State of Women in Engineering
The State of Women in Engineering

Welcome

1:00 pm – 2:30 pm CT
Friday, October 27, 2017
The State of Women in Engineering

Jonna Gerken
FY18 President
Society of Women Engineers
The State of Women in Engineering

Peggy Layne, P.E., F.SWE
Assistant Provost for Faculty Development
Office of the Executive Vice President and Provost
Virginia Tech
Employed women scientists and engineers, as a percentage of selected occupations: 2015

Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017
Percentage of Bachelor's Degrees Awarded to Women by Discipline: 20.8% of Total

Source: American Society for Engineering Education 2017
Percentage of Women Tenured/Tenure-Track Faculty by Level

- All Faculty: 16.3%
- Full Professor: 11.0%
- Associate Professor: 18.8%
- Assistant Professor: 24.4%

Source: American Society for Engineering Education 2017
Median Earnings (dollars)

Source: U.S. Census American Community Survey 2015
The State of Women in Engineering

Peter Meiksins, Ph.D.
Vice Provost for Academic Programs
Professor of Sociology
Cleveland State University
FRONT PAGE NEWS: A “CHILLY CLIMATE”

• Cases of Sexual Harassment/Retaliation
• A “Male” Culture
• Male Backlash
Why don’t more women choose to study engineering?

Feeling engineering isn’t consistent with my goals
Experience of self-doubt
Perception of engineering as “masculine”
Is there a “leaky pipeline?”

Do women leave engineering programs at higher rates than men?
Do more women than men abandon engineering careers after completing their education?
If yes, why?
Why do Women Leave?

• Some possible answers from a study by Seron et al.
  – entry and orientation into a program of study
  – initiation rituals such as collaborative team projects
  – anticipatory socialization through internships and summer jobs.
Possible solutions?

Supporting female students/overcoming self-doubt

Programs supporting work/family balance

Lessons from NSF - ADVANCE
The State of Women in Engineering

Kacey Beddoes, Ph.D.
Assistant Professor of Sociology
University of Massachusetts Lowell
TURNING THE LENS

- Increasing recognition of the need to focus on faculty
  - JEE
  - EJEE
  - Studies in Higher Education
  - Engineering Studies
  - ASEE
INTERSECTIONAL RESEARCH

- Multiple intersecting facets of identities
  - Race, ethnicity, class, gender, sexuality
- Continued upward trend
  - Notable advances this year
    - Conceptual
    - Methodological
INTERSECTIONAL RESEARCH

- Conceptual Advances
  - Engagement with non-binary gender and sexuality
    - Cisgender vs non-cisgender sense of belonging in engineering
    - More inclusive demographic sections
    - Experiences of heterosexual vs LGBTQ women in the workplace & inequality regimes
INTERSECTIONAL RESEARCH

• Methodological Advances
  – Creation of new survey instruments to better understand experiences of women of color
    • Womanist Identity Attitude Scale
    • The National Survey of Women Engineering Faculty
The State of Women in Engineering

Heather Metcalf, Ph.D.
Director of Research & Analysis
The Association for Women in Science
metcalf@awis.org
Beyond a Buzzword: Exploring Intersectionality to Revolutionize Our STEM Workplaces

Heather Metcalf, PhD
Director of Research & Analysis, AWIS
What is Intersectionality?

Contextual framework for systemically understanding how multiple social identities intertwine to influence experiences & opportunities
Intersectionality in STEM Workplace Research

General vs STEM workplace intersectionality research

- Gender
- Race/Ethnicity
- No focus
- Nationality
- Age
- Class
- Religion
- Sexuality
- Disability

STEM Workplace (n=52) vs General (n=2,824)

Percentage distribution for various intersectionalities.
Challenges

• Balancing:
  – Privacy & Inclusion
  – Meaning & Significance

• Obtaining timely data access

• Handling outmoded, missing, or shifting social categories

• Situating and interpreting data within context
Example 1: STEM Workplace Attrition

Primary Reason Women with STEM Degrees Take Jobs Outside Field, by Race

NH/PI: Family

White: Pay, Promotion, Change in interest, Job unavailable

Hispanic: Working Conditions

Black: Job unavailable

AI/AN: Job unavailable

Asian: Pay, Promotion
Example 2: STEM Workplace Climate

“I feel like my disability comes with stigma and it is hard to come out and ask for support at work.”

“Accusations of being lesbian (or slurs about it) are one way men impose power over junior women. A woman with opinions may be called a dyke, as an insult…as though being gay is worthy of insult, but challenging straight women’s sexuality, too.”
Recommendations

• Challenge is worth it
• Remember the systemic focus
• Be inclusive in response options and language
• Incorporate qualitative elements
• Pay attention to power dynamics

“Wow, thank you for allowing so many answer possibilities!!”
Get in Touch!

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The State of Women in Engineering

Roberta Rincon, Ph.D.
Manager of Research
Society of Women Engineers
Minority Women in Early Career

- < 5% of working engineers are minority women
- Qualitative study conducted in partnership with NSBE
- Purpose
  - To identify obstacles that minority women in engineering face early in their career and the types of supports that were most impactful
  - Gain insight into how professional organizations like SWE and NSBE can better support minority female engineers
Challenges Encountered

- Difficulty fitting in
- Gender and race-based biases
- Salary negotiations
- Unfair performance evaluations or lack of honest feedback

“I know that I’m 1% of people that …look like me. I’ve known that through most of college.”

“There are joking comments….I guess I didn’t expect some of those mentality jokes to still be there.”

“At the time, [I was satisfied with my salary] because I didn’t know any better…”
Support Systems

• Family members who were engineers
• University career centers and alumni
• Mentors
• Colleagues and coworkers
• Professional associations
Suggestions for Professional Associations

• Leadership should reflect what we want the organization to look like
• Help women find professional chapters after a job relocation
• Provide better access to events and diversify event options
• Need more mentors who are willing to share their experiences with failure

“Because we don’t hear those failures, ...one mistake we make could be completely devastating...”
Minority women need to know their own worth and be given the tools to advocate for themselves.
The Community College STEM Pathway

- Objectives
  - To determine success of women who transfer to complete their bachelor’s degrees in engineering and computer science (ECS)
  - To identify institutions that have high rates of successful female transfer and degree completion.
- Quantitative study conducted using data from the Texas Education Research Center
Higher Education in Texas

- Across 10 first-time-in-college cohorts (2002/03 to 2010/11)
  - Between 160,000 and 190,000 students each year
  - Consistently, over 50% are female
  - ECS Major Declaration: 20% of men versus 4% of women
  - Less than 20% of ECS majors are women, and this percentage is decreasing.
% of Transfer Students Who Declared an ECS Major

- 2002/03: 2.2%
- 2003/04: 2.2%
- 2004/05: 2.2%
- 2005/06: 11.7%
- 2006/07: 11.4%
- 2008/09: 11.4%
- 2009/10: 1.6%
- 2010/11: 1.6%

Legend: Male, Female
# of Transfer Students Who Earned an ECS Degree

<table>
<thead>
<tr>
<th>FTIC cohort</th>
<th>Female</th>
<th>Male</th>
<th>% Female of Total ECS Transfer Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002/03</td>
<td>253</td>
<td>1,733</td>
<td>12.7%</td>
</tr>
<tr>
<td>2003/04</td>
<td>191</td>
<td>1,466</td>
<td>11.5%</td>
</tr>
<tr>
<td>2004/05</td>
<td>203</td>
<td>1,388</td>
<td>12.8%</td>
</tr>
<tr>
<td>2005/06</td>
<td>214</td>
<td>1,382</td>
<td>13.4%</td>
</tr>
<tr>
<td>2006/07</td>
<td>187</td>
<td>1,338</td>
<td>12.3%</td>
</tr>
<tr>
<td>2007/08</td>
<td>195</td>
<td>1,241</td>
<td>13.6%</td>
</tr>
<tr>
<td>2008/09</td>
<td>161</td>
<td>992</td>
<td>14.0%</td>
</tr>
<tr>
<td>2009/10</td>
<td>140</td>
<td>731</td>
<td>16.1%</td>
</tr>
<tr>
<td>2010/11</td>
<td>85</td>
<td>391</td>
<td>17.9%</td>
</tr>
</tbody>
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Notes:  
(1) Cohorts include all students that started at a community college or four-year university in that particular school year.  
(2) Graduation counts include all students who graduated by 2015, so the 2010/11 cohort might still be enrolled and working towards an ECS degree.
Findings

• Across 10 years of FTIC cohorts in Texas
  – Fewer than 1,300 women transferred and graduated in ECS
    • <10% Black women
    • 35% Hispanic women
  – Fewer than 9,000 men transferred and graduated in ECS
    • 5% were Black men
    • 25% were Hispanic men
Next Steps: Phase II Qualitative Study

- **Objective:** To identify the supports (programs and services) that female community college students find helpful towards meeting their educational goals, particularly those offered by professional associations.

- **Data source:** Focus groups and one-on-one interviews with community college and university students.
Other Research Projects Planned or Underway

• Gender Bias Study in India
  • Objective: To analyze how bias in the engineering workplace differs by gender, race, sexuality, industry, and geographic location.

• SWENext and the Development of an Engineering Identity
  • Focus on high school girls
  • Focus primarily on peer and media influences
The State of Women in Engineering

Imelda Castro
Director of Equipment Workforce Capability
Intel Corporation
2020 Intel Diversity & Inclusion Goal

Intel has set a goal to reach full representation at all levels in our workforce by 2020.
How we got to our commitment: We started with external & internal diversity research
Background

• **Intel** worked with **Dalberg Global Development Advisors** to conduct a study on the **economic returns of diversity in the tech industry**.

• **First-of-its-kind data** specific to the technology industry, quantifying the financial and economic impact of diversity in tech. Looked at both racial and gender diversity. Data is collected from **170 U.S. technology companies**.

• The study revealed that **improving ethnic and gender diversity** in the US technology workforce represents a **massive economic opportunity**.

• This analysis is based on **regression analysis**, using published, released or publically discussed data.

• Full report: Decoding Diversity on Intel.com
Overview of Diversity in the US Tech Workforce by GENDER

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Labor Force</th>
<th>Tech Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>52%</td>
<td>47%</td>
<td>28%</td>
</tr>
<tr>
<td>Male</td>
<td>48%</td>
<td>53%</td>
<td>72%</td>
</tr>
</tbody>
</table>

28% tech representation compared to the 47 percent ratio of women in the general U.S. labor force reflects a gap of 700,000 women.
Every incremental percentage point in African American and Hispanic representation at NASDAQ-listed tech companies is linked with a three-percentage-point increase in revenues.
Representation at the leadership level correlates with **13–16 percent higher** enterprise value controlling for company revenues, profitability, size, and range.
Financial Impact of Gender Diversity: A Global Opportunity

Global CIO roles occupied by women, 2014

Closing the global gender leadership gap could add 0.5 - 0.6% to global GDP – equal to an economy the size of Norway.
Root Causes of Diversity Challenges in Tech

**VISIBILITY**
- Lack of role models and sponsorship
- Limited access and exposure to careers

**PATHWAYS**
- Underrepresentation in computer science and engineering
- Covert stereotyping
- Low expectations among teachers
- Unequal access to classes and facilities.

**CULTURE**
- Unsupportive/lack of inclusive work environment
- Bias in the interview and resume review processes.
Two comprehensive women’s & multicultural retention & progression studies completed at Intel to formulate Intel’s diversity strategy.
A Leader in Diversity & Inclusion
Transforming Intel and the Tech Industry

1. Achieve full workforce representation
2. Lead with inclusion
3. Grow Intel's future workforce
4. Drive thought leadership

Ecosystem development
- Diversify the Supply Chain
- Invest in Diverse Entrepreneurs
ACHIEVE FULL WORKFORCE REPRESENTATION

- Accelerating diverse hiring
- Retaining our diverse talent
- Advancing careers
- Fostering inclusion
GROW THE PIPELINE OF DIVERSE TALENT

Transformational education solutions

Activating our employee base

Blueprint for the tech industry

The future
IMPROVE DIVERSITY IN OUR SUPPLY CHAIN

Empowers and opens new doors for diverse suppliers

Goal: $1B annually with diverse suppliers by 2020

Transparency with our progress

Brings innovation and greater value to our business
INVEST IN DIVERSE ENTREPRENEURS

Intel Capital Diversity Fund, the largest fund of its kind

Investing $125M over 5 years in women- & minority-led tech companies

Investments to date: Brit+Co, CareCloud, Mark One, Venafi, LISNR
Supply chain – Growing our diverse talent

Delivering Intel’s Future Through the World’s Best Supply Chain
We are making steady progress
2017 Mid-year report

Representation Gap improved 65%
Surpassed our Retention Exit Goals
WarmLine has a 90% success rate
Completed largest ever Retention Study
13K managers to be trained in 1 yr.
Achieving our Supplier Diversity Goals
Investing strongly in pathways to tech (HBCUs, Oakland and Navajo)

Progress includes all Corp People Movement including Hiring and exits, M&A etc.
Accountable goals and transparency

- Public Diversity and Inclusion Report 2X year
- Goals are incorporated in Intel APB
- Internal weekly report to our CEO
- Warmline Service to resolve retention challenges with specific actions.
- Building strong allies to sustain our efforts
Questions?
Thank You

Go to research.swe.org for more information.