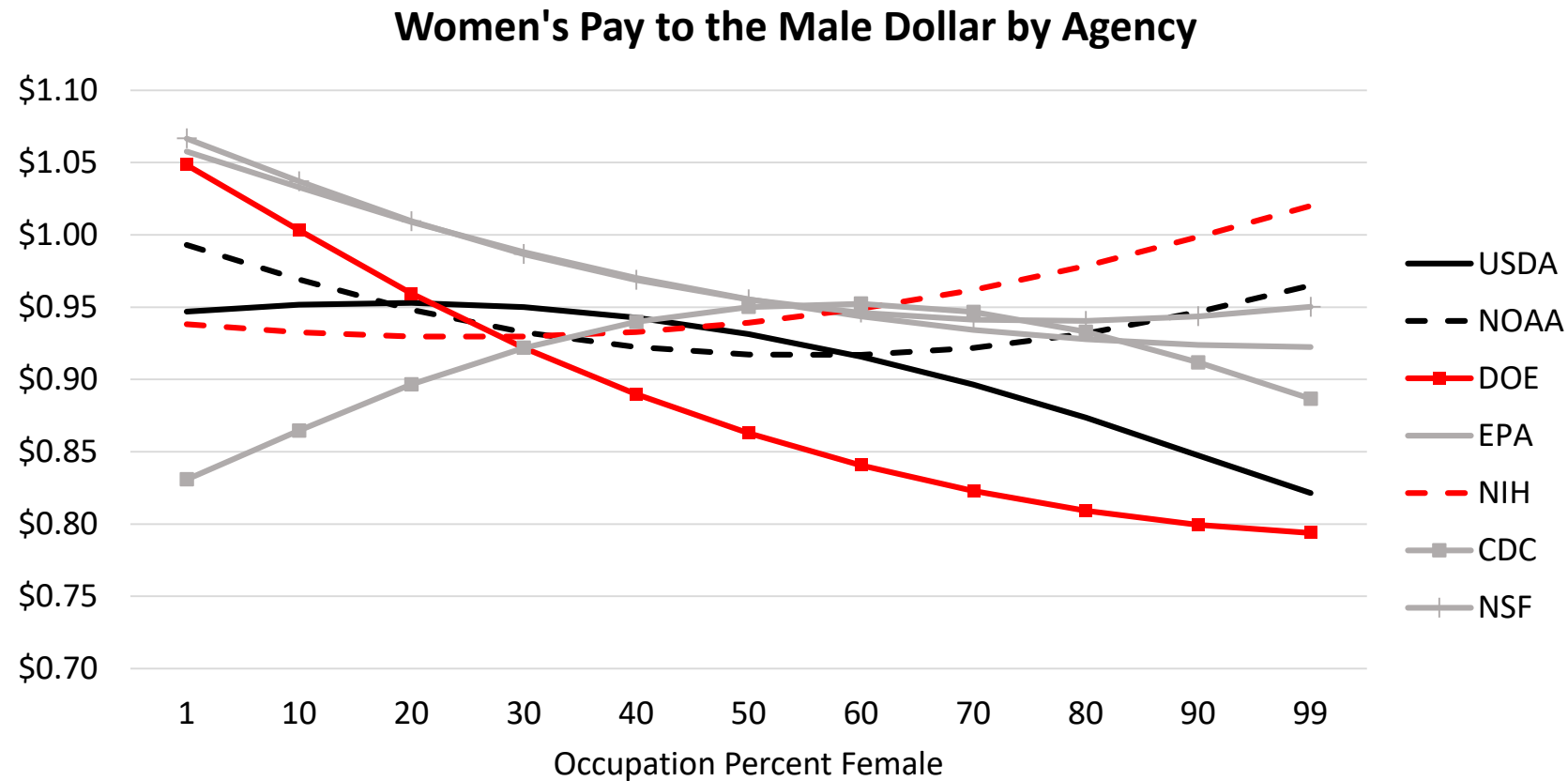


**It's not just about us,
it's about *all of us*!**

"Lift while you climb"

Thank you!

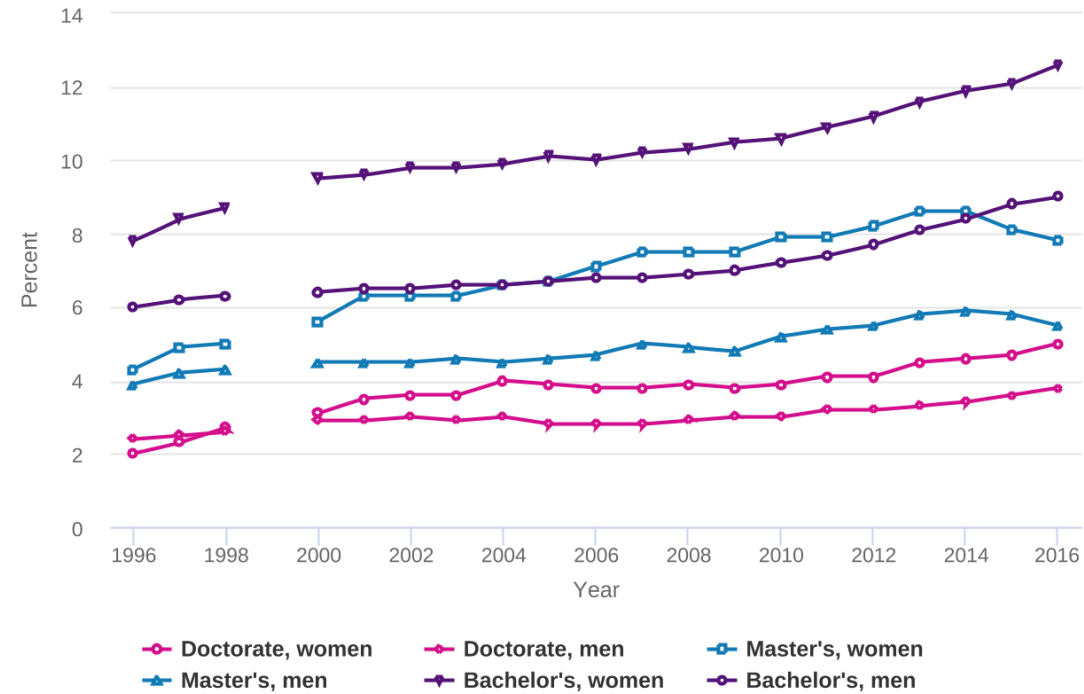
What's Next on How Organizational Context Matters



Gap is largest for: 1) women in female dominated occupations at physical science agencies, and 2) for women in male dominated occupations at life/multidisciplinary science agencies

FIGURE 4-B

Science and engineering degrees earned by underrepresented minority women and men, as a percentage of all S&E degrees awarded of each degree, by degree type: 1996–2016



S&E = science and engineering.

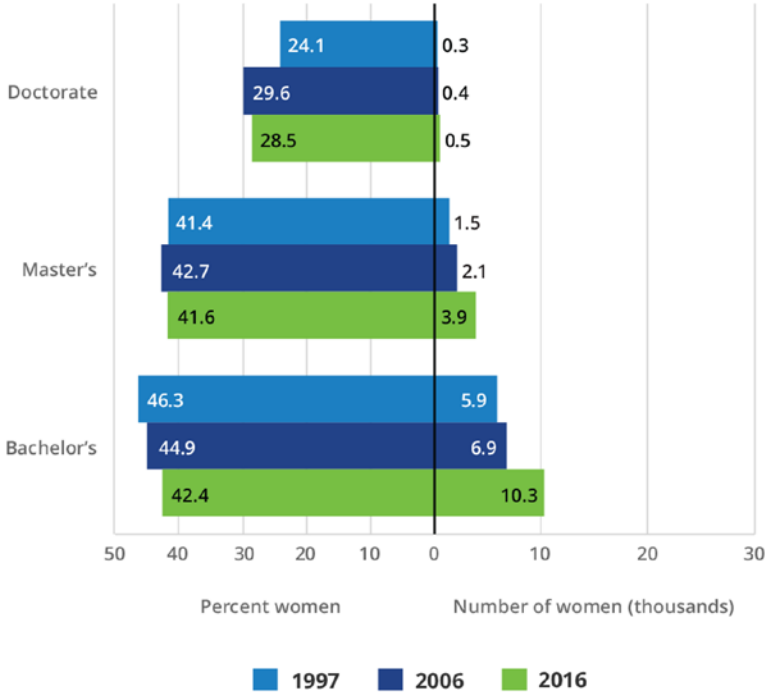
Note(s)

Data not available for 1999. Underrepresented minority groups include black or African American, Hispanic or Latino, and American Indian or Alaska Native. Data are for U.S. citizens and permanent residents only.

Source(s)

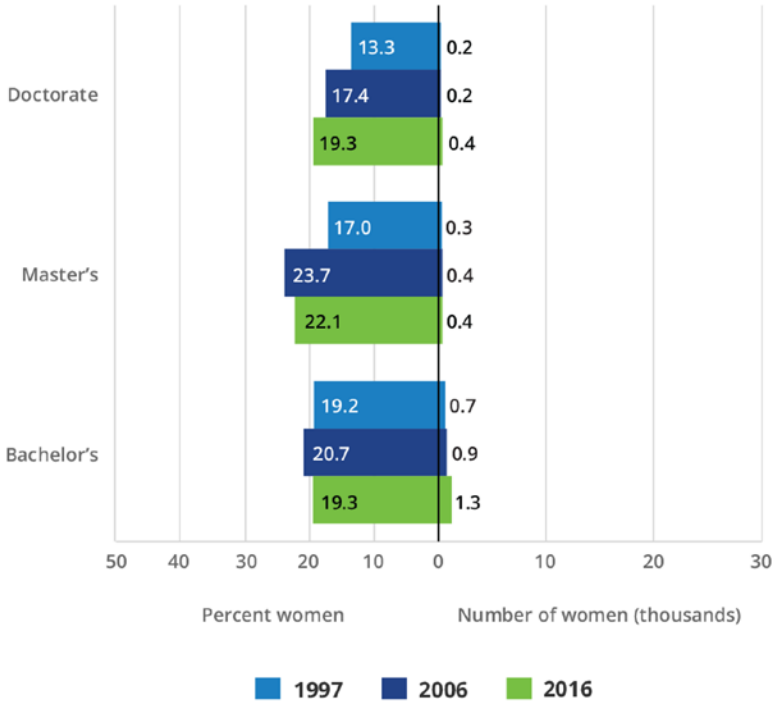
National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, unrevised provisional release data. Related detailed data: WMPD table 5-1, table 5-2, table 5-3, table 6-3, table 6-4, table 6-5, and table 7-7.

FIGURE 2-E
Degrees awarded to women: Mathematics and statistics, 1997, 2006, 2016



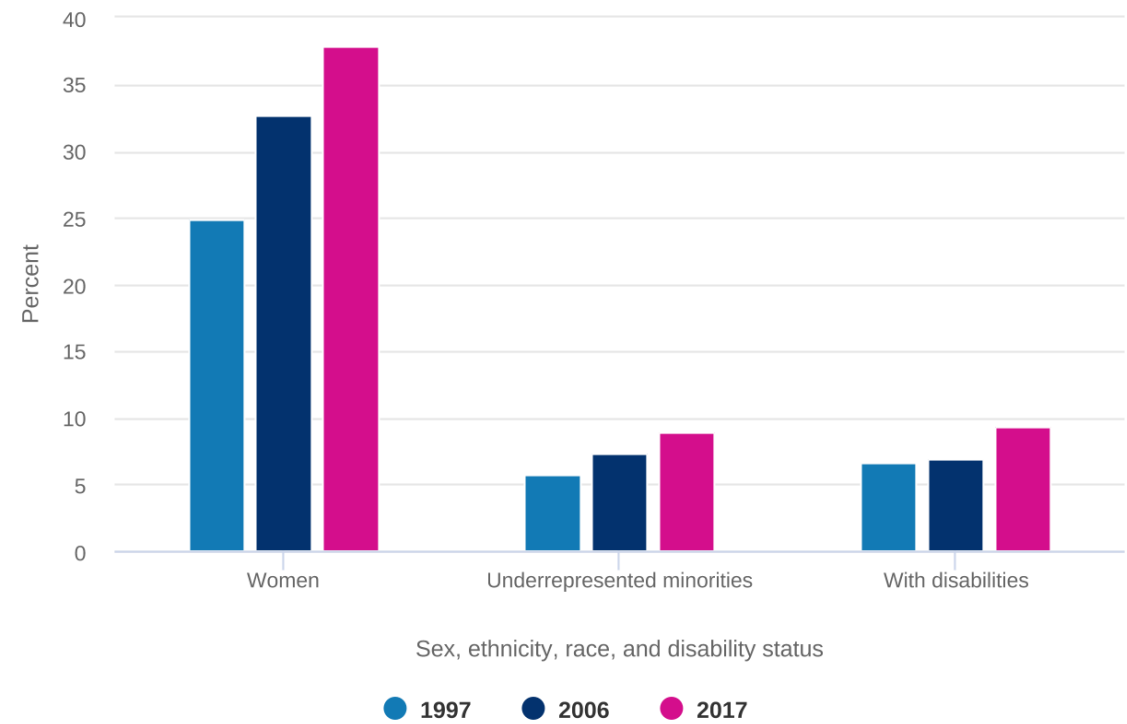
Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, unrevised provisional release data, various years. Related detailed data: WMPD table 5-2, table 6-1, table 6-2, table 7-1, and table 7-2.

FIGURE 2-F
Degrees awarded to women: Physics, 1997, 2006, 2016



Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, unrevised provisional release data, various years. Related detailed data: WMPD table 5-2, table 6-1, table 6-2, table 7-1, and table 7-2.

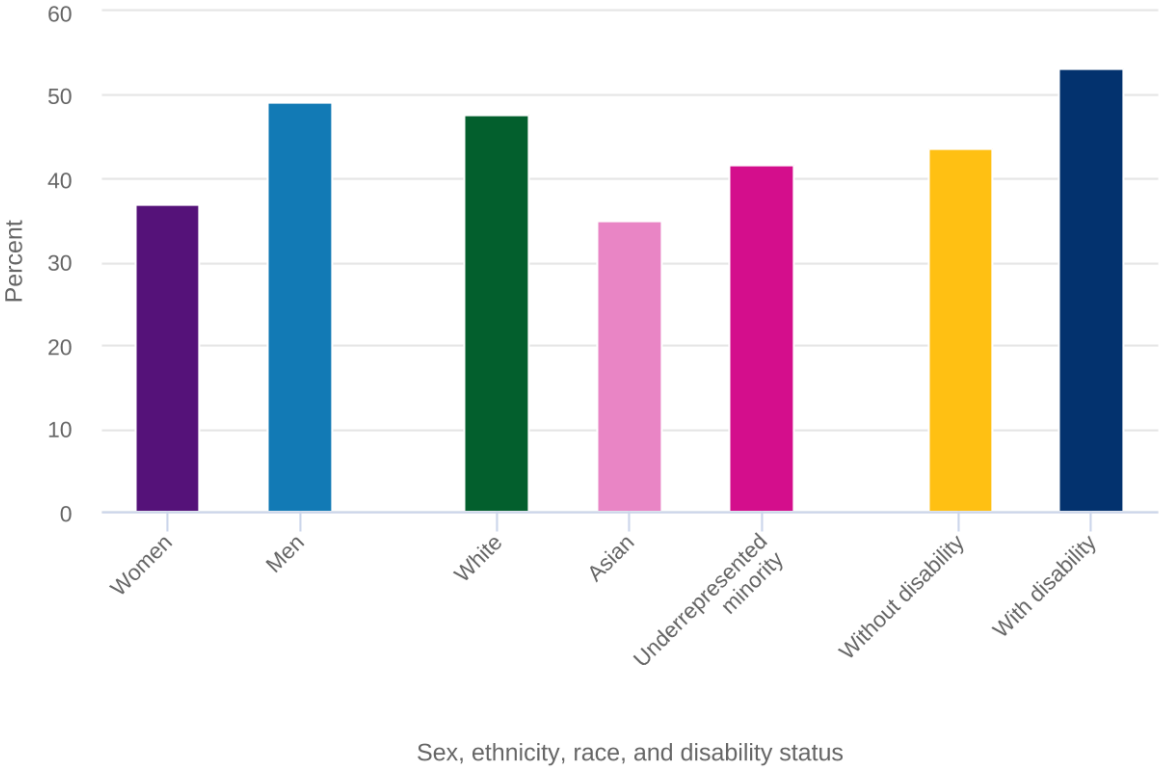
FIGURE 6-E
Women, underrepresented minorities, and those with disabilities as a percentage of the academic doctoral workforce: 1997, 2006, 2017



Note(s)
Underrepresented minority groups include black or African American, Hispanic or Latino, and American Indian or Alaska Native. Survey of Doctorate Recipients asks the degree of difficulty—none, slight, moderate, severe, or unable to do—an individual has in seeing (with glasses); hearing (with hearing aid); walking without assistance; lifting 10 pounds; or concentrating, remembering, or making decisions. Respondents who answered "moderate," "severe," or "unable to do" for any activity were classified as having a disability.

Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients. Related detailed data: WMPD table 9-22.

FIGURE 6-F
Doctoral scientists and engineers employed in universities and 4-year colleges who are tenured: 2017



Note(s)
Underrepresented minority groups include black or African American, Hispanic or Latino, and American Indian or Alaska Native. Survey of Doctorate Recipients asks the degree of difficulty—none, slight, moderate, severe, or unable to do—an individual has in seeing (with glasses); hearing (with hearing aid); walking without assistance; lifting 10 pounds; or concentrating, remembering, or making decisions. Respondents who answered "moderate," "severe," or "unable to do" for any activity were classified as having a disability. Doctoral scientists and engineers includes those who received research doctorates in science, engineering, and health fields.

Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2017. Related detailed data: WMPD table 9-26 and table 9-29.