The State of Women in Engineering

Welcome

1:00 pm – 2:30 pm CT
Friday, October 27, 2017

sWe 17
The World's Largest Conference
for Women Engineers

ALWAYS   ALWAYS
CONNECTING   ENGINEERING

swe
Society of Women Engineers

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
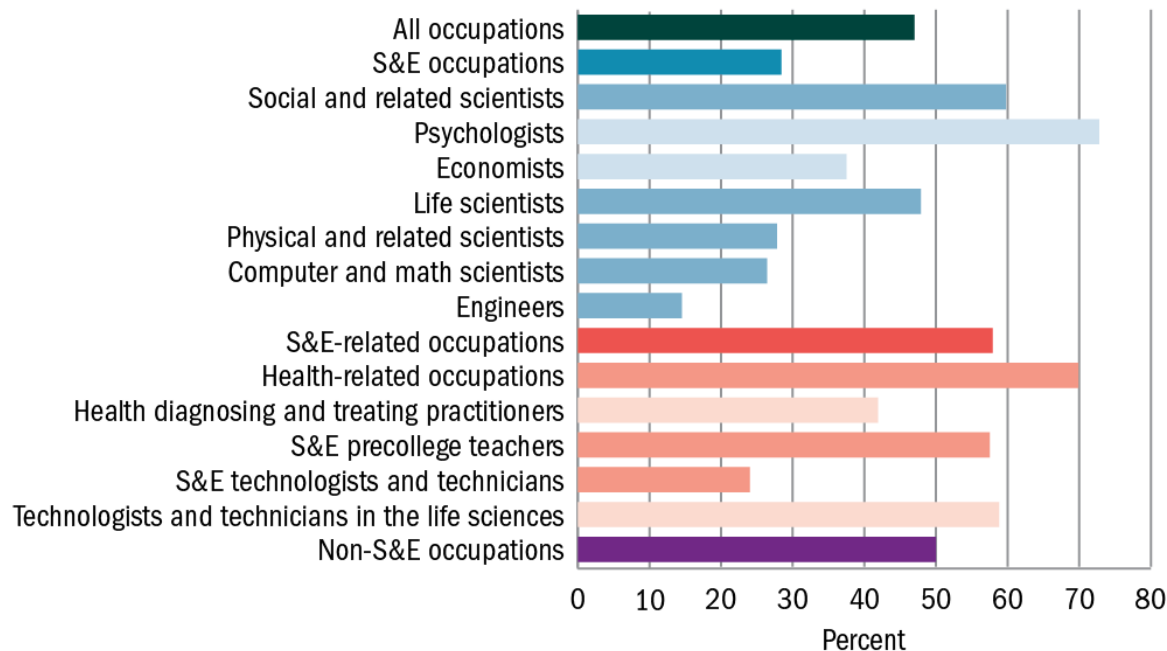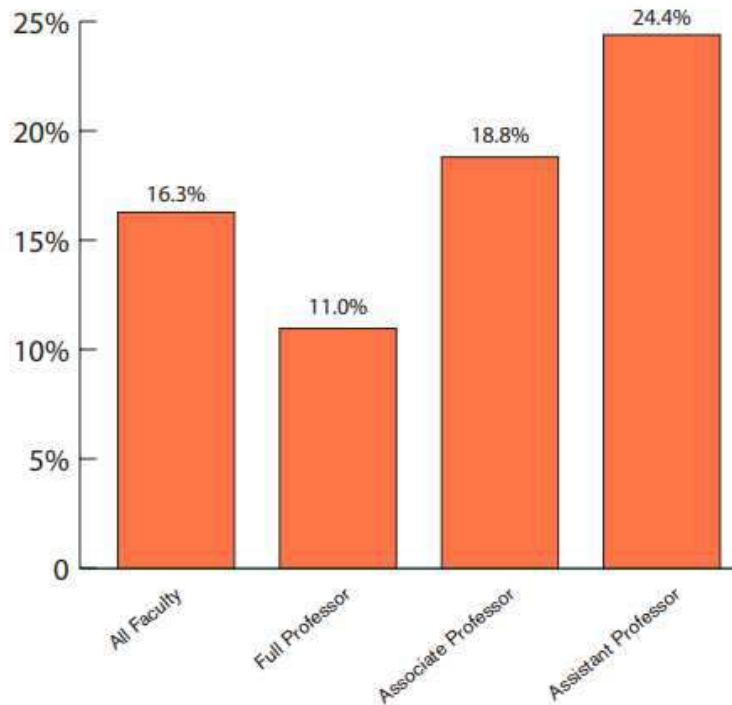
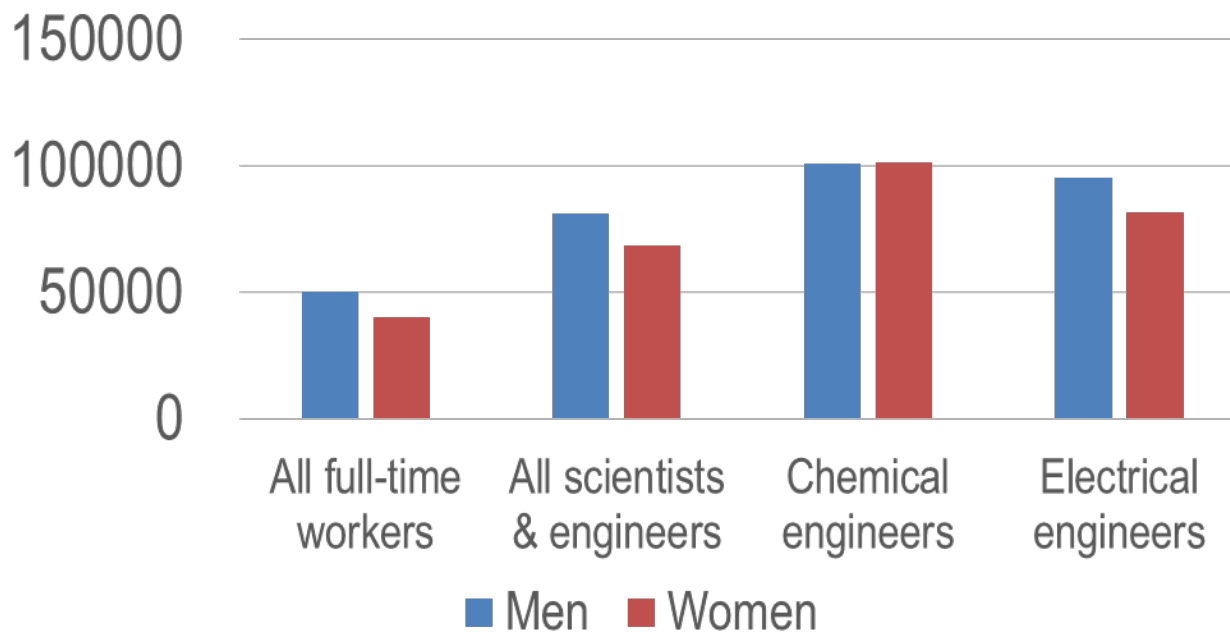PERCENTAGE OF BACHELOR'S DEGREES AWARDED TO WOMEN BY DISCIPLINE: 20.8% OF TOTAL
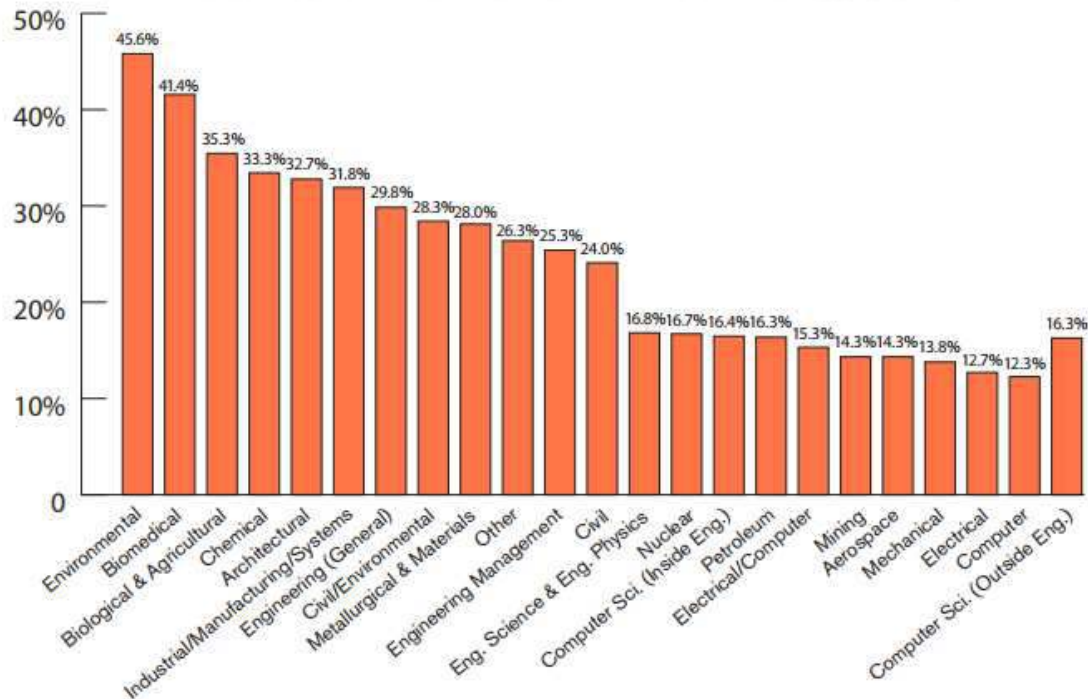
Source: American Society for Engineering Education 2017

PERCENTAGE OF WOMEN TENURED/TENURE-TRACK FACULTY BY LEVEL

Source: American Society for Engineering Education 2017

Source: U.S. Census American Community Survey 2015

sWe 17
The World's Largest Conference
for Women Engineers

ALWAYS ALWAYS
CONNECTING ENGINEERING

swe
Society of Women Engineers

The State of Women in Engineering
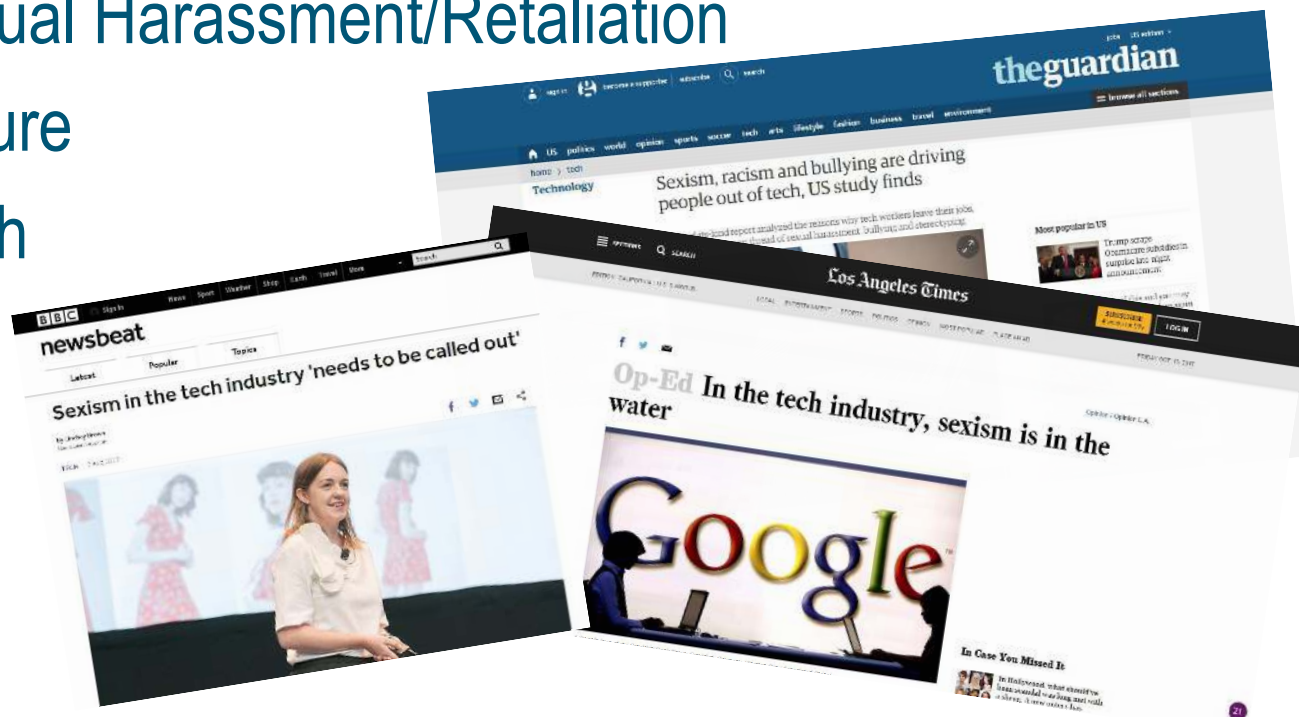
Peter Meiksins, Ph.D.
Vice Provost for Academic Programs
Professor of Sociology
Cleveland State University

FRONT PAGE NEWS: A "CHILLY CLIMATE"

- Cases of Sexual Harassment/Retaliation

- A "Male" Culture

- Male Backlash

ALWAYS ALWAYS
CONNECTING ENGINEERING

sWe 17
The World's Largest Conference
for Women Engineers

swe
Society of Women Engineers

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

sWe 17
The World's Largest Conference
for Women Engineers

ALWAYS ALWAYS
CONNECTING ENGINEERING

swe
Society of Women Engineers

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

sWe17
The World's Largest Conference
for Women Engineers

ALWAYS   ALWAYS
CONNECTING   ENGINEERING

swe
Society of Women Engineers

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

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

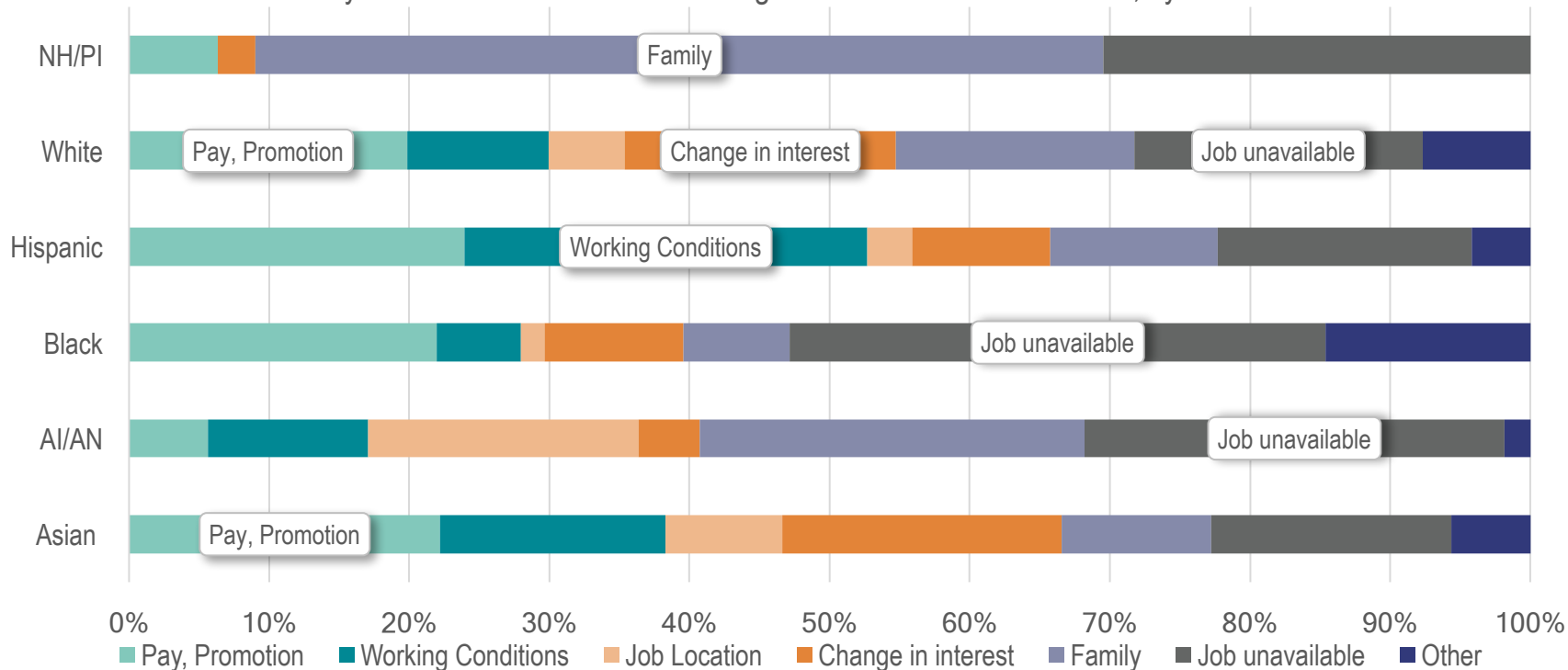STEM Workplace (n=52)   General (n=2,824)
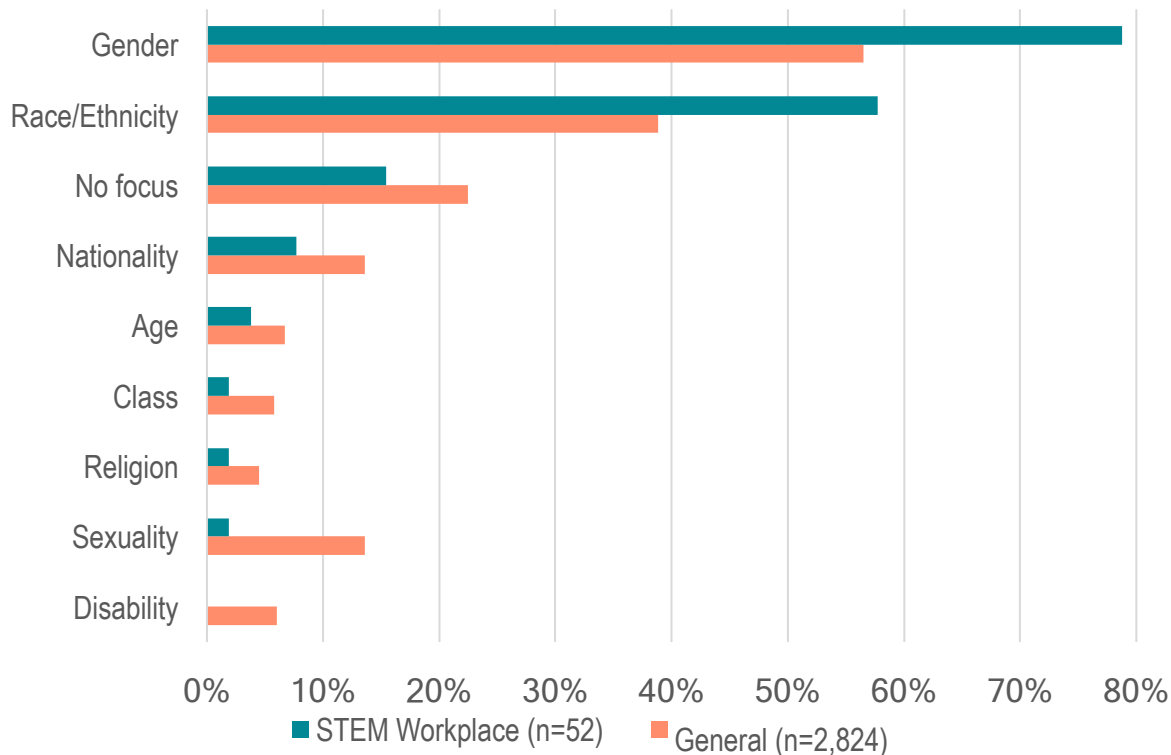
Challenges

- Balancing:
  - Privacy & Inclusion
  - Meaning & Significance
- Obtaining timely data access
- Handling outmoded, missing, or shifting social categories
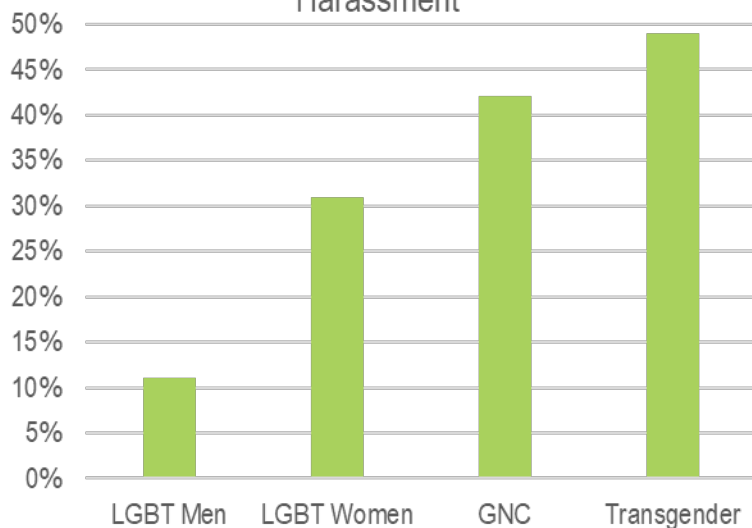- Situating and interpreting data within context

Example 1: STEM Workplace Attrition

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

Example 2: STEM Workplace Climate

LGBT Physicists' Experiences of Harassment

"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."

Comfort sharing disability in STEM Workplace

■ Comfortable ■ Neutral ■ Uncomfortable
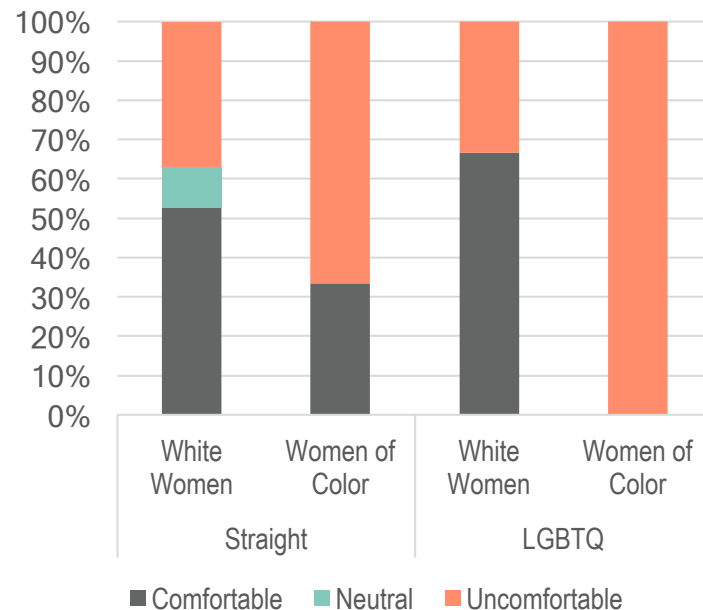
Recommendations

- 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!

1667 "K" Street, NW, Suite 800

Washington, DC 20006

www.awis.org

metcalf@awis.org

@AWISNational

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..."

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
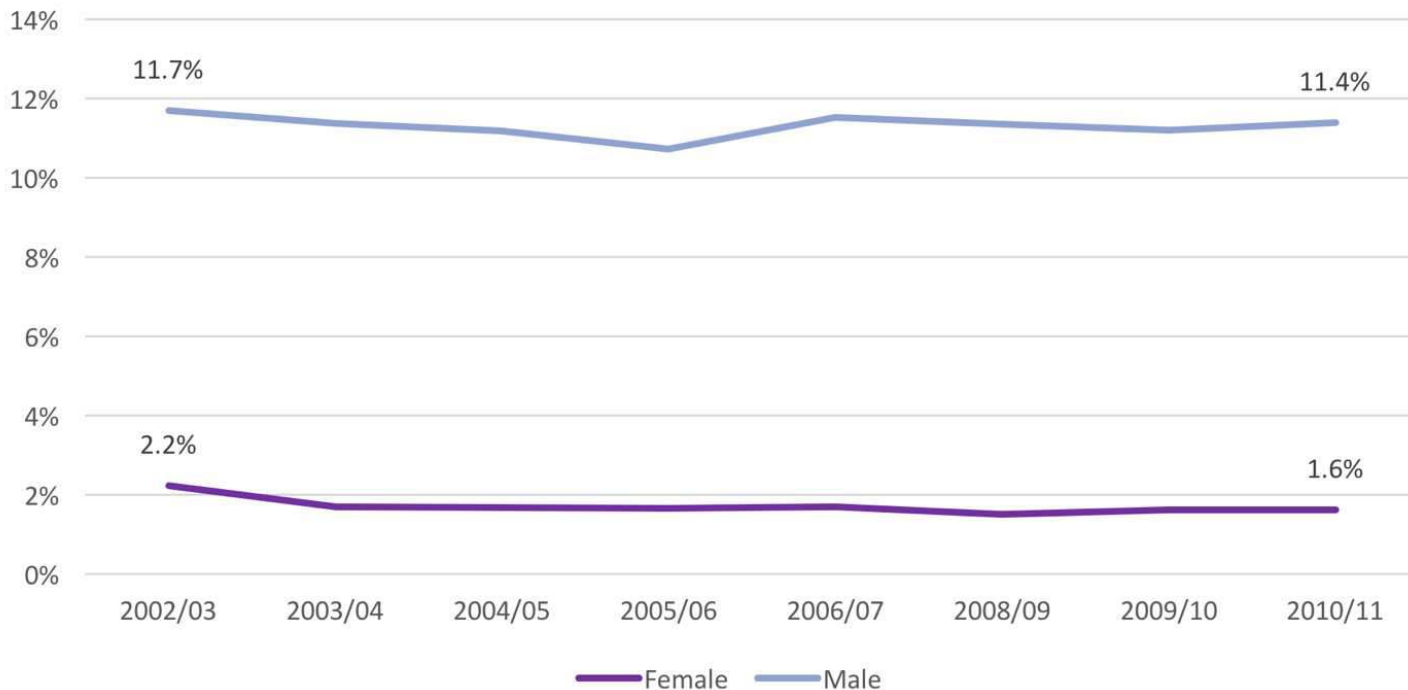
of Transfer Students Who Earned an ECS Degree

FTIC cohort	Female	Male	% Female of Total ECS Transfer Graduates
2002/03	253	1,733	12.7%
2003/04	191	1,466	11.5%
2004/05	203	1,388	12.8%
2005/06	214	1,382	13.4%
2006/07	187	1,338	12.3%
2007/08	195	1,241	13.6%
2008/09	161	992	14.0%
2009/10	140	731	16.1%
2010/11	85	391	17.9%

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

Intel Corporation

The World's Largest Semiconductor Manufacturer

State of Women in Engineering
Intel's Journey: Data to Action

WE17 Conference: October 27, 2017

Imelda G. Castro

Director, Global Supply Management, Equipment Workforce Capability
Intel Corporation

2020 Intel Diversity & Inclusion Goal

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

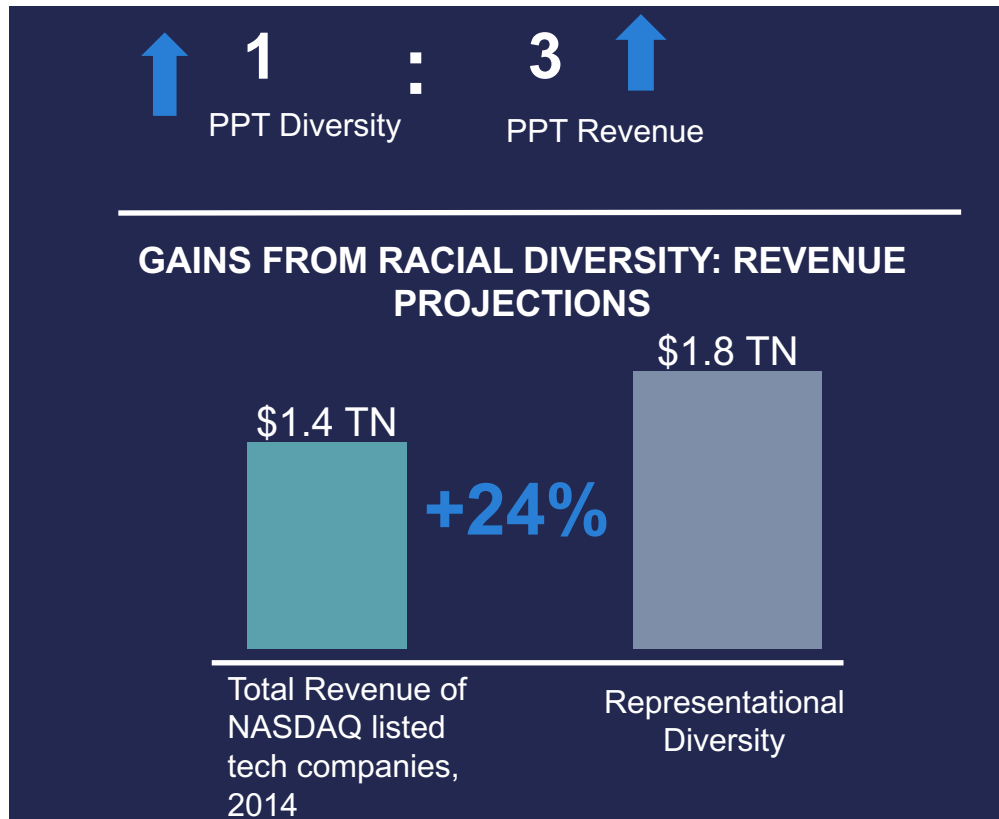# Overview of Diversity in the US Tech Workforce by GENDER

FEMALE

52%   47%   28%

MALE

48%   53%   72%

Population   Labor Force   Tech Sector
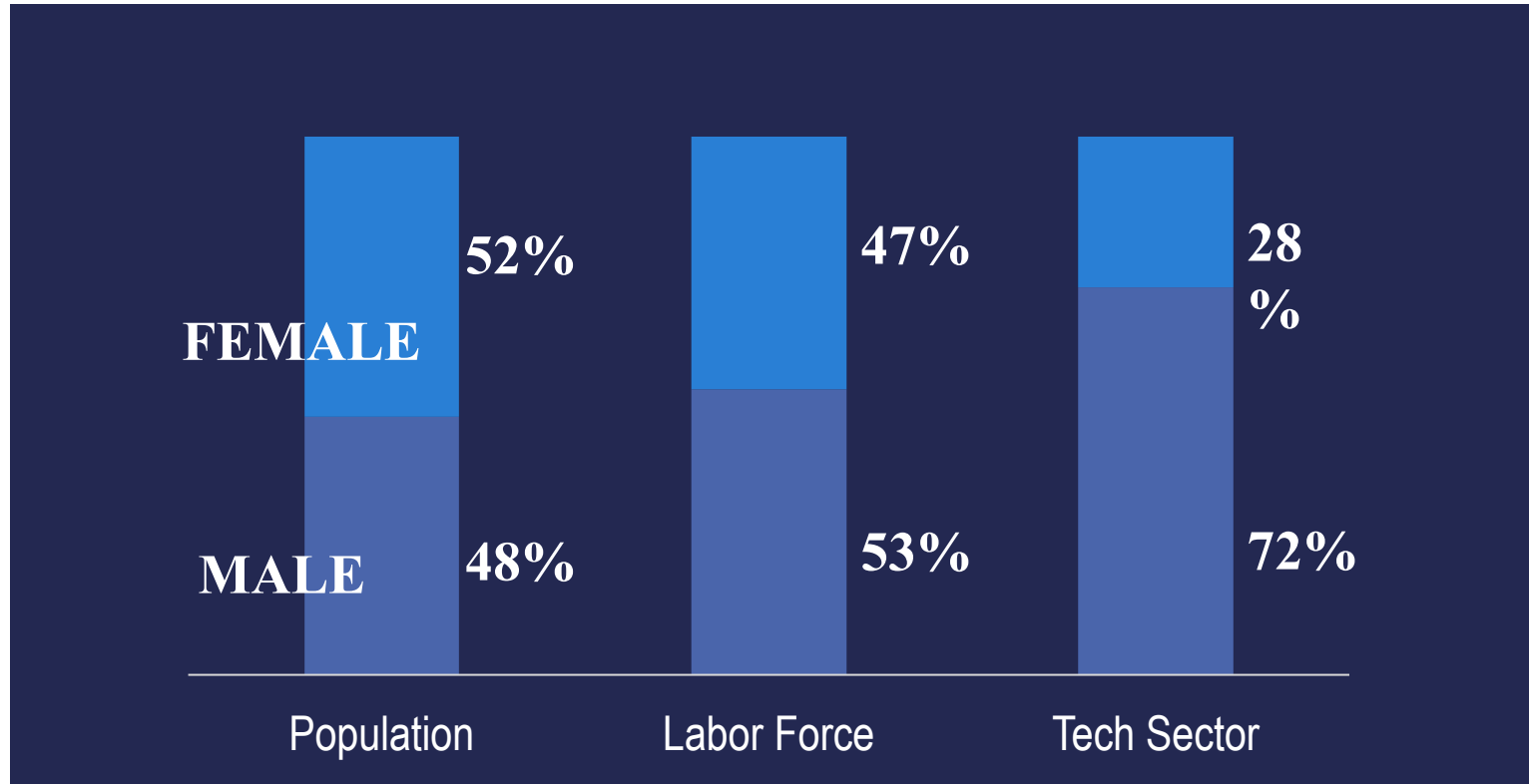
28% tech representation compared to the 47 percent ratio of women in the general U.S. labor force reflects a gap of 700,000 women

Economic Returns on Racial/Ethnic Diversity

- **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.

1 : 3

PPT Diversity   PPT Revenue

GAINS FROM RACIAL DIVERSITY: REVENUE PROJECTIONS

$1.8 TN

$1.4 TN

+24%

Total Revenue of NASDAQ listed tech companies, 2014

Representational Diversity

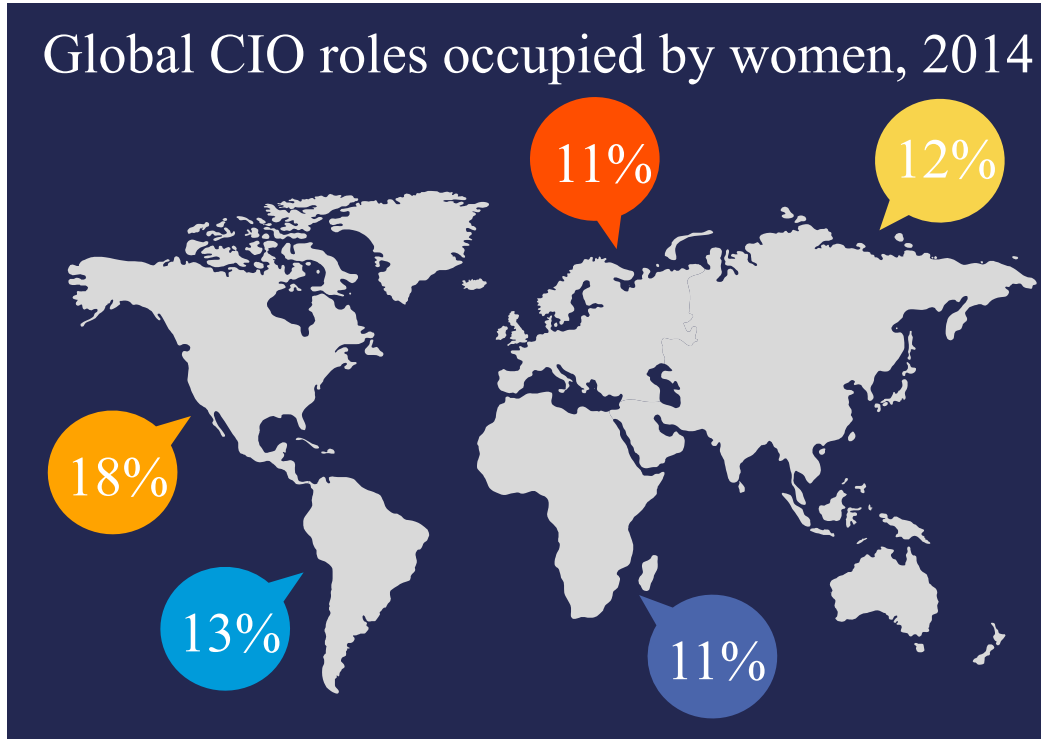# Economic Returns on Gender Diversity

Representation at the leadership level correlates with **13 –16 percent higher** enterprise value controlling for company revenues, profitability, size, and range.

➡ **1** : **13- 16%**

Female on Leadership team

Company market value ⬆

GAINS FROM GENDER DIVERSITY: AGGREGATE MARKET VALUE PROJECTIONS

$3.9 TN

$4.2 TN

2014

At least 1 female on leadership team
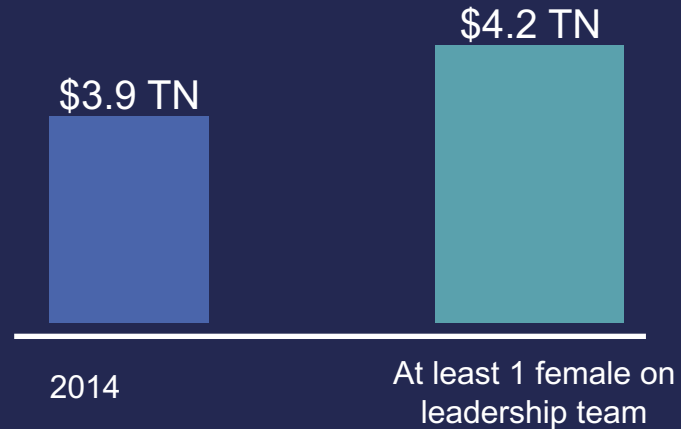
Financial Impact of Gender Diversity: A Global Opportunity

Global CIO roles occupied by women, 2014

11%

12%

18%

13%

11%

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

2

3

4

Achieve full workforce representation

Lead with inclusion

Grow Intel's future workforce

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

IMPROVE DIVERSITY IN OUR SUPPLY CHAIN

Brings innovation and greater value to our business

Empowers and opens new doors for diverse suppliers

Goal: $1B annually with diverse suppliers by 2020

Transparency with our progress

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

SUPPLY CHAIN PROFESSIONAL
Evolution as a Business Partner.

- CRITICAL THINKER
- STRATEGIC THINKER
- PROBLEM SOLVER
- INNOVATOR
- INFLUENCER

ATTRACT & HIRE

- Top 25 supply chain schools
- Diversity conferences
- Relationship focus schools
  - Influence curriculum
  - Reputation
  - Recommendations
- Intern program as Pipeline
- HR active support of Experienced candidates

GSM
Global Supply Management

DEVELOP & PROGRESS

DEFINE THE SKILLS
- Competency Menu
- Commercial, Technical curriculum

DEVELOP THE SKILLS
- Expert Courses
- Accelerated Workshops

EXPAND THE EXPERIENCES
- Career Lattice
- Supply Chain Opportunities

NETWORKS, MENTORS & SPONSORS
- All "Gateway Grades" Senior Women
- 27 Employee Resource Groups
- Women VPs & Fellows
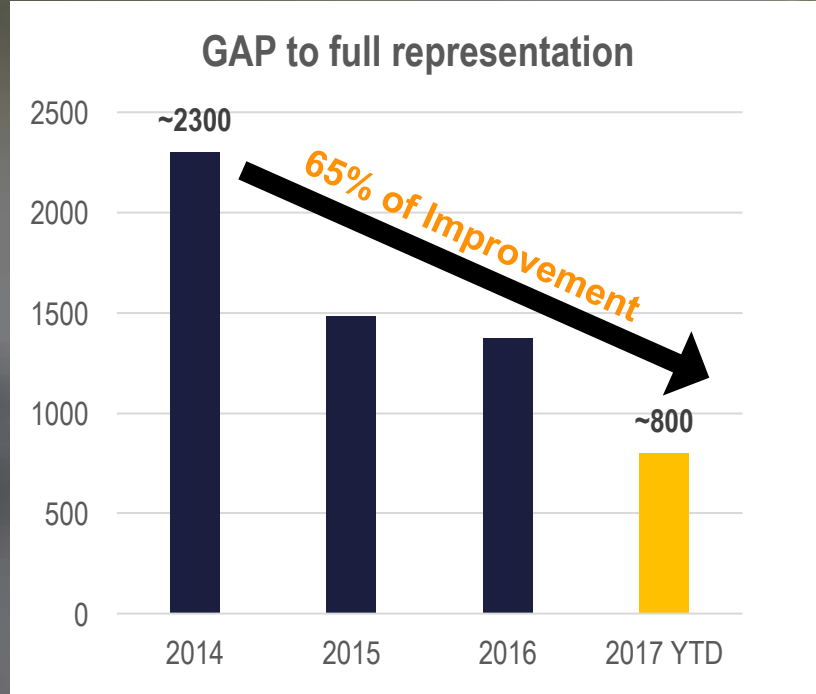- Hispanic, Black Leadership Councils

JOB PROFILES

CAREER LATTICES

DEVELOPMENT PORTAL & CAREER ZONE

GSM
Global Supply Management

GSM
Global Supply Management

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**

YEAR-OVER-YEAR U.S. HIRING RATE: ETHNICITY

8.7% UP 51% SINCE 2014
7.4%
5.8%

5.0% UP 63% SINCE 2014
4.2%
3.1%

0.16% 0.22% 0.42% UP 158% SINCE 2014
2014 2015 2016

HISPANIC
BLACK
NATIVE AMERICAN
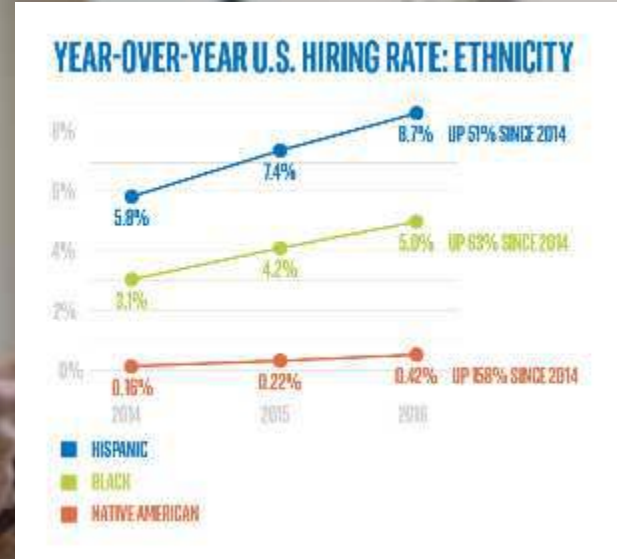
Learn more

www.intel.com
/diversity

Thank You

Go to research.swe.org for more information.