The Science of Broadening Participation: Women in Science, Education and the Workforce

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Workshop on Broadening Participation of Women in Science and Education Fields and the Workforce

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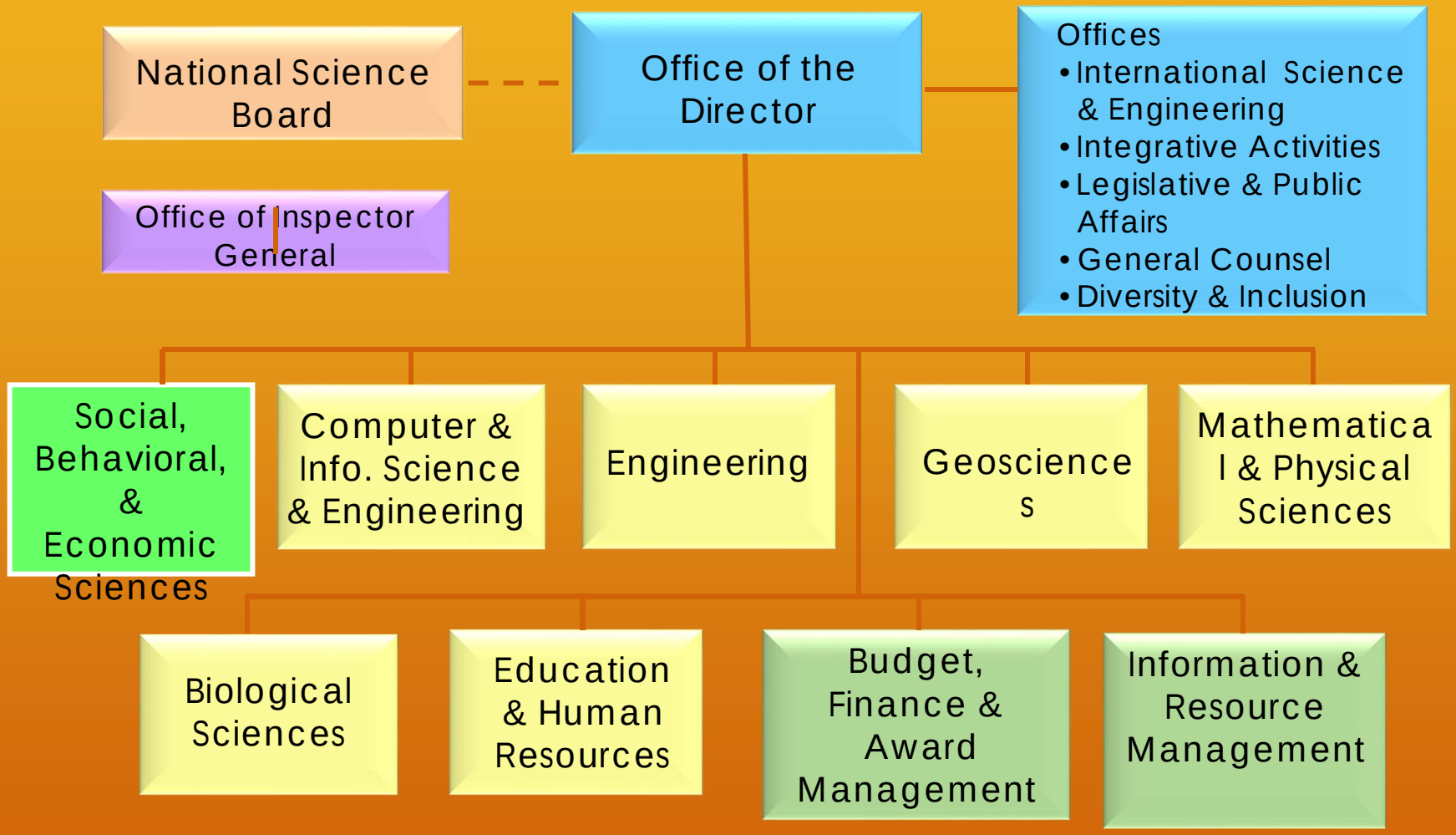
Outline of remarks

- U.S. National Science Foundation
- Women's rates of participation in STEM
- SBE sciences and use-inspired research
- Science of Broadening Participation
  - Research
  - Activities
  - Findings

U.S. National Science Foundation



SBE's Core Programs

SBE Office of Multidisciplinary Activities (SMA)

- Science of Science and Innovation Policy
- Research Experiences for Undergraduates Sites
- SBE Postdoctoral Research Fellowships
- Science of Learning
- Interdisciplinary Behavioral and Social Science Research

Behavioral and Cognitive Sciences (BCS)

- Cognitive Neuroscience
- Perception, Action and Cognition
- Developmental and Learning Sciences
- Social Psychology
- Geography and Spatial Sciences
- Archaeology and Archaeometry
- Biological Anthropology
- Cultural Anthropology
- Linguistics
- Documenting Endangered Languages

Social and Economic Sciences (SES)

- Economics
- Political Science
- Sociology
- Law and Social Sciences
- Decision, Risk and Management Sciences
- Science of Organizations
- Science, Technology and Society
- Methodology, Measurement and Statistics

National Center for Science and Engineering Statistics (NCSES)

- Human Resources Statistics Program
- Research and Development Statistics Program
- Science and Engineering Indicators Program
- Information and Technology Services Program
- Research on the Science and Technology Enterprise: Statistics and Surveys

U.S. Women continue to be underrepresented in some STEM fields

- Engineering
- Computer Science
- Mathematics
- Physics
- Economics

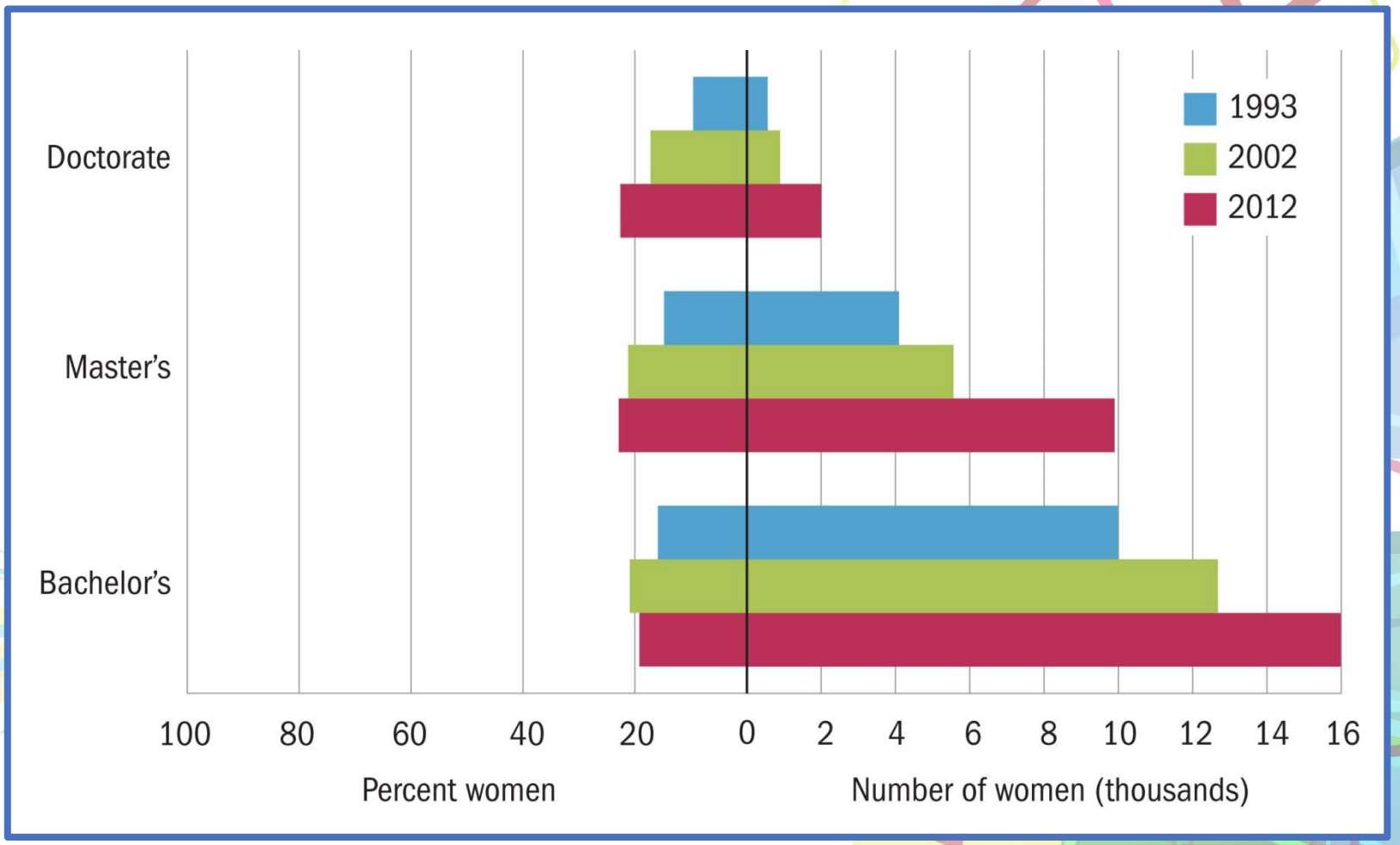
SBE's NCSES

http://www.nsf.gov/statistics/index.cfm

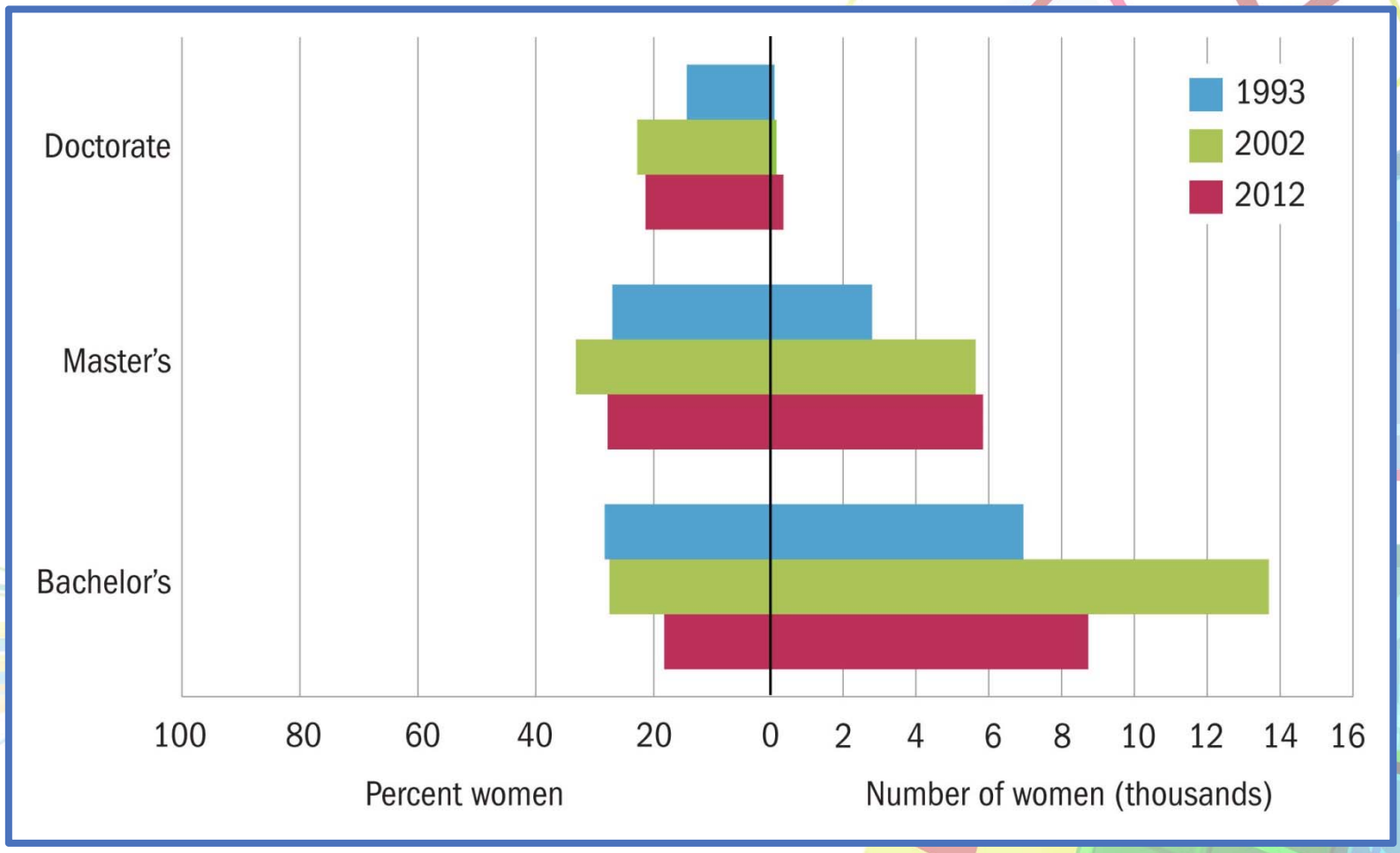
The National Center for Science and Engineering Statistics (NCSES) is the nation's leading provider of statistical data on the U.S. science and engineering enterprise.

NCSES

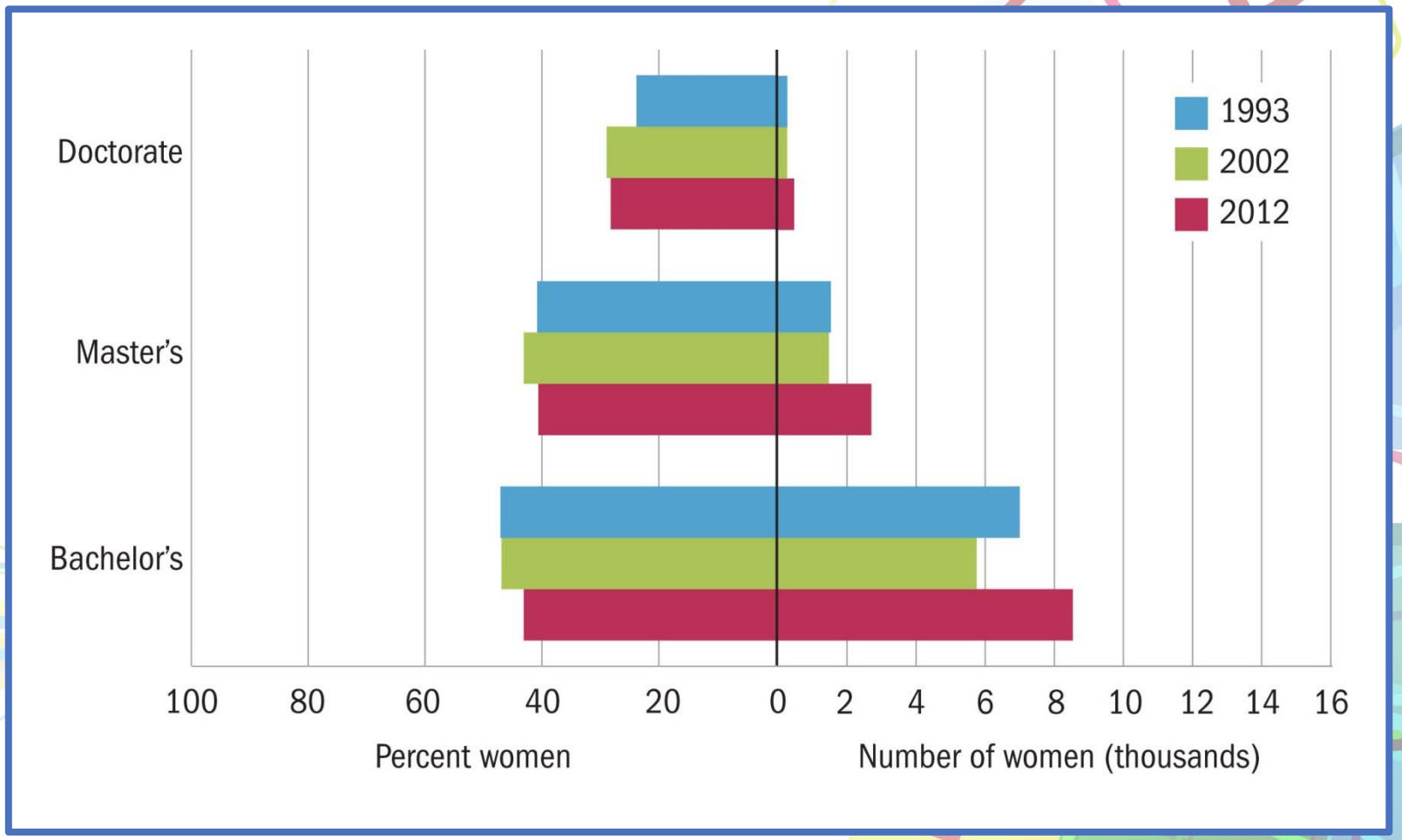
Low participation field for women: Engineering, 1993, 2002, 2012



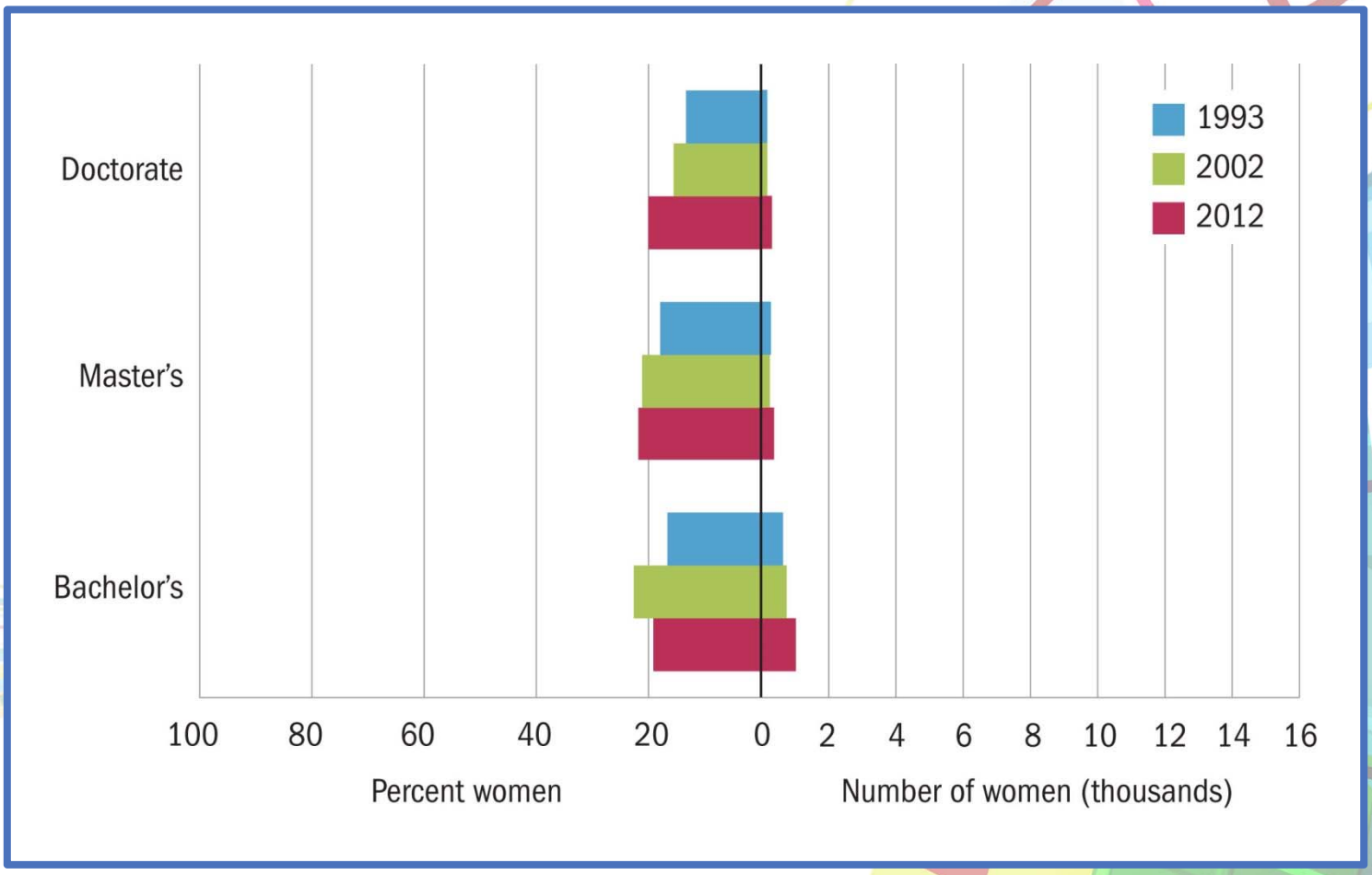
Low participation field for women: Computer sciences, 1993, 2002, 2012



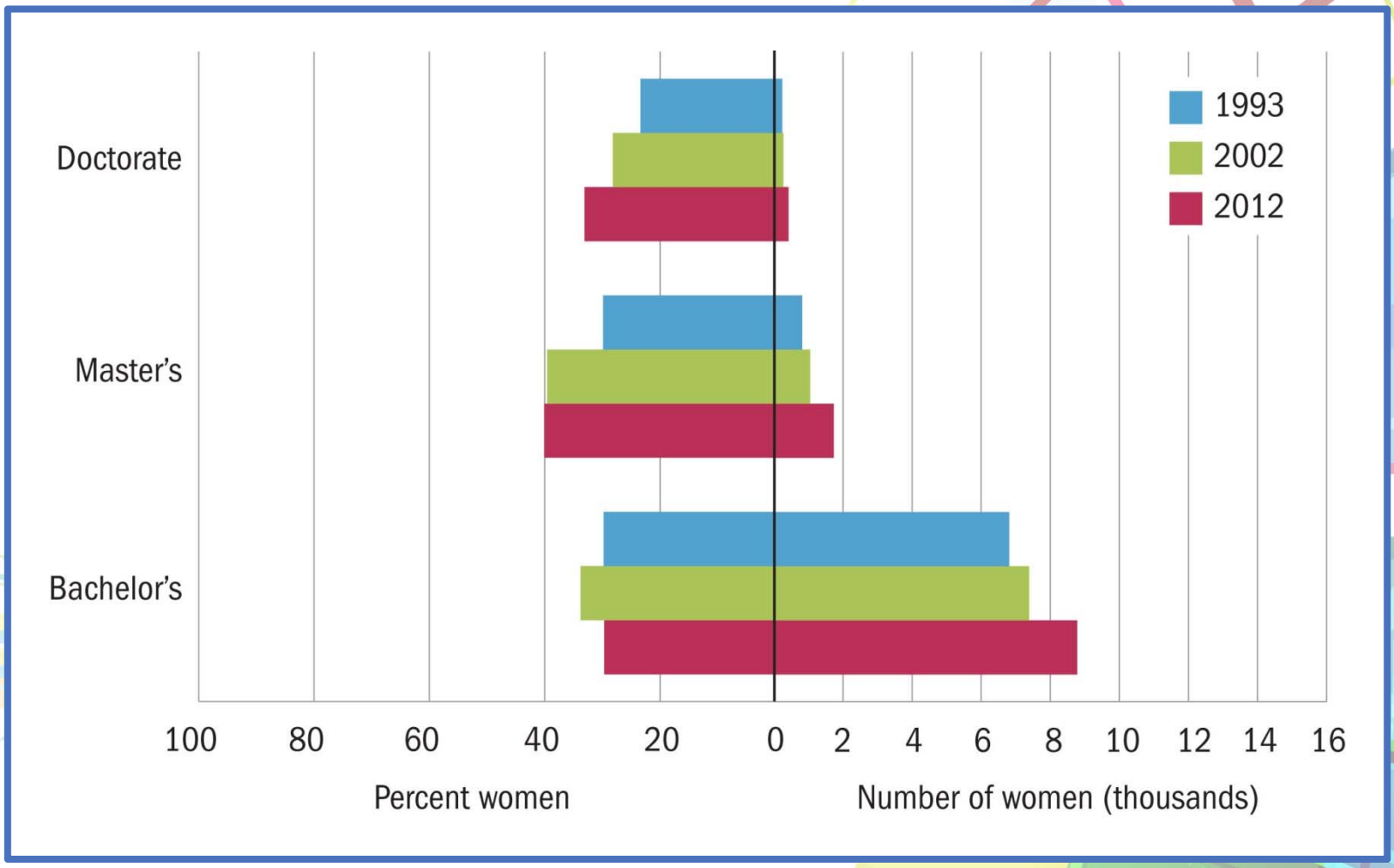
Low participation field for women: Mathematics and statistics, 1993, 2002, 2012



Low participation field for women: Physics, 1993, 2002, 2012

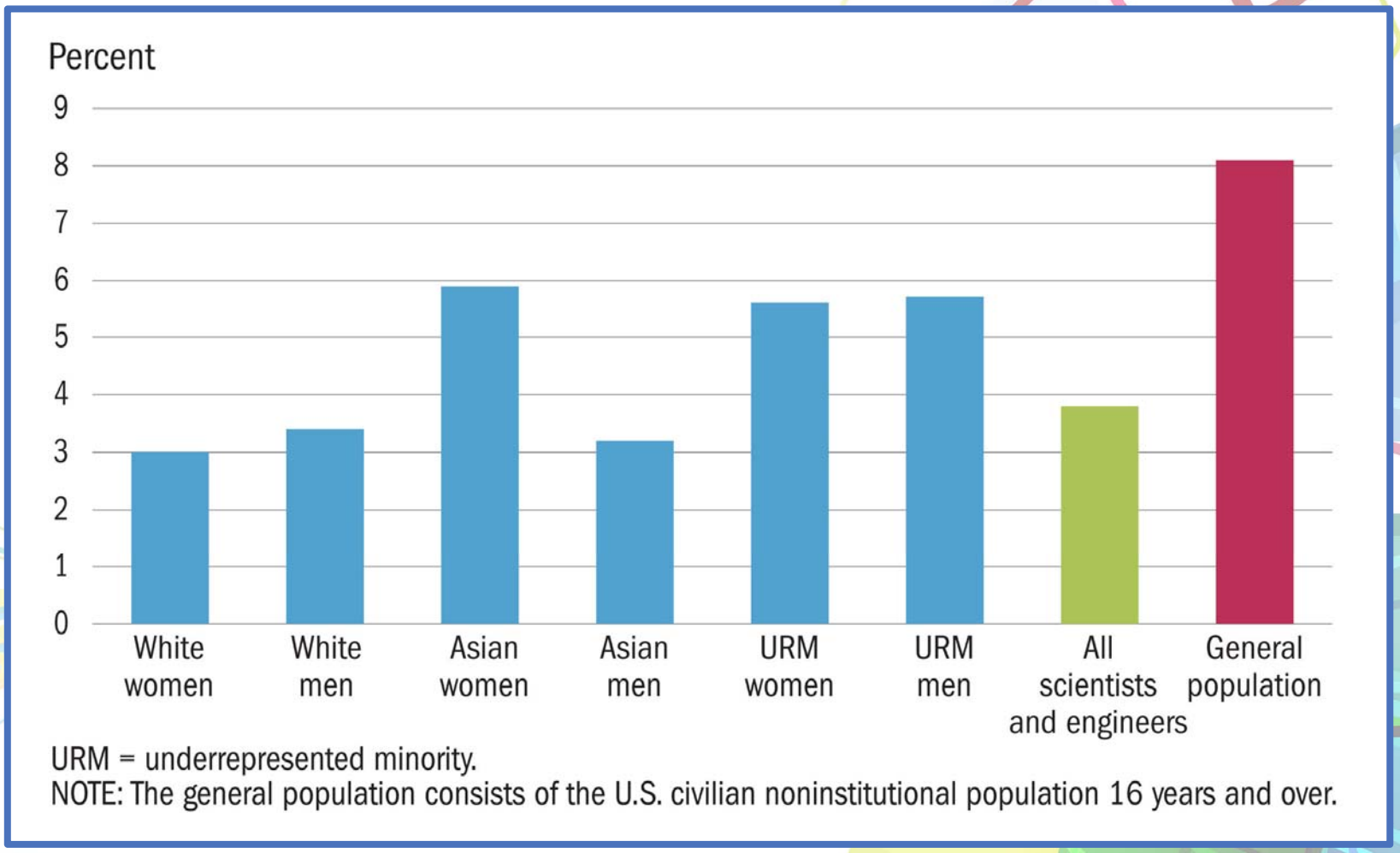


Low participation field for women: Economics, 1993, 2002, 2012



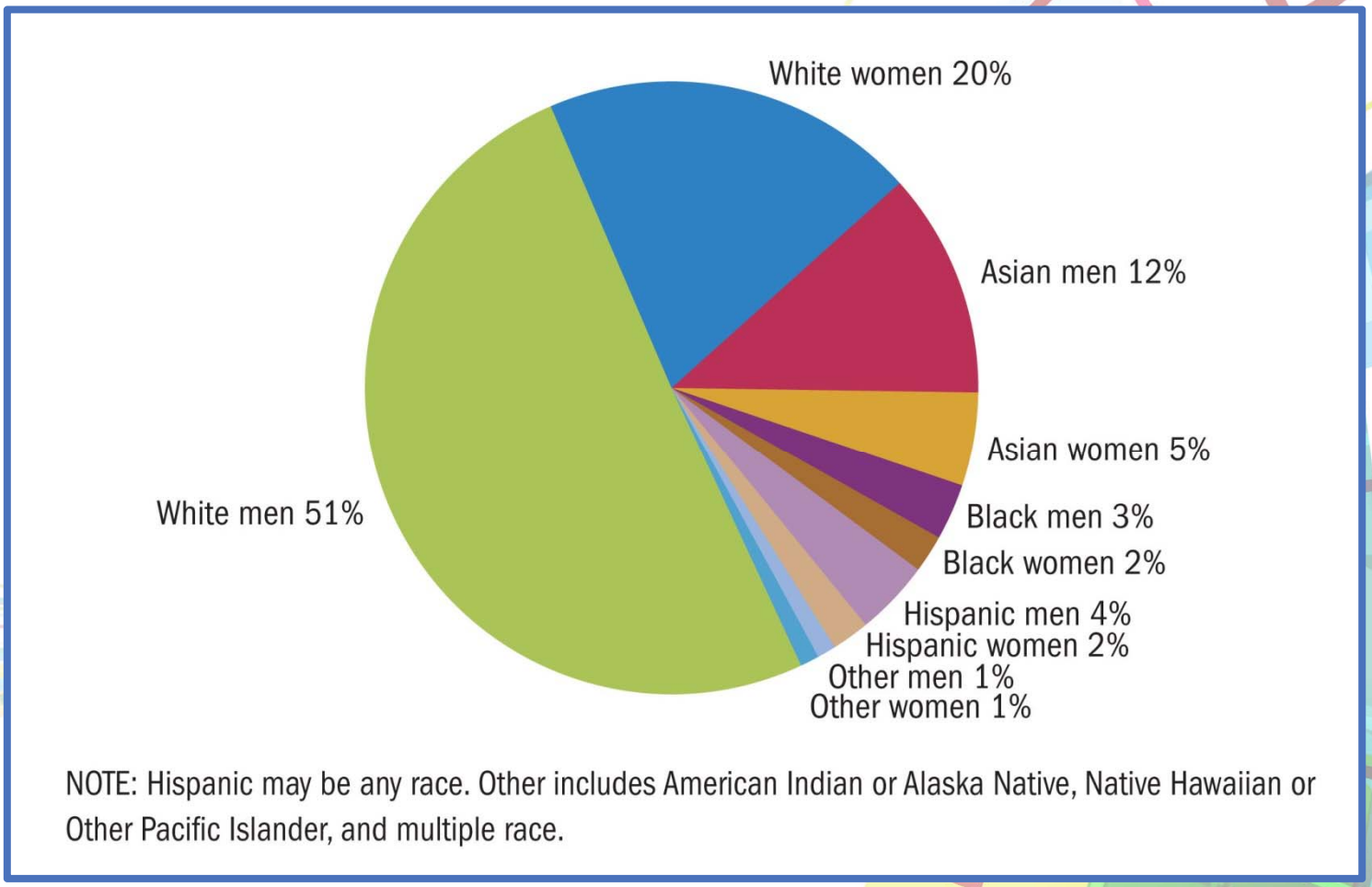
There are practical reasons to encourage participation in the STEM workforce!

Unemployment rates among scientists and engineers: 2013



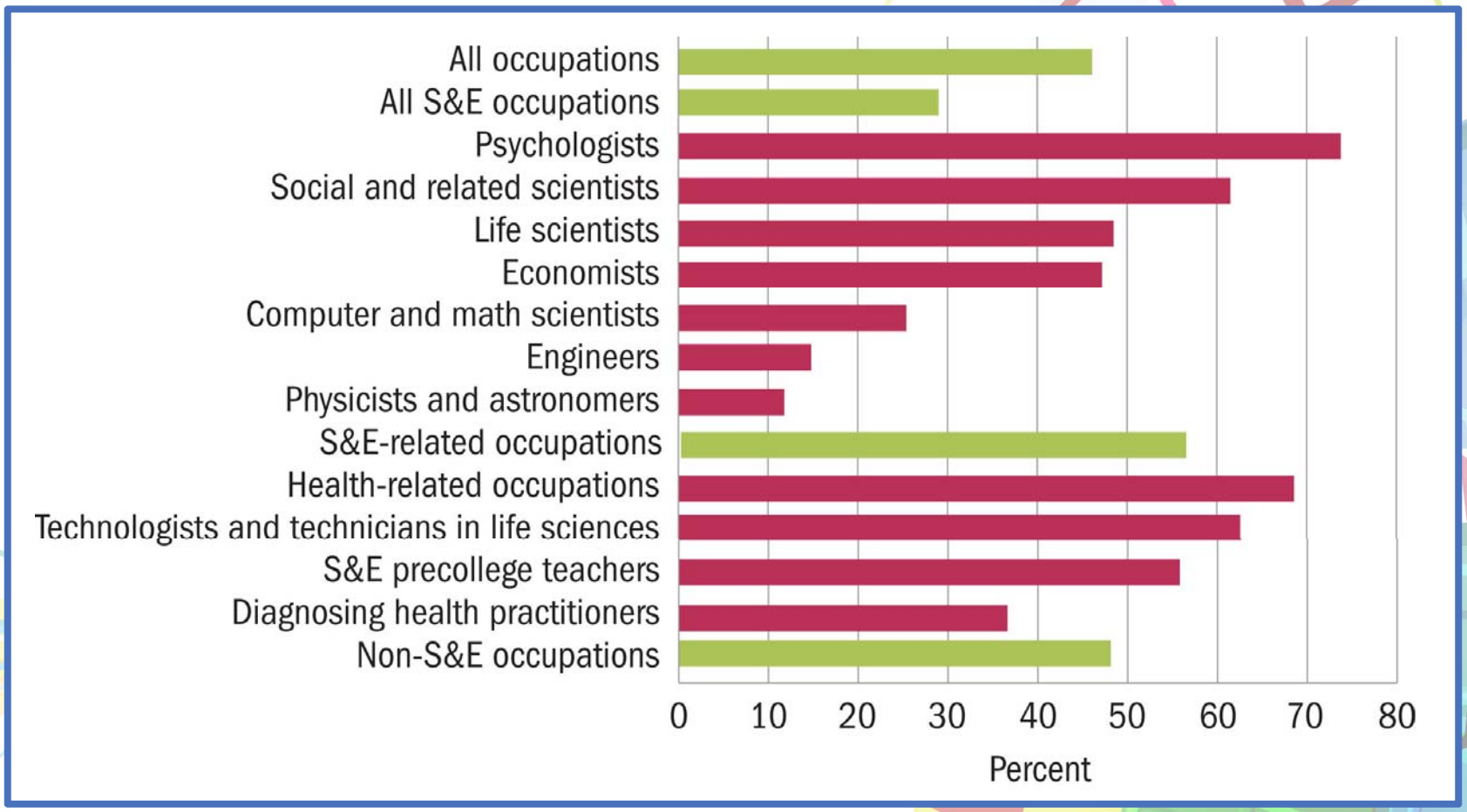
URM = underrepresented minority.
NOTE: The general population consists of the U.S. civilian noninstitutional population 16 years and over.

Scientists and engineers working in science and engineering occupations: 2013

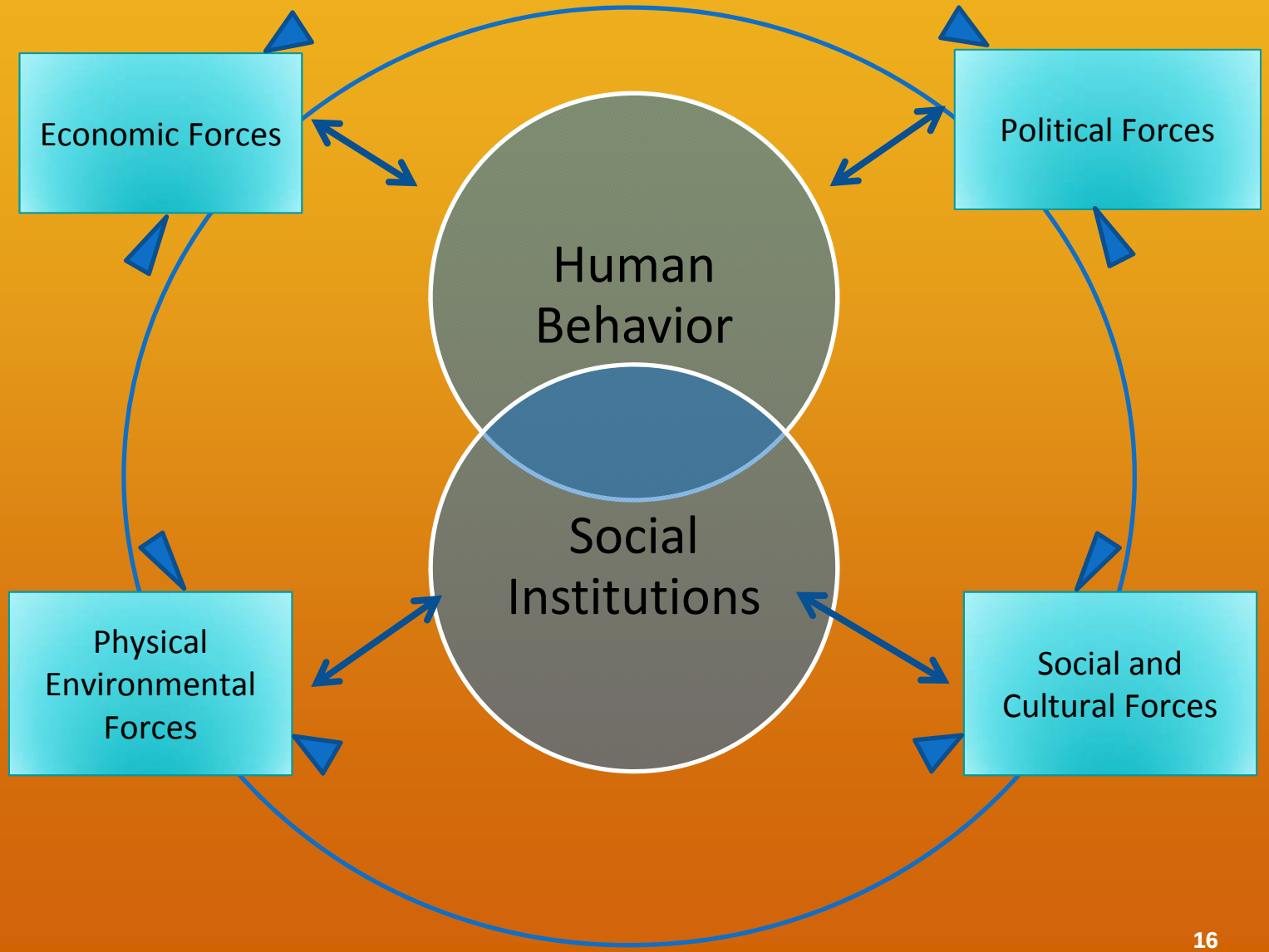


NOTE: Hispanic may be any race. Other includes American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and multiple race.

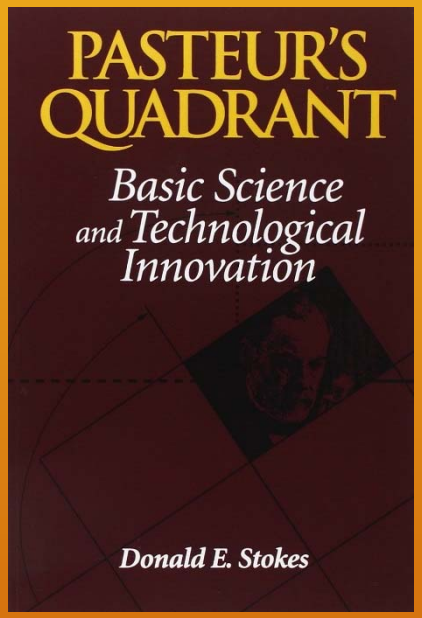
Employed women within the science and engineering workforce as a percentage of selected occupations: 2013



SBE in a Nutshell: A Heuristic Framework



Basic and Applied Research: Pasteur's Quadrant



Brookings Institution Press, 1997

Quest for fundamental understanding?	Consideration of use? No	Consideration of use? Yes
Yes	Pure basic research (Bohr)	Use-inspired basic research (Pasteur)
No		Pure applied research (Edison)

What does the SBP look like?

- Informed by and building on to existing social and behavioral science theories.
- Inherently interdisciplinary.
- Methodologically rigorous incorporating research that employs a variety of empirical approaches and methods.
- Potentially transformative (i.e., disrupt existing paradigms).


ARE STEREOTYPES
KEEPING WOMEN AWAY
FROM SCIENCE?

Examples of SBE Questions that can be addressed through SBP

- What are the underlying psychological and social issues affecting different participation and graduation rates in STEM?
- Under what conditions do behavioral, economic, and socio-legal factors influence recruitment and retention in STEM?
- What aspects of learning environments and workplace culture moderate the factors impacting STEM participation?
- What theoretical approaches predict success in ensuring that young people from underrepresented groups do not lose interest in STEM during adolescence?
- What are the impacts of a diverse STEM workforce on scientific productivity, innovation, and the economy?

Research Examples from the SBP

- Implicit Bias (Moss-Racusina, Dovidio, Brescollc, Graham & Handelsman, 2012).

- Stereotype threat (Steele & Aronson, 1995; Maass, 2008; Osborne, 2007).
- Assertiveness training does not improve women's ability to negotiate (Babcock, 2003, 2005, 2007).
- Diversity training does not lead to greater diversity in senior management (Dobbin, F. et al. 2010 ASR).
- Letters of recommendation disadvantage women (Trix & Psenka (2003); Madera, Hebl & Martin (2009); Schmader, Whitehead, Wysocki, (2007)).

NSF's Science of Broadening Participation Activity (SBP)

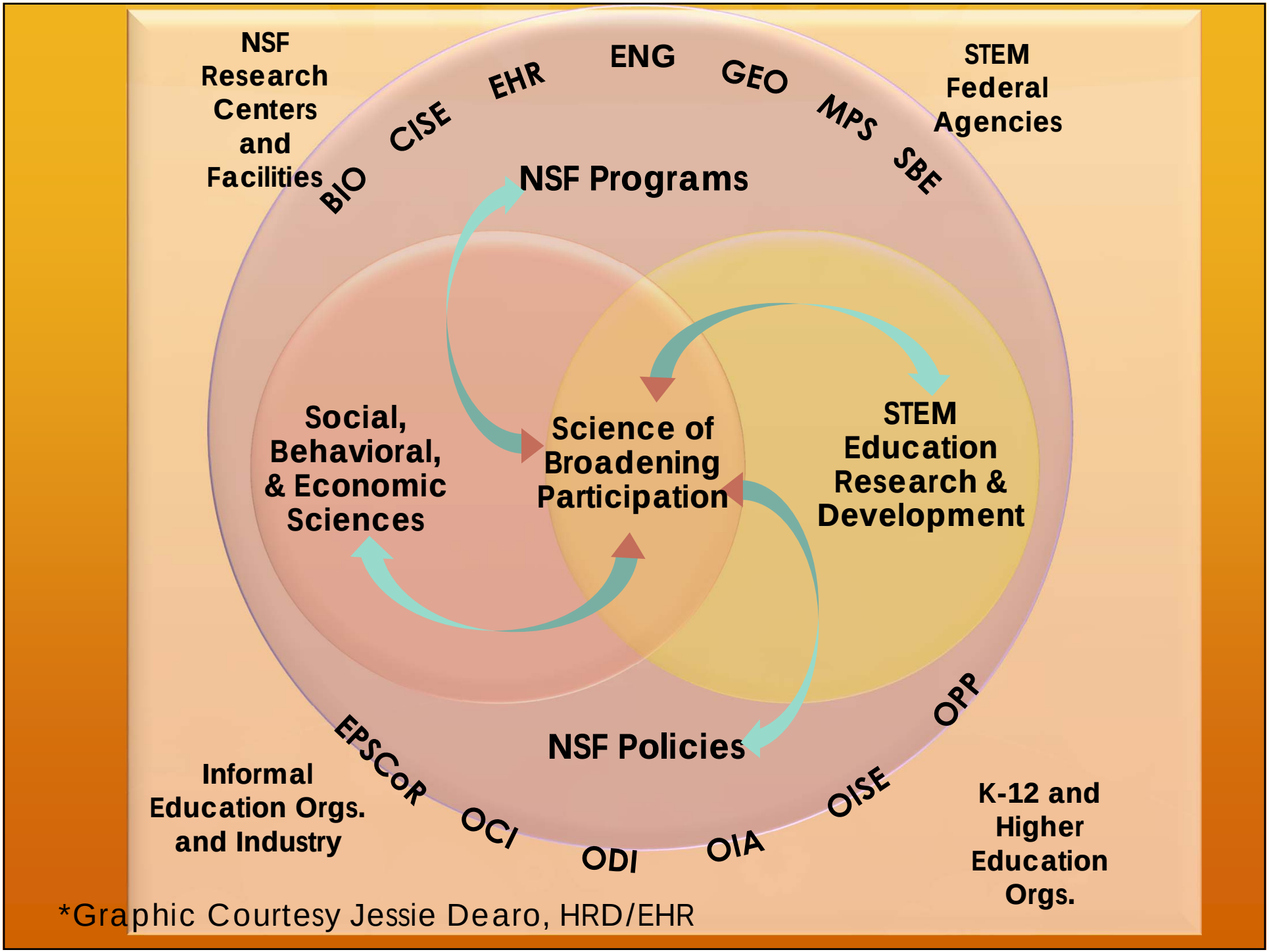
- Builds the scientific foundation and research evidence base for future programmatic efforts to expand participation in STEM.
- Includes the social sciences and education research fields.
- Provides opportunities for collaboration between SBE researchers with others engaged in the actual science of broadening participation.

The Science of Broadening Participation Reveals

- Issues of access, inclusion and retention by documenting the inequitable distribution of educational and economic opportunities.
- Information at all levels of analysis of behavior including the individual, group and societal.
- Provides an impetus for collaboration between SBE scientists and those in the natural and physical sciences engaged BP efforts.
- What works and what doesn't work to reduce disparity in STEM participation.

Activities and Timelines

- SBE's DCL to research communities for proposals on SBP - FY 2011 ($1M).
- SBE's DCL to research communities for proposals on SBP - FY 2012 ($1M).
- SBE & EHR DCL to research communities for proposals on SBP and BPR investments - FY 2013 (>$1M).
- FY 2014 : SBP Foundation-wide activity
- FY 2015 : NSF DCL 15-066 – SBE & EHR



*Graphic Courtesy Jessie Dearo, HRD/EHR

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