

Women in STEM

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Overview

- * Background on women in STEM.
Why the conversation?
- * Factors that impact women's participation in STEM
- * Ways to change the situation

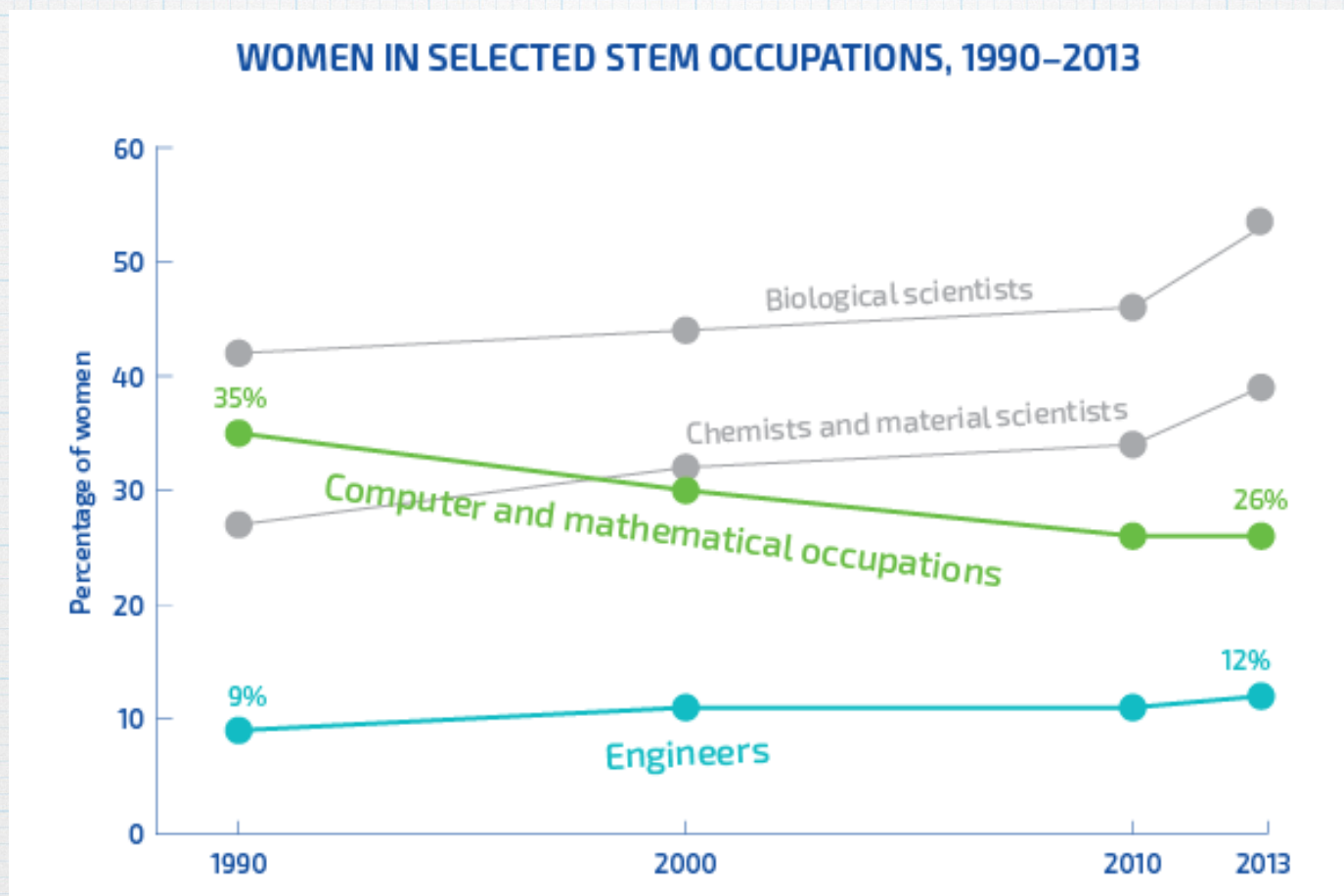
Background: My role

- * NSF ADVANCE: National Science Foundation program focused on women STEM professors
- * Women in Engineering: College of Engineering program focused on graduate students.

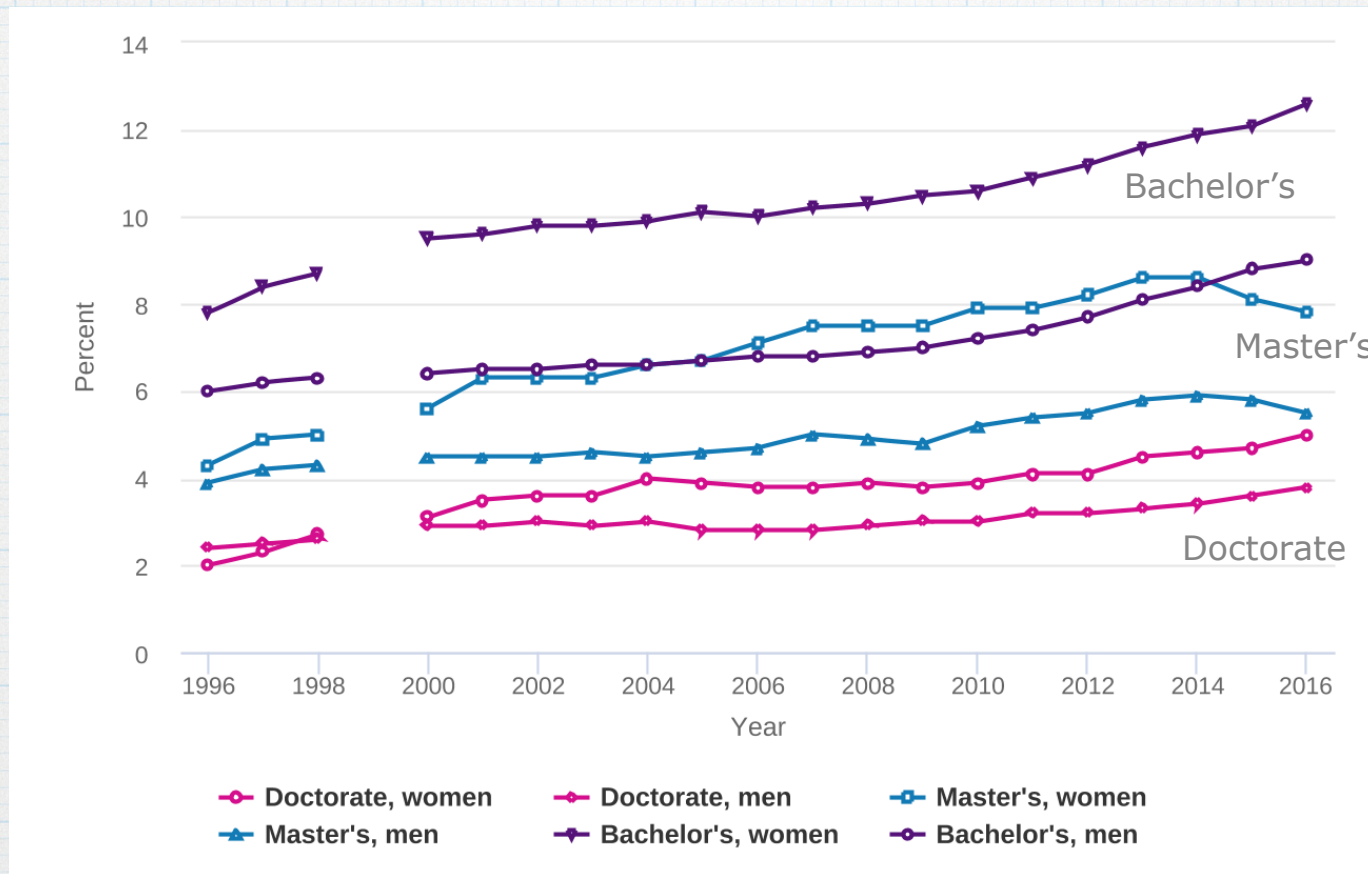


Some fun pictures from
grad school at UCSB

Women in STEM



Historically underrepresented groups in STEM



Includes black or African American, Hispanic or Latino, and American Indian or Alaska Native. Data are for U.S. citizens and permanent residents only.

nces.nsf.gov/pubs/nsf19304/digest/field-of-degree-women-men-and-racial-and-ethnic-groups



Women in Science,
Technology,
Engineering,
and Mathematics

It's a good question, but the answer is complicated. There are a lot of factors.

www.aauw.org/research/why-so-few/

Outright sexism

- * The scientific world has historically been predominately male. Certain attitudes and norms became acceptable and persist today.
- * For example—

Incivility & Harassment



Sign created by Dr. Jen Golbeck, U. Maryland

"Let me tell you about my trouble with girls. Three things happen when they are in the lab: You fall in love with them, they fall in love with you, and when you criticize them they cry."

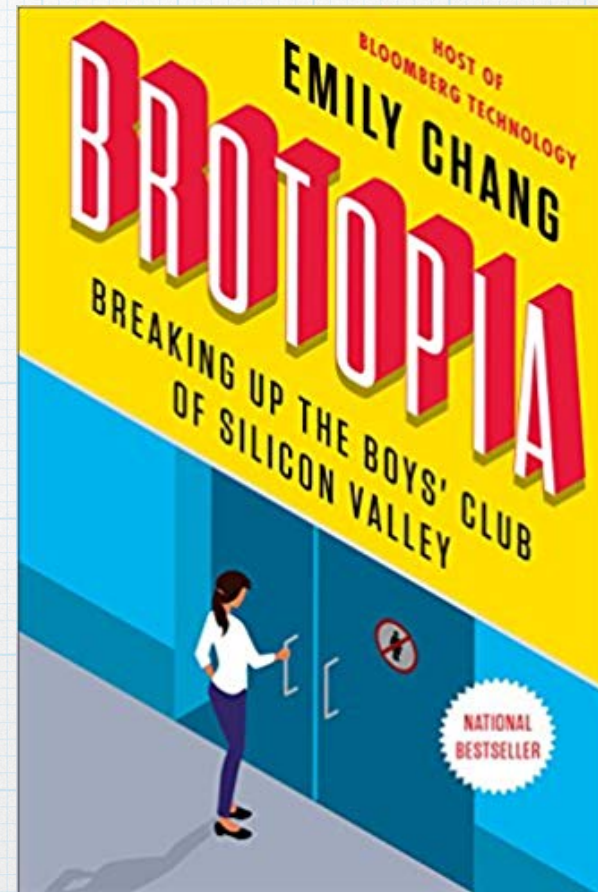
-- Biochemist Tim Hunt



Booth Babes (replaced with "fitness models") at tech conferences

www.networkworld.com/article/2226167/testing-the-effectiveness-of-booth-babes.html

Silicon Valley culture



SELECTION COMMITTEE

All-Male Panels

Selection Committee for the Breakthrough Prize in Fundamental Physics and the New Horizons Prize in Fundamental Physics:



Nima Arkani-Hamed



Alan Guth



Alexei Kitaev



Juan Maldacena



Alexander Polyakov



Nathan Seiberg



Kip S. Thorne



Rainer Weiss



David N. Spergel



Lyn Evans



Joseph Incandela



Maxim Kontsevich



Arthur McDonald



Adam Riess



Ashoke Sen



Cumrun Vafa



Edward Witten



Charles L. Bennett



Michael B. Green



Takaaki Kajita



Andrei Linde



Saul Perlmutter



John H. Schwarz



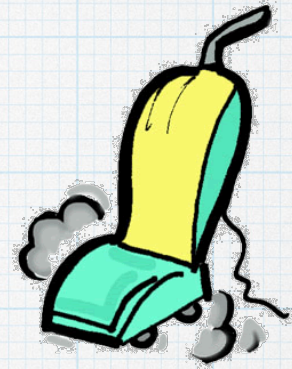
Andrew Strominger

ng

age Jr.



Social Pressures



- * Some things are changing, but society still encourages girls to feel responsible for housework and childrearing
- * Hedy Lamarr selling war bonds
- * Different "standards of beauty"



Social Pressures

- * Imposter Syndrome--feeling like you don't belong, despite plenty of evidence to the contrary
- * Stereotype threat--the stress associated with the fear that you might confirm a negative stereotype about your group (e.g., women in math). Has been shown to lead to lower performance on tests.

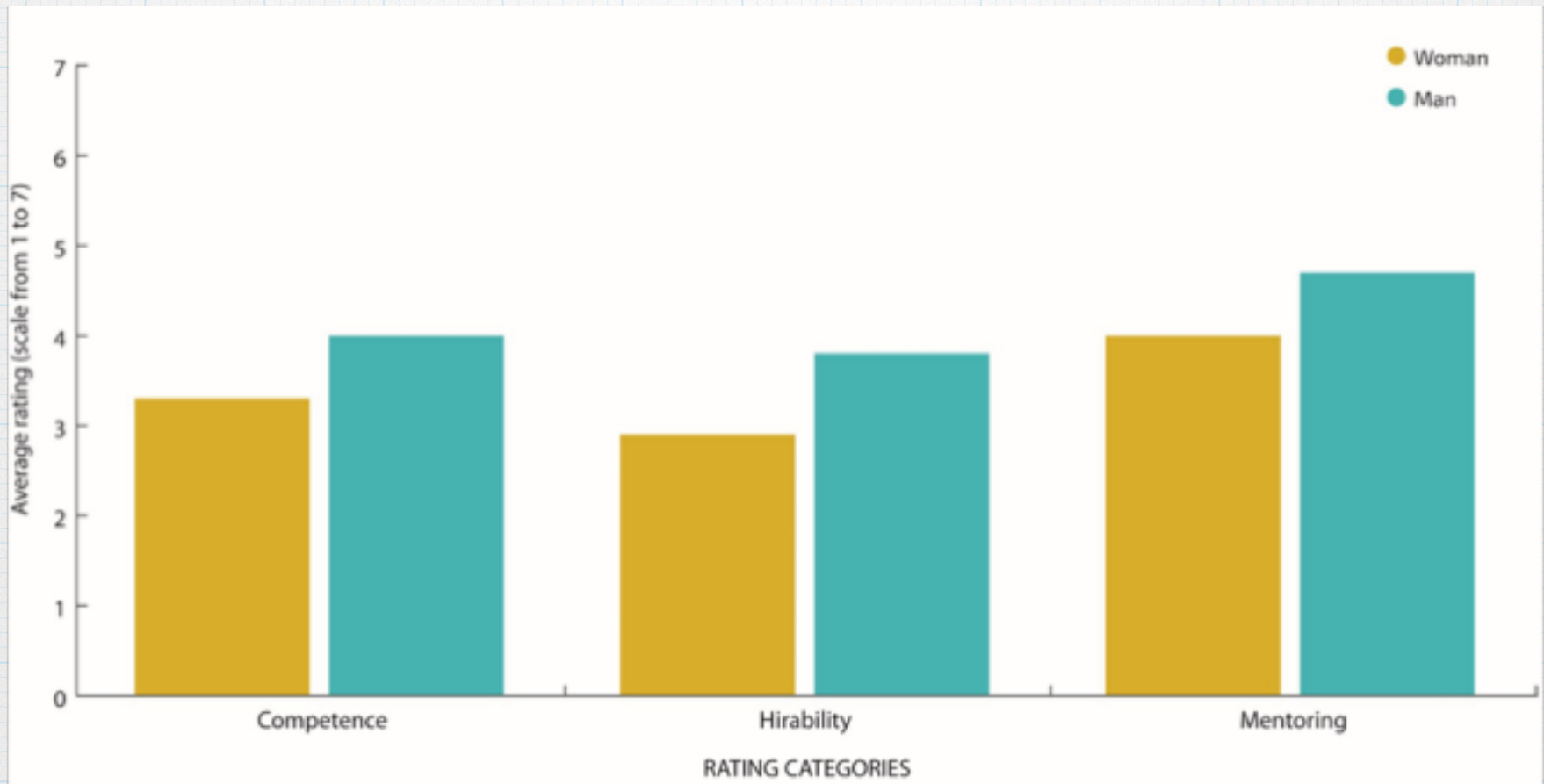
Issues facing the U.S. (scientific) workforce

- * Lack of infrastructure to support families
- * Long work hours, professional travel → stress on families
- * Competitive environment and fixed mindset.

Implicit Bias

- * Attitudes or stereotypes that we hold about groups of people, without knowing that we hold them.
- * Everyone has implicit bias; it's a byproduct of our life experiences.
- * Small effects can add up over time.
- * A lot of social science research studies implicit bias and its effects

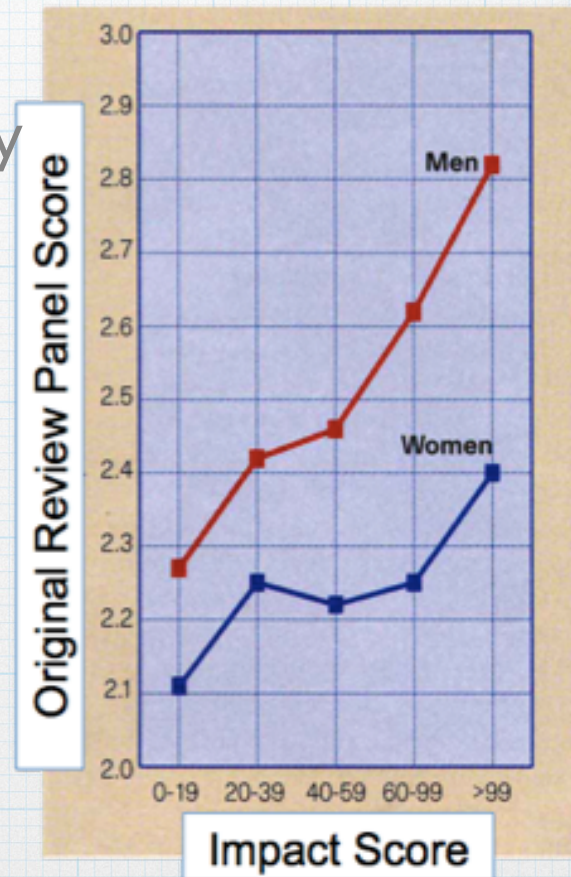
Lab Manager Study



Moss-Racusin, Dovidio et al. PNAS (2012a).
Figure courtesy of AAUW: *Solving the Equation*, 2015

Swedish Medical Research Council Fellowships

- Researchers noticed that 46% of applicants were women... but only 20% of awardees.
- Acquired access to the original applications and reviewer scores.
- Developed their own scoring criteria and used it to develop an objective "impact score"
- **Key result: women had to be 2.5 times as productive as men to receive a fellowship**



Why does it matter?

- * In this room the question may seem too obvious even to address.
- * But that is not true everywhere.
- * "Business case" for diversity is often used to justify expense and work
- * Fundamentally it's an equity issue.

What are we going to do about it?

- * Change can happen!
- * A lot of work at K-12 level to get more girls interested in STEM
- * Industry diversity work
- * My work focuses on academia

Two general approaches

1. Fix the people (information, mentoring programs, etc.)
2. Fix the problem (e.g., cultural shifts, improved policies, etc.)

Approach 1 can be okay, but more significant change will be possible if we focus on approach 2 (or both).

Classroom culture

- * Traditional STEM education methods can discourage women and people of color to persist in STEM majors (*"If you have to ask that kind of question, you don't belong here!"*)
- * A lot of research being done to create classroom cultures that foster success for more students

UD Women in Engineering



An NSF ADVANCE Origin Story: MIT Study

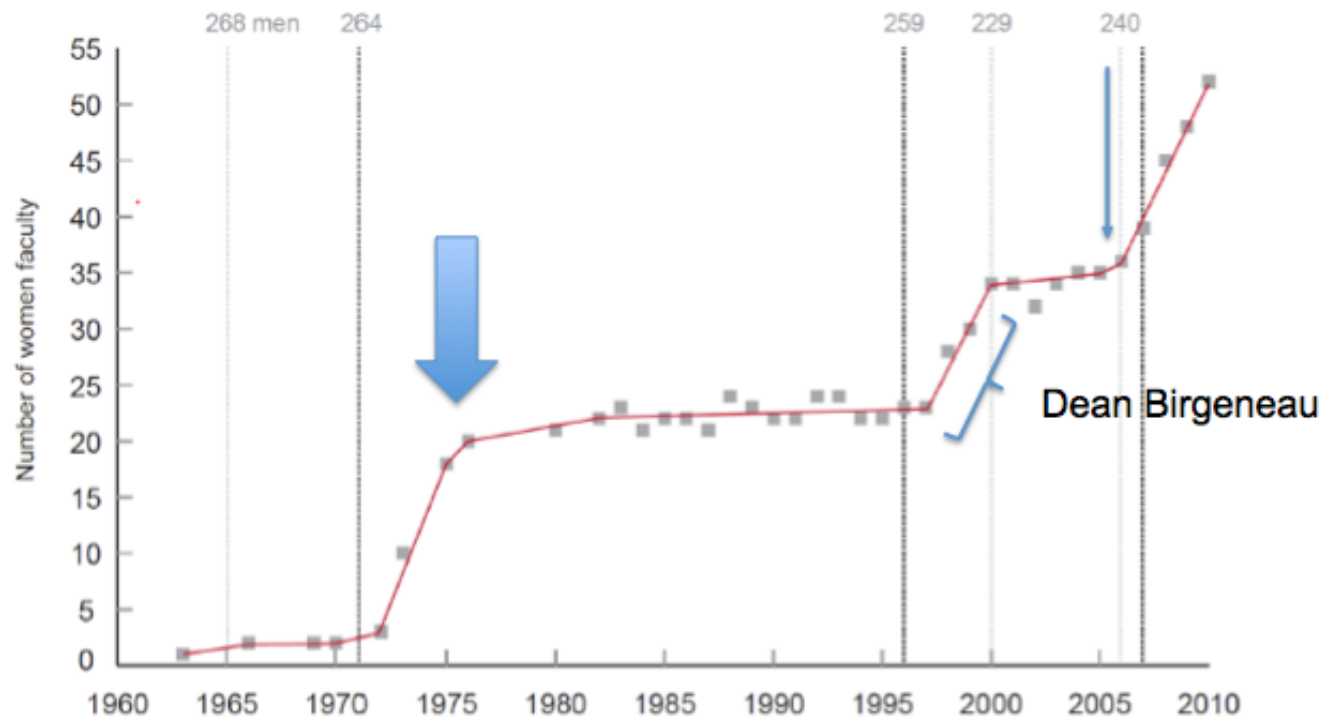
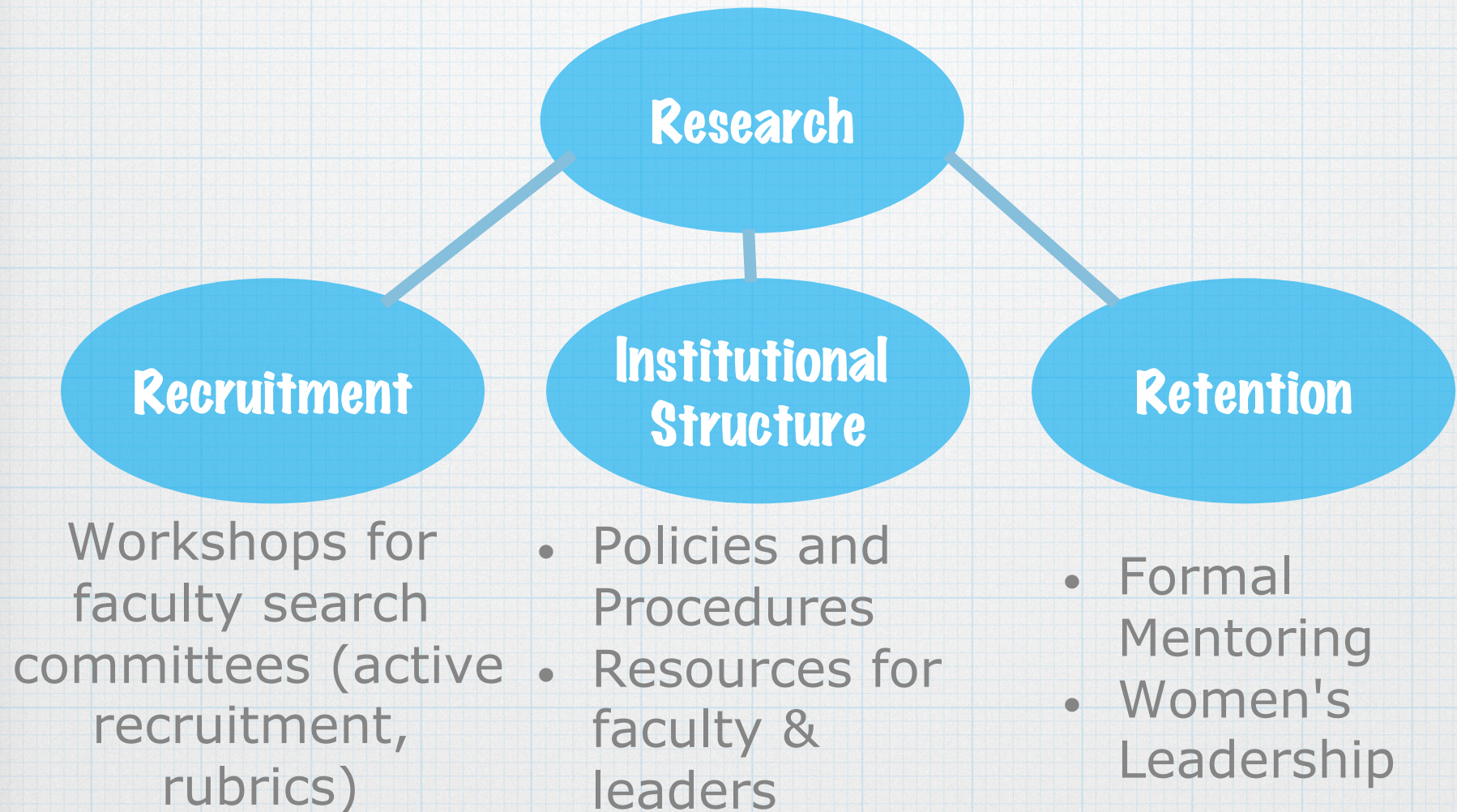


Figure 1. Number of women faculty in the School of Science at MIT (1960-2010).
(Revised from Hopkins, MIT Faculty News Letter, no. 4, vol. XVIII, 2006.)

Lessons

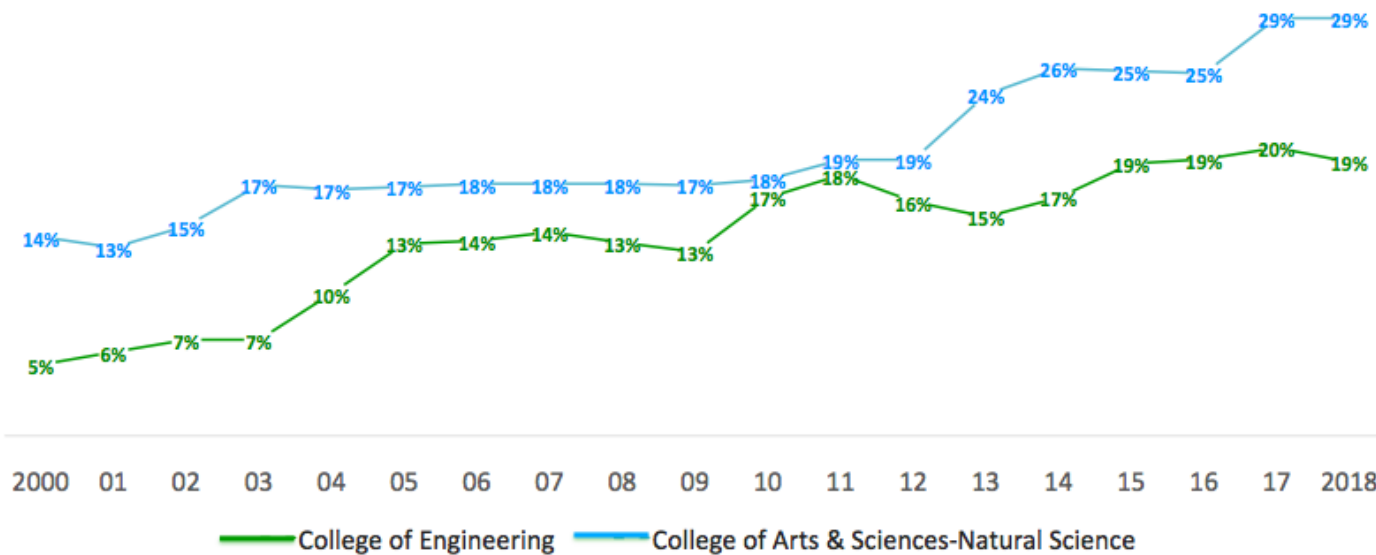
- * Leadership is critical. A good leader can make positive changes. But progress can stall when attention is no longer paid to a situation.
- * No sacrifice of quality

UD NSF ADVANCE



How are we doing at UD?

% UD Women T/TT Science & Engineering Faculty



Conclusion

- * There is a lot more work to be done before women and people of color have critical mass in STEM.
- * However, progress can be made & the world will be better for it!

Questions &
Discussion

