



Symposium on Evidence-based Interventions: *NSF Taking Action*



Suzi Iacono, Head

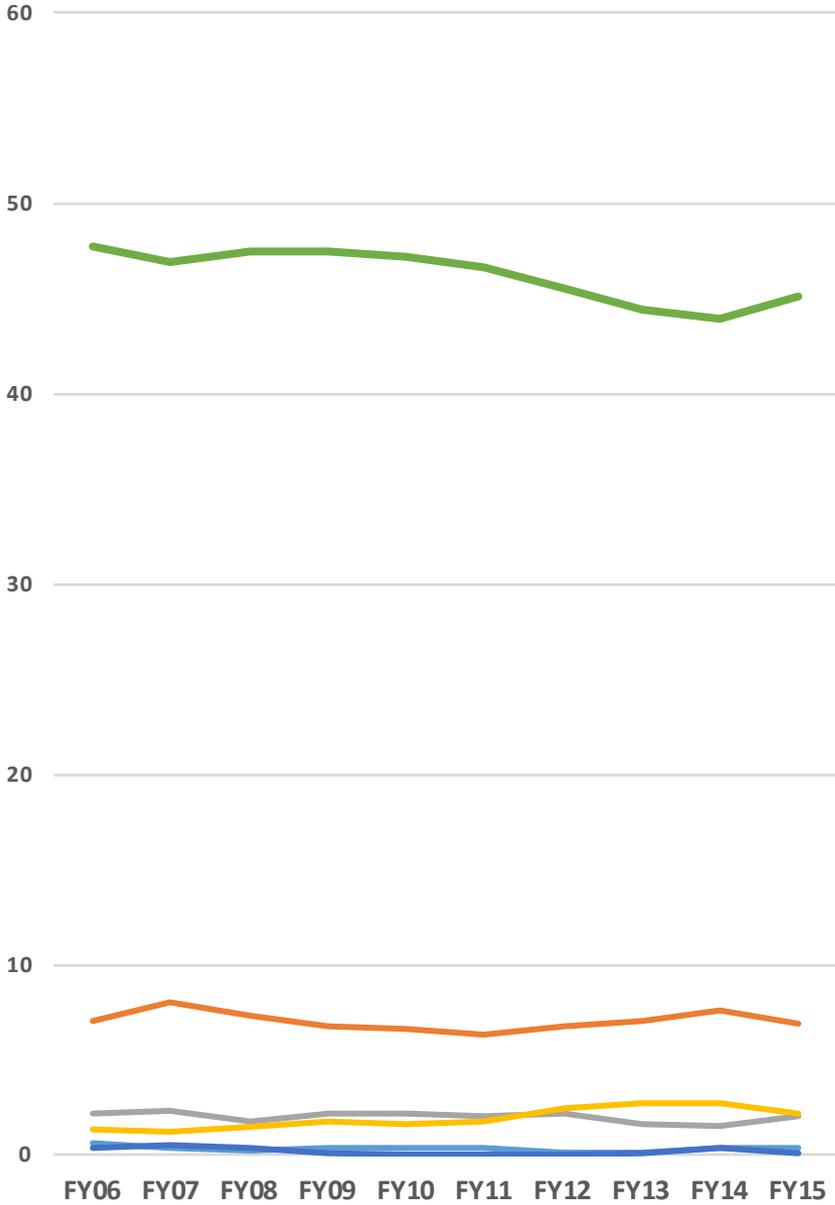
Office of Integrative Activities
National Science Foundation

National Academies
March 11, 2019

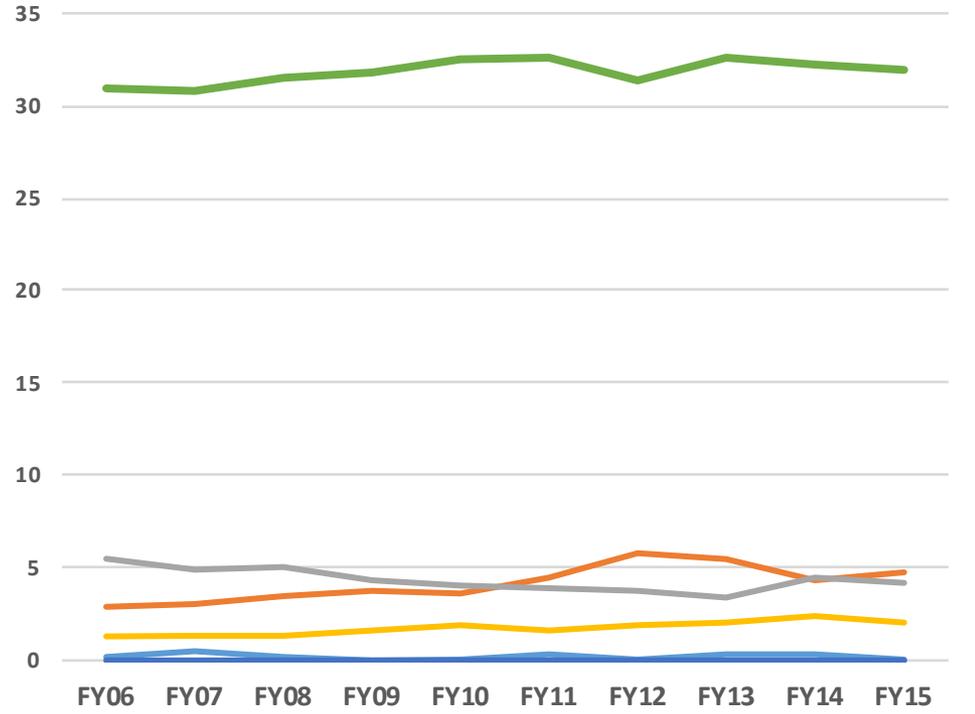
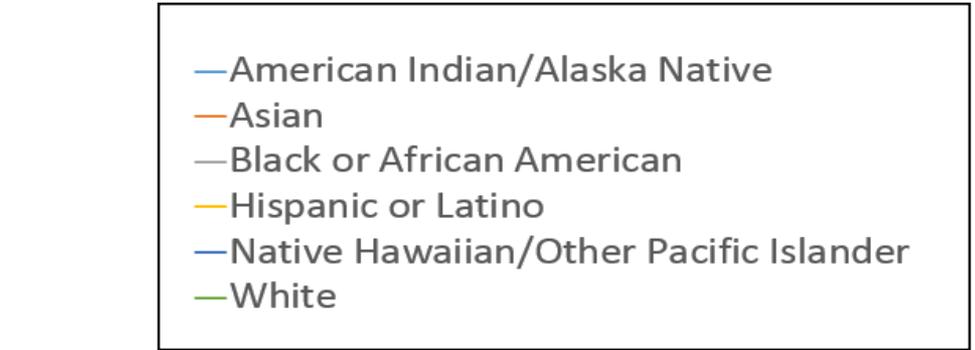
NSF Commitment to Diversity & Inclusion

- Congressionally-mandated advisory committee--CEOSE
- Office – ODI
- Cross-agency Sexual Harassment Working Groups
 - Director’s Executive Leadership Group on Harassment
 - Director’s Sexual Harassment Task Group
 - Terms and Conditions Working Group
 - Team Responding to the NASEM Report
- Broadening Participation Programs
 - FY19 Budget Request is \$887M
- Strategic Plan FY18-FY22 Core Value
 - *Inclusion* – a staff that is representative...; outstanding and diverse researchers....
- Changes to policies and practices....

Gender and Racial/ethnic Diversity of NSF's Scientists and Engineers: FY 2006-2015



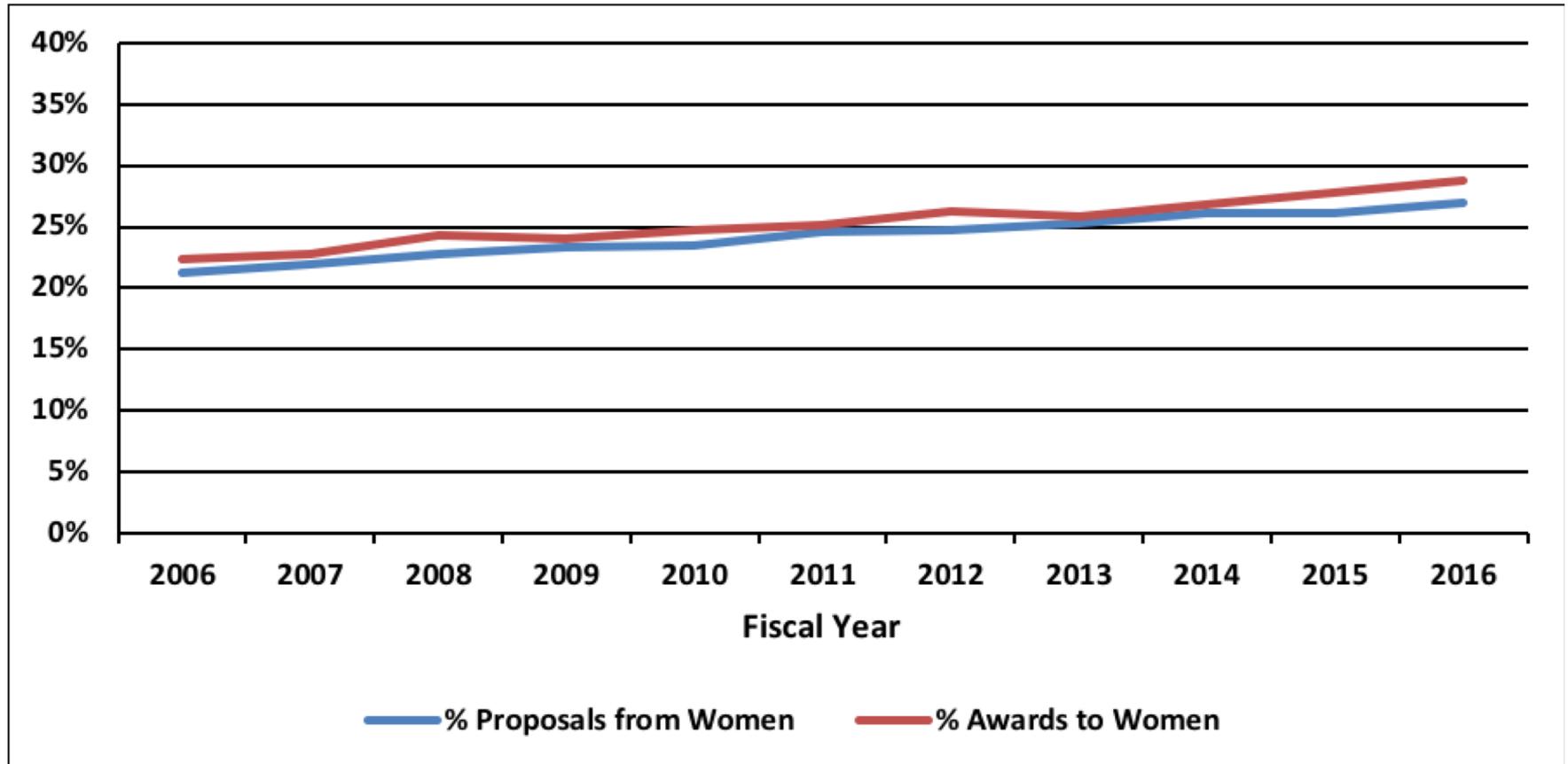
Male Scientists/Engineers



Female Scientists/Engineers

Source: NSF Division of Human Resources Management

Percentage of NSF Proposals from and Awards to Women



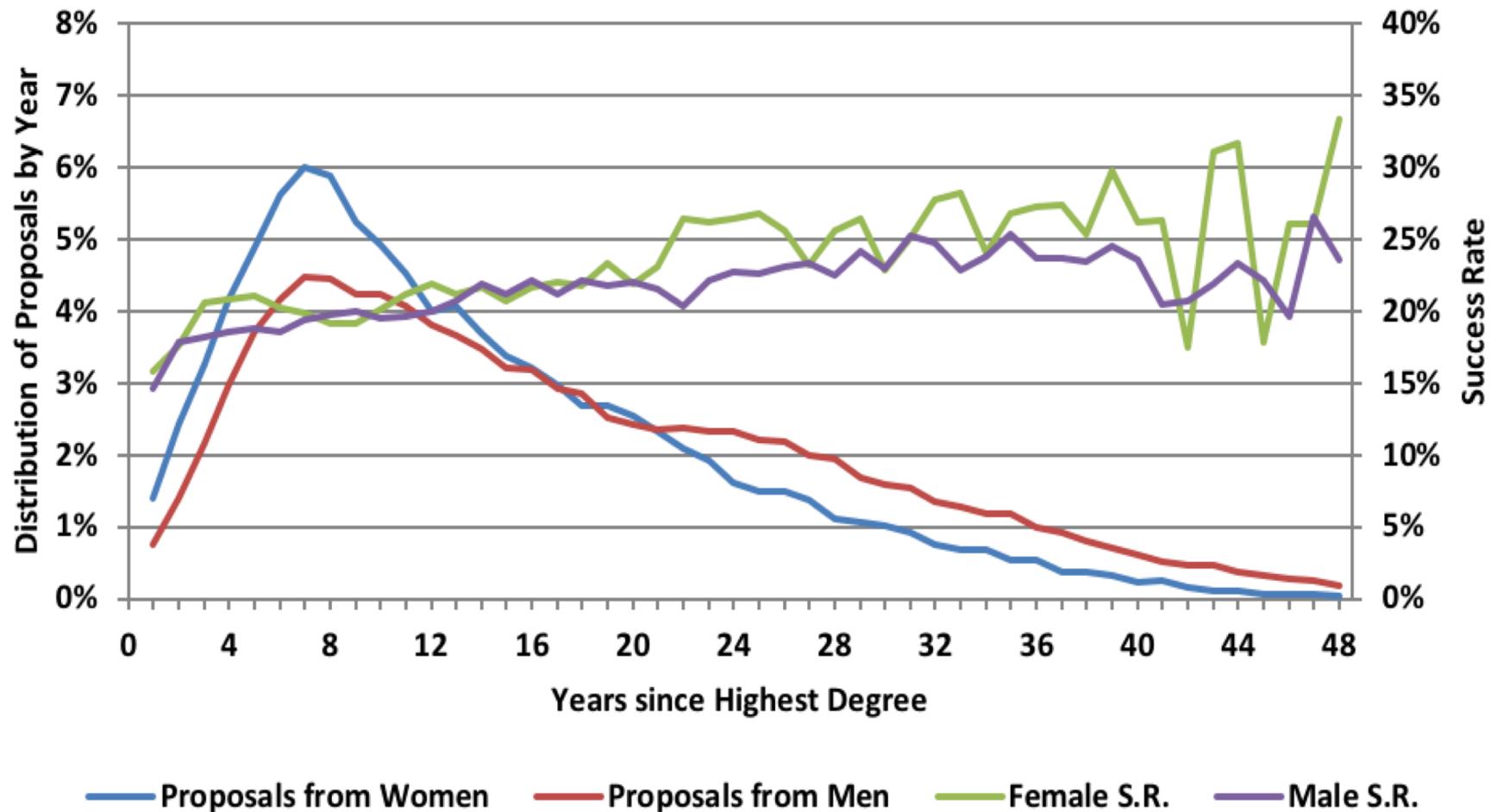
FY 2015 Research Proposals - Comparison of Women's and Men's Success Rates



Competitively Reviewed Proposals, Awards and Success Rates, by PI Type

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All PIs	Proposal	42,352	44,577	44,428	45,181	55,542	51,562	48,613	48,999	48,051	49,620
	Awards	10,425	11,463	11,149	14,595	12,996	11,192	11,524	10,829	10,958	12,007
	Funding Rate	25%	26%	25%	32%	23%	22%	24%	22%	23%	24%
Female PIs	Proposal	8,510	9,197	9,431	9,727	11,903	11,488	10,795	11,152	11,142	11,444
	Awards	2,233	2,493	2,556	3,297	2,982	2,602	2,775	2,556	2,669	3,007
	Funding Rate	26%	27%	27%	34%	25%	23%	26%	23%	24%	26%
Male PIs	Proposal	31,482	32,650	32,074	32,091	38,695	35,211	32,932	32,866	31,625	32,411
	Awards	7,765	8,451	7,986	10,437	9,080	7,739	7,816	7,316	7,286	7,810
	Funding Rate	25%	26%	25%	33%	23%	22%	24%	22%	23%	24%

Research Proposals and Success Rates, FY 2013 – FY 2016, by Years Since Highest Degree and by Gender



BP Focused Programs

HBCU-UP

Career-Life Balance Initiative

ATE

CREST

BROADENING
PARTICIPATION IN
BIOLOGY FELLOWSHIP

AGEP

ADVANCE

LSAMP

BPE

SBE SCIENCE OF
BROADENING
PARTICIPATION

PAARE

TCUP

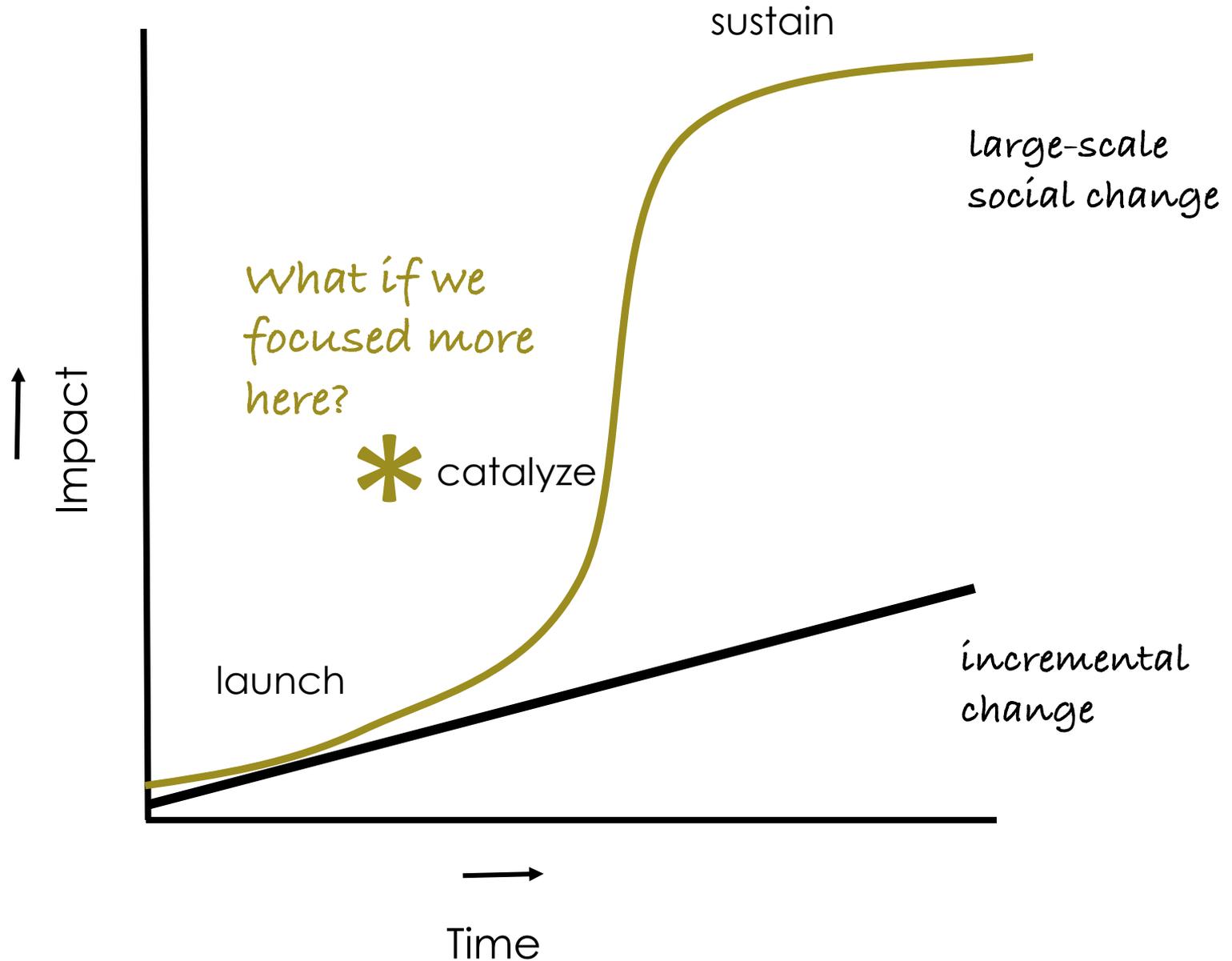
 NSF INCLUDES

SBE Postdoctoral Research Fellowship –
Broadening Participation

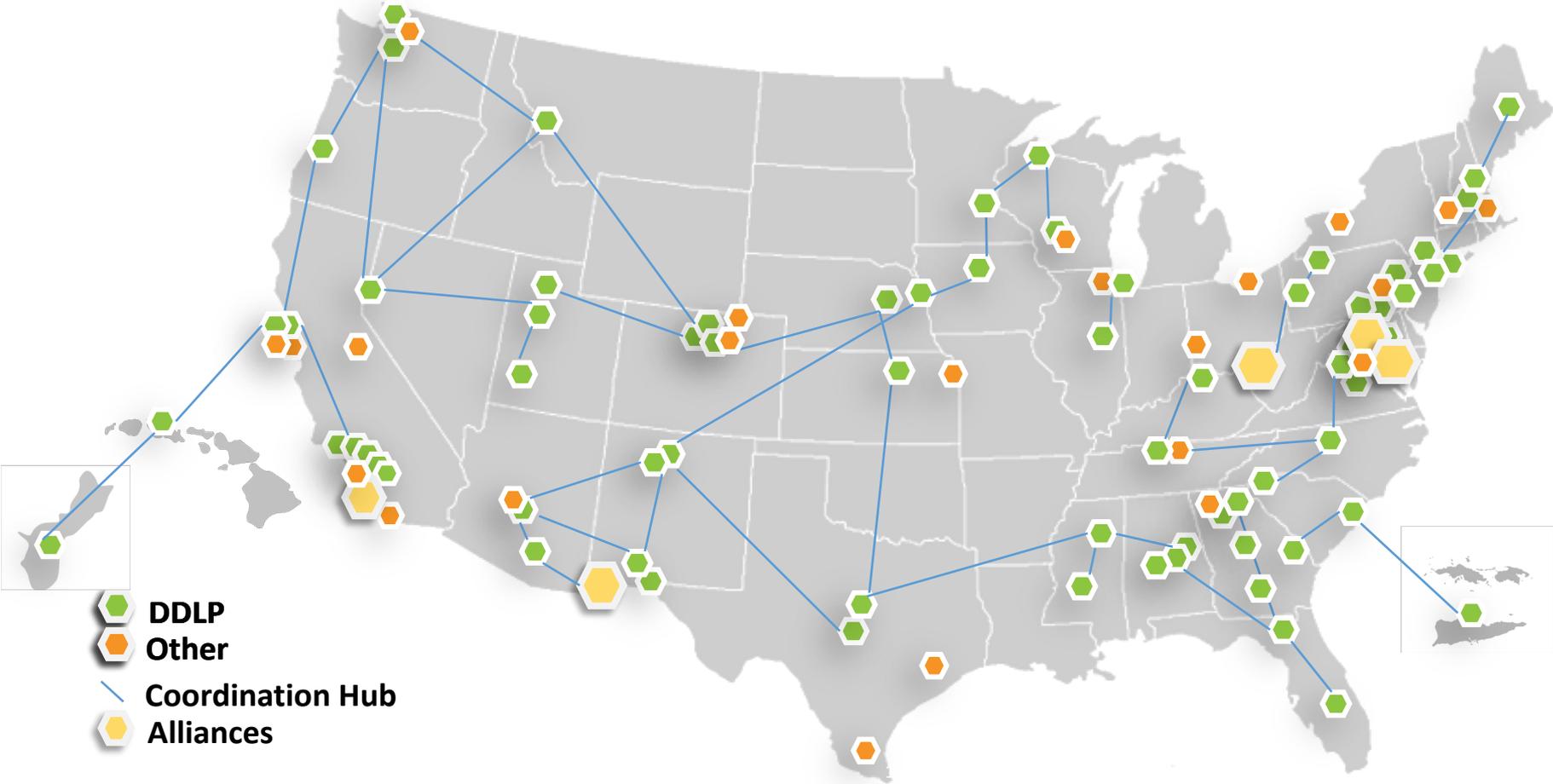
NATIONAL SCIENCE FOUNDATION
PREM
Partnership for Research and Education in Materials

*All awards for which information was collected were active as 1/23/2017
https://www.nsf.gov/about/budget/fy2017/pdf/10_fy2017.pdf

NSF INCLUDES: Broadening Participation in STEM



NSF INCLUDES National Network

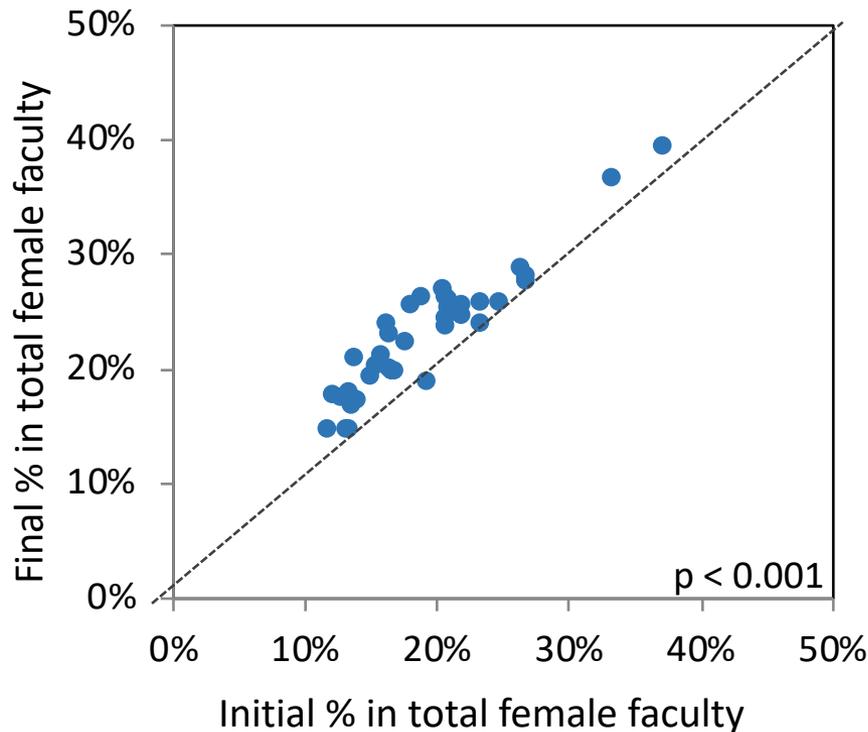


ADVANCE

Indicators of Long-Term Goal: A Successful & Diverse STEM Academic Workforce

From 2012 ADVANCE program evaluation (N=13 to 19) not published

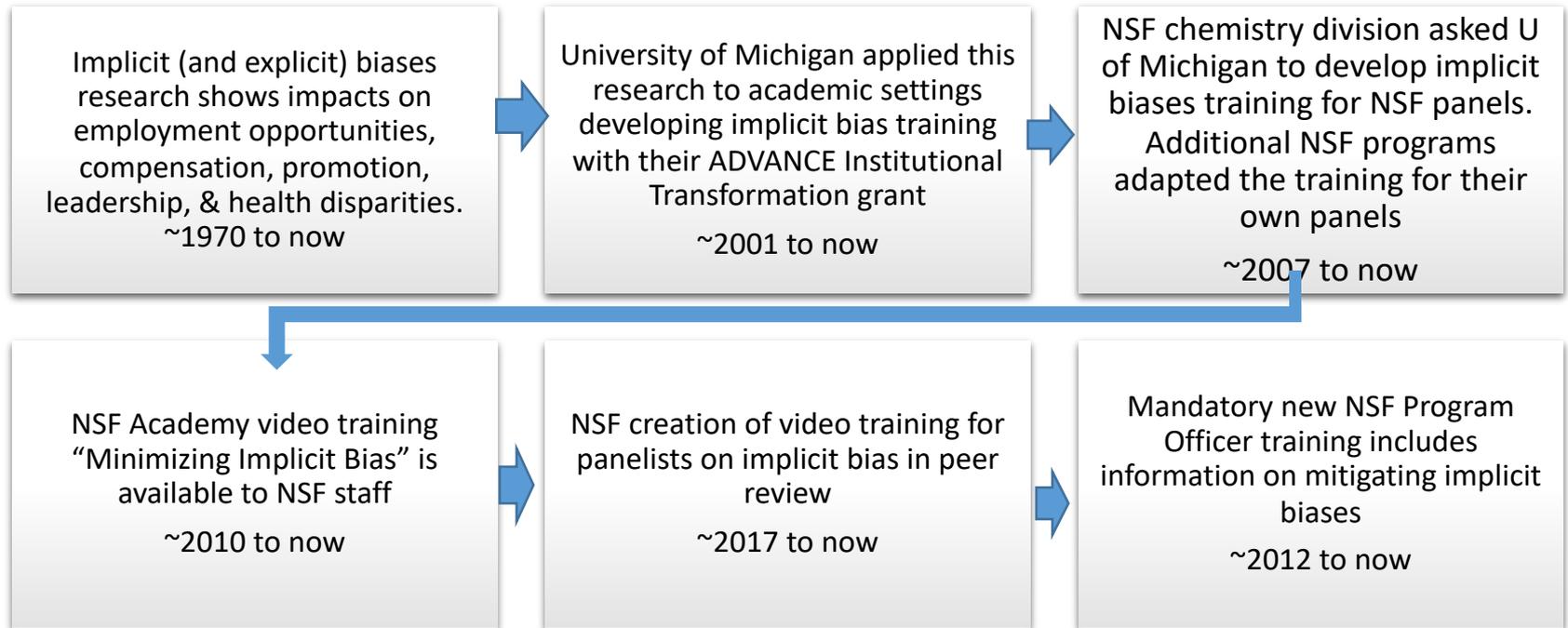
Percent Change in Women STEM Faculty



ADVANCE IT Institutions Cohorts 1-4 (n=41)
from NSF grantee reports

From 2001 to 2008	Accomplishment
Women STEM faculty	49% increase in women STEM faculty (from 16% to 24%)
Women of color STEM faculty	Increased from 2.4% to 3.8% of STEM faculty
STEM faculty hiring	40% increase in new women STEM hires (from 25% to 35%)
Women in leadership	64% increase in STEM women in leadership (from 10% to 16%)

Implicit Bias Research Informing NSF Practice



*Important Notes:

1. Awareness of one's own implicit biases is NOT enough to eliminate the impact of implicit biases in decision making – structures and policies around decision making need to be created to ensure mitigation of implicit bias influence.
2. "Implicit bias training" does NOT change an individual's implicit biases – rather it provided strategies and tools to mitigate the impact of implicit biases in decision making.

NSF Video contains...

(1) Tips on writing analytical reviews

(2) Broader Impacts

MERIT REVIEW CRITERIA

Assessing Broader Impacts:

- The potential for the proposed project to benefit society

Benefits may be:

- Inherent in the research
- Flow from activities that are directly related to the research project
- OR from activities that are supported by, but are complementary to, the main project

(3) How to mitigate cognitive biases

CONSTRUCTIVE FEEDBACK

Which review would you prefer to receive?

<p>This proposal describes:</p> <p>A long, boring summary of what is in the proposal which you already know because you wrote the proposal in the first place!</p> <p>Summary Rating: Good What? Why Good and not Excellent?!</p>	<p>This is a proposal to study X.</p> <p><u>Intellectual Merit</u></p> <p>Strengths: If the theory is proven true it will transform our understanding of the field.</p> <p>Weaknesses: The method proposed will not work because: ...</p> <p><u>Broader Impacts</u></p> <p>Strengths:</p> <p>Weaknesses:</p> <p><u>Summary:</u> Although the idea is exciting and the broader impacts would be large, the method is flawed so I can only rate the proposal as "Good"</p>
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BIAS IN ACADEMIA

Applications with the name "Jennifer" at the top were much less likely to be recommended than those attributed to "John."



The illustration shows two stacks of gold coins. The left stack has a pink pushpin on top, and the right stack has a blue pushpin on top. To the right of the coins is a stack of papers, with the top one being a resume for "John J. Jones". The resume has a section for "Experience" and "Technical" skills.

Interagency Policy Group on Increasing Diversity in the STEM Workforce



BEST PRACTICES identified with credible evidence include:

Analyses of mandated workforce data sets;

Implicit bias training;

Conflict resolution; and

Promoting work flexibility.

PROMISING PRACTICES are defined as those that are consistent with principles established by research but have not been the subject of evaluation. The following are particularly promising:

Diversity change agents;

Diversity toolkits;

Technical qualifications board; and

Proposal review experiments.

EMERGING PRACTICES include:

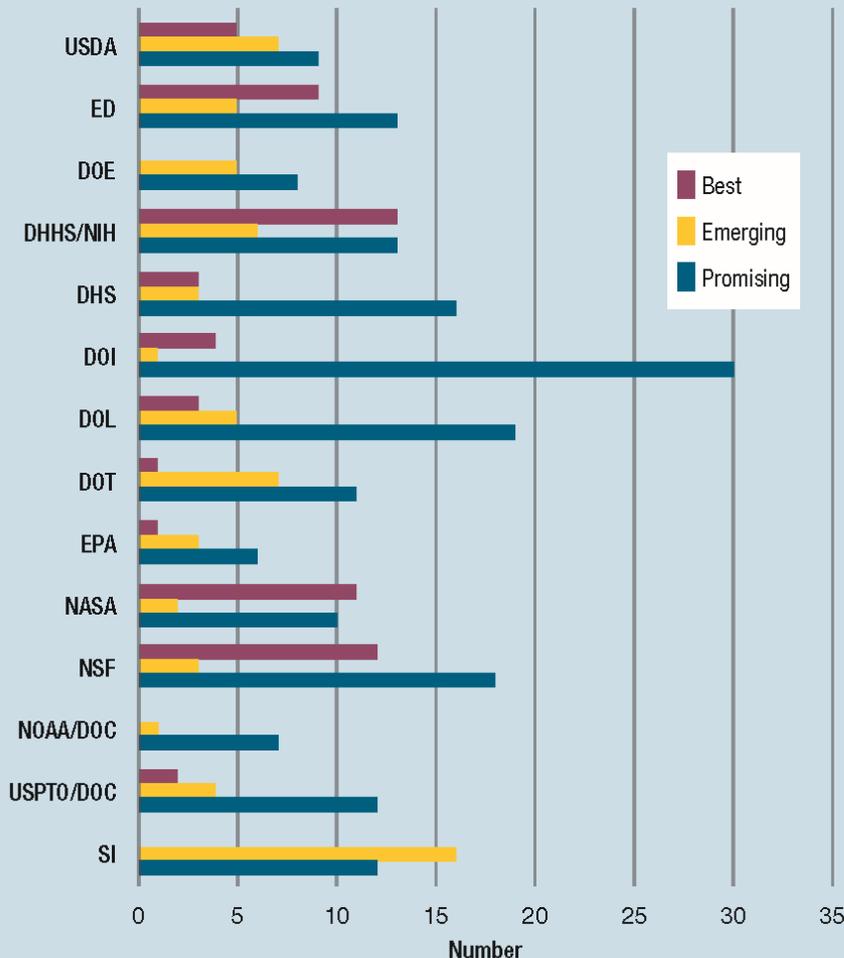
Unconscious bias training for search committees;

Special training for the entire workforce;

Hiring and promotions safeguard

Best, Promising, and Emerging Practices to Reduce the Impact of Bias in the Federal STEM Workforce

Number of Agency Efforts Reported



BEST PRACTICES identified with credible evidence include:

- » Analyses of mandated workforce data sets;
- » Implicit bias training;
- » Conflict resolution; and
- » Promoting work flexibility.

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- » Diversity change agents;
- » Diversity toolkits;
- » Technical qualifications board; and
- » Proposal review experiments.

EMERGING PRACTICES include:

- » Unconscious bias training for search committees;
- » Special training for the entire workforce;
- » Hiring and promotions safeguard pilots; and
- » New inclusive workforce tools.

In the Federal STEM Workforce

Recommendation 1: Each Federal agency should exercise leadership at all levels, including senior officials, STEM program and administration managers, human capital officials, and diversity and inclusion officials, to reduce the impact of bias in their internal operations, including:

- Incorporating diversity and inclusion objectives in the strategic plan;
- Implementing recruiting, hiring and promotion practices that encourage diversity and inclusion; and
- Establishing bias-mitigation goals, techniques, and accountability mechanisms.

Conclusions

- Guiding principles
 - Diversity strengthens the STEM enterprise
 - Preparation and advancement of all US talent is essential to US STEM leadership
 - Diversity and inclusion are central all organization's missions and business cases
 - Groups traditionally underrepresented and underserved are a reservoir of untapped creativity, diversity of thought and engines of innovation
- Mitigating biases/assumptions
 - Raise awareness and motivation to change
 - Provide strategies and tools
 - Empower and set expectations for positive outcomes
 - Increase commitment to reduce bias
- Take action today!

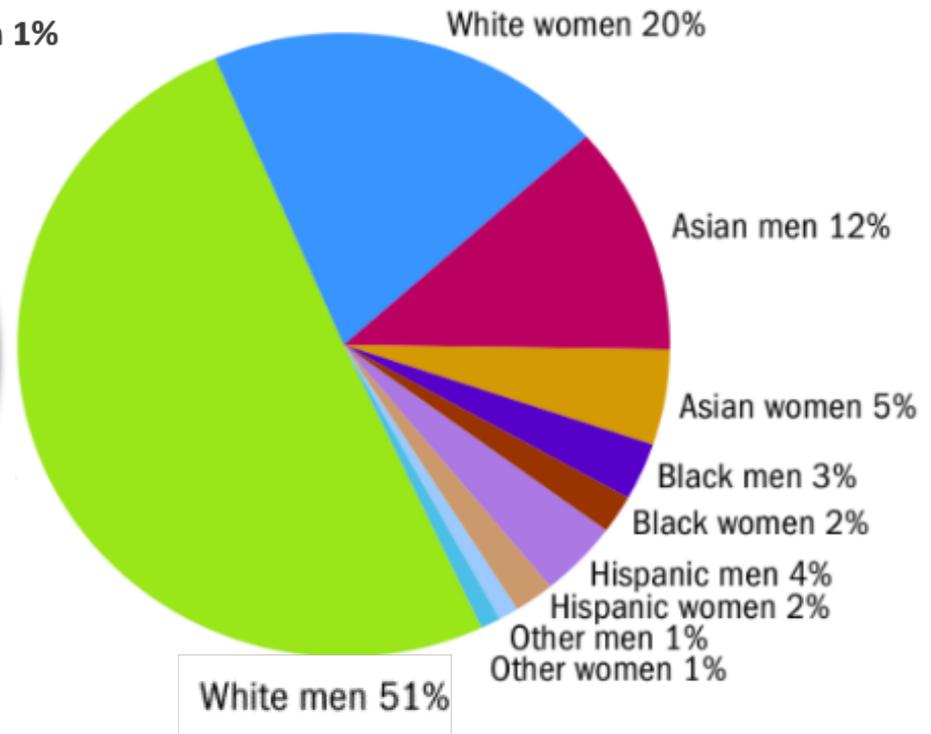
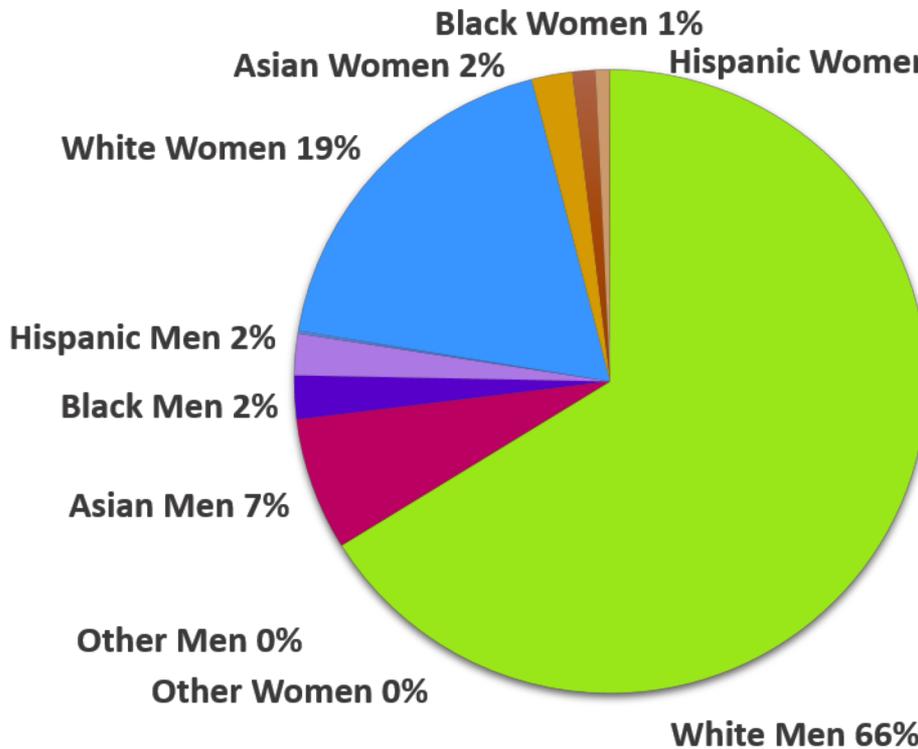
Thanks!

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Employed scientists and engineers, by sex and race/ethnicity: 1993 and 2013

1993

2013



SOURCE: National Science Foundation, National Center for Science and Engineering Statistics

Cognitive Biases

ANCHORING BIAS

Relying too heavily on one piece of information or an initial impression (the anchor) and neglecting subsequent information.

"I enjoyed that well-written introduction. Therefore, I am less bothered than I should be by the subsequent sketchy methodological section."



HALO EFFECT

The tendency to apply an overall impression of a person to specific traits.

Also, extending a positive or negative trait to other parts of personality.



THE LIMITS OF INFORMATION PROCESSING

Most cognitive processing is *unconscious*.



SOCIAL STEREOTYPE BIASES



BIAS AT WORK



Cohen, J., & Preuss, C. (2015). Confronting Inequality: The Impact of Work-Related Practices on Financial Markets. *The American Economic Review*, 105(1), 718-741.

HELPFUL HINTS

HELPFUL HINTS

1. Do not over-rely on your initial impressions.
2. Remember why you are looking at the data and what you are trying to achieve.
3. Do not let your initial impressions influence your decisions.
4. Do not let your initial impressions influence your decisions.
5. Do not let your initial impressions influence your decisions.
6. Do not let your initial impressions influence your decisions.
7. Do not let your initial impressions influence your decisions.
8. Do not let your initial impressions influence your decisions.
9. Do not let your initial impressions influence your decisions.
10. Do not let your initial impressions influence your decisions.

www.melgocollia.com/



BIAS IN LANGUAGE

A giraffe can go without drinking water longer than a camel can.



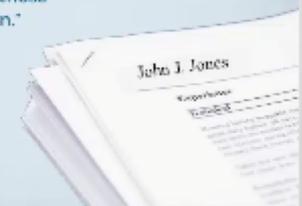
CONFIRMATION BIAS

Thoughtful reviewers remain open to the idea of testing alternative theories to those they support themselves.

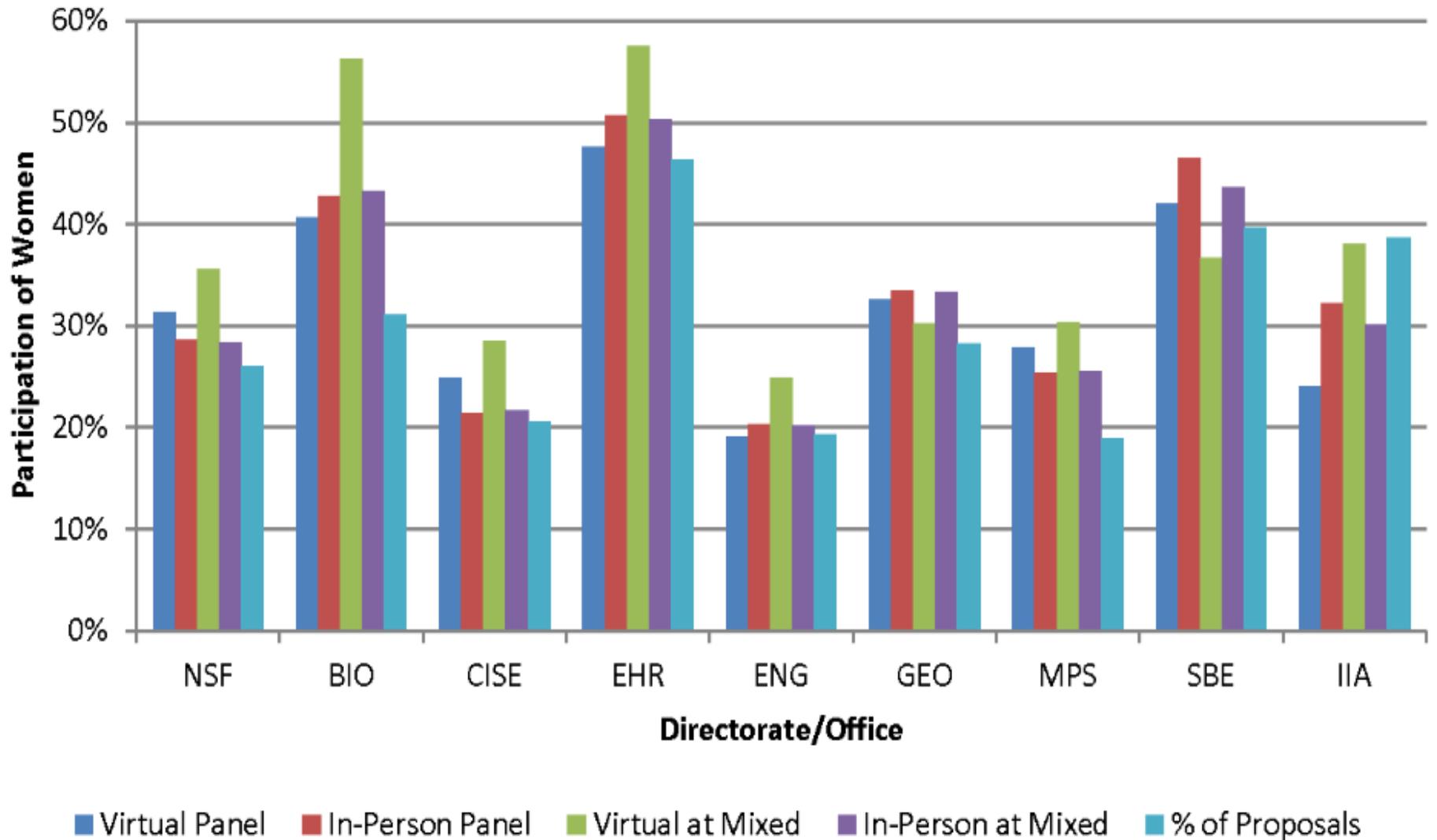


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Participation of Female Reviewers in Virtual, In Person, and Mixed Panels FY 2014



Source: NSF Enterprise Information System, 3/15/15.

In Federally Funded Institutions of Higher Education

Recommendation 2: Each Federal agency incorporate bias-mitigation strategies into its proposal review process and offer technical assistance to grantee institutions to implement bias-mitigation strategies, including:

- Achieving fairness and quality in the STEM endeavor;
- Collecting and analyzing data on the entire cycle of the grant making process to analyze success rates across groups; and
- Providing information about methods to reduce bias.

Cross-cutting Government-wide Leadership

- **Recommendation 3:** The Federal Government, through OSTP, OPM, and the Department of Justice (DOJ), should exercise leadership to reduce the impact of bias in the Federal STEM workforce and federally funded institutions by:
 - Serving as focal points and clearinghouses for bias-reduction strategies for both Federal agencies and federally funded institutions;
 - Coordinating civil rights compliance efforts;
 - Enhancing the capacity for Government-wide performance and accountability for efforts to mitigate explicit and implicit bias through validated measurement tools;
 - Spurring greater strategic coordination, collaboration, and impact of successful programs aimed at reducing bias and increasing diversity in federally funded institutions; and
 - Strengthening university--community partnerships to mitigate bias and increase access to pathways to Federal STEM employment.

New Merit Review Pilot: *Reviewer Orientation*

- Complaints/Confusion/Data
 - Variable quality of reviews – noted in COVs and in comments from PIs
 - Confusion about Broader Impacts – noted in COVs and in discussion with Advisory Committees
 - Data about differences in success rates – graphs put in every NSF Annual Merit Review Report
- What we will do
 - Move reviewer orientation up a few weeks – before they read proposals and write reviews
 - And use a standardized format for everyone