



Stemming the Tide: Why Women Leave Engineering

Dr. Nadya Fouad & Dr. Romila Singh

WEPAN 2011-2012 Webinar Series



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- **Moderator: Jenna Carpenter**, Ph.D., Associate Dean; College of Engineering & Science, Louisiana Tech University; Director of Professional Development, WEPAN BOD



- **Presenters: Dr. Nadya Fouad**, Prof., Educational Psychology, and **Dr. Romila Singh**, Assoc. Prof., Organizations and Strategic Management, University of Wisconsin-Milwaukee

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Who's on the Call Today

- **We have almost 300 registered participants.**
- **Thank you to ASEE WIED, ASEE ERM, NAPE Stem Equity Pipeline, PGEList, ADVANCE, and others for helping us spread the word!**

What's WEPAN? www.wepan.org

WEPAN is the nation's leading organization for transforming culture in engineering education to promote the success of all women.

- mobilize diverse, inclusive and collaborative stakeholders
- foster diversity in engineering graduates
- inspire a network of advocates to empower and advance the education of women pursuing engineering and related disciplines
- translate research into practice and develop national models to attract and retain women in engineering



WEPAN Knowledge Center

<http://wepanknowledgecenter.org>

Goal: Increase the number, scope and effectiveness of initiatives to advance women in engineering.

- **Catalogued and fully cited resources**

Research, reports, data and statistics, agenda papers, bibliographies, best practices, key programs, and more—1,000+

- **Online Professional Community**

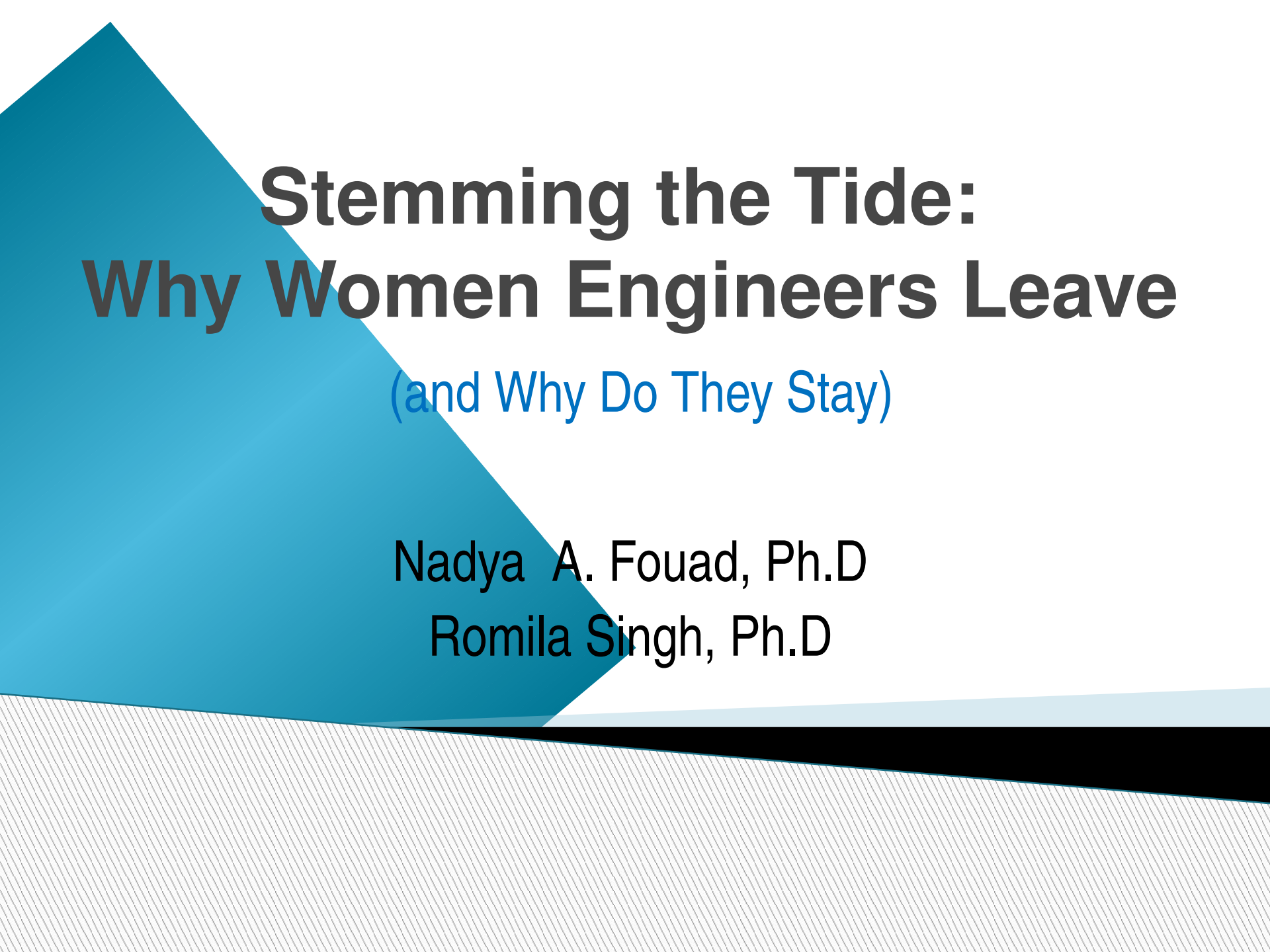
Network, collaborate, identify experts, share information

- **Special online events**

Feature WKC Professional Community and networking opportunities

- **Use** the research, information & data, **Submit** & suggest resources, **Share** the WKC with colleagues





Stemming the Tide: Why Women Engineers Leave

(and Why Do They Stay)

Nadya A. Fouad, Ph.D

Romila Singh, Ph.D

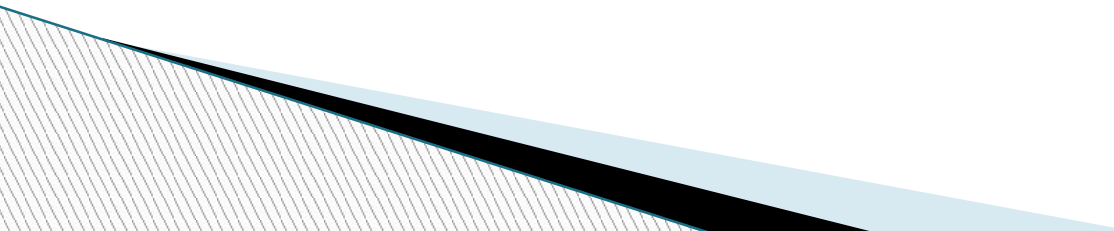
Agenda

- ▶ Status of women engineers nationally
- ▶ Stemming the tide
 - Rationale
 - Key findings
- ▶ Best practices from the study
- ▶ Summary and recommendations

Motivation for POWER

(Project on Women Engineers' Retention)

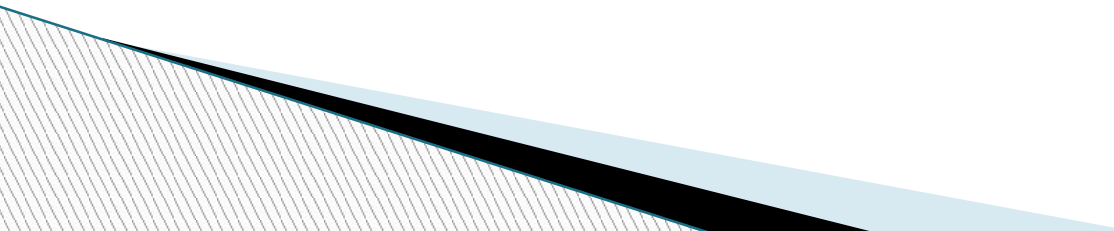
► What Do We Know:

- 1-in-4 women leave engineering compared to 1-in-10 men
 - Women comprise more than 20% of engineering school graduates, but only 11% of practicing engineers are women
 - Girls are just as likely as boys to do as well in math, science subjects in high school (no ability differences)
 - Early intervention programs found to be effective in encouraging women to consider engineering as a career
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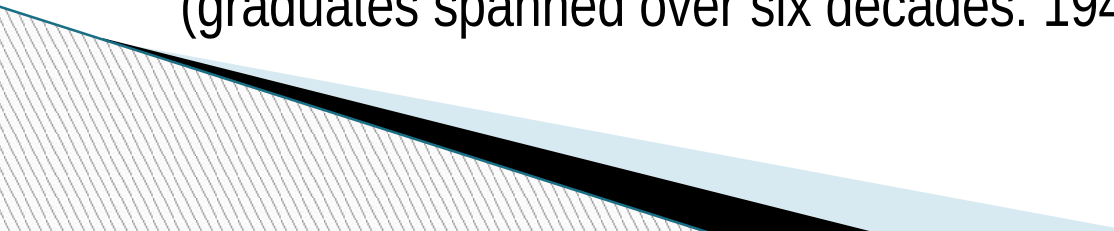
Women Engineers: What We Do Not Know

- ▶ Not much known about women engineers' workplace experiences – only anecdotal information
- ▶ No systematic answers to --
 - *why* women leave
- ▶ Just as important --
 - *when* do they leave
- ▶ No one really knows at what career and life stage women engineers are most likely to leave

So Why Should We Care?

- ▶ Nationwide shortage of engineers
 - ▶ National security reasons
 - ▶ At stake – United States' leadership in technical innovation
 - ▶ Engineering profession has the highest turnover compared to other skilled professions: accounting, law, medicine, and higher education.
 - ▶ ROI on STEM careers is not optimally realized
 - ▶ Loss of women engineers=loss to organizations, loss to society, loss to the U.S.'s competitive edge
- 

Study Site and Method

- ▶ 3-year, NSF-funded longitudinal study – results reported from 1st phase; Phase 2 in progress.
 - ▶ Formally partnered with top 30 universities with the highest number of women engineering graduates (list from ASEE, 2008).
 - ▶ Reached out to their female engineering alumnae through email and postcards
 - ▶ Women from an additional 200 colleges participated in the survey after hearing of this study through colleagues
 - ▶ As of July 2011, over 5,700 women responded to the survey; Usable responses = 3,961 (Response rate ~ 27%)
 - ▶ Engineering alumnae targeted across different life and career stages (graduates spanned over six decades: 1947-2010)
- 

Partner Schools

California Polytechnic State University, SLO

California State Polytechnic University, Pomona

California State University, Northridge

Cornell University

Georgia Institute of Technology

Iowa State University

Marquette University

Michigan State University

Massachusetts Institute of Technology

North Carolina State University

Ohio State University

Penn State University

Purdue University

Rutgers University

San Jose State University

Southern Illinois University

Stanford University

University of California, San Diego

University of Florida

University of Illinois

University of Maryland

University of Michigan

University of Missouri-Kansas City

University of New Mexico

University of Texas, El Paso

University of Washington

University of Wisconsin-Madison

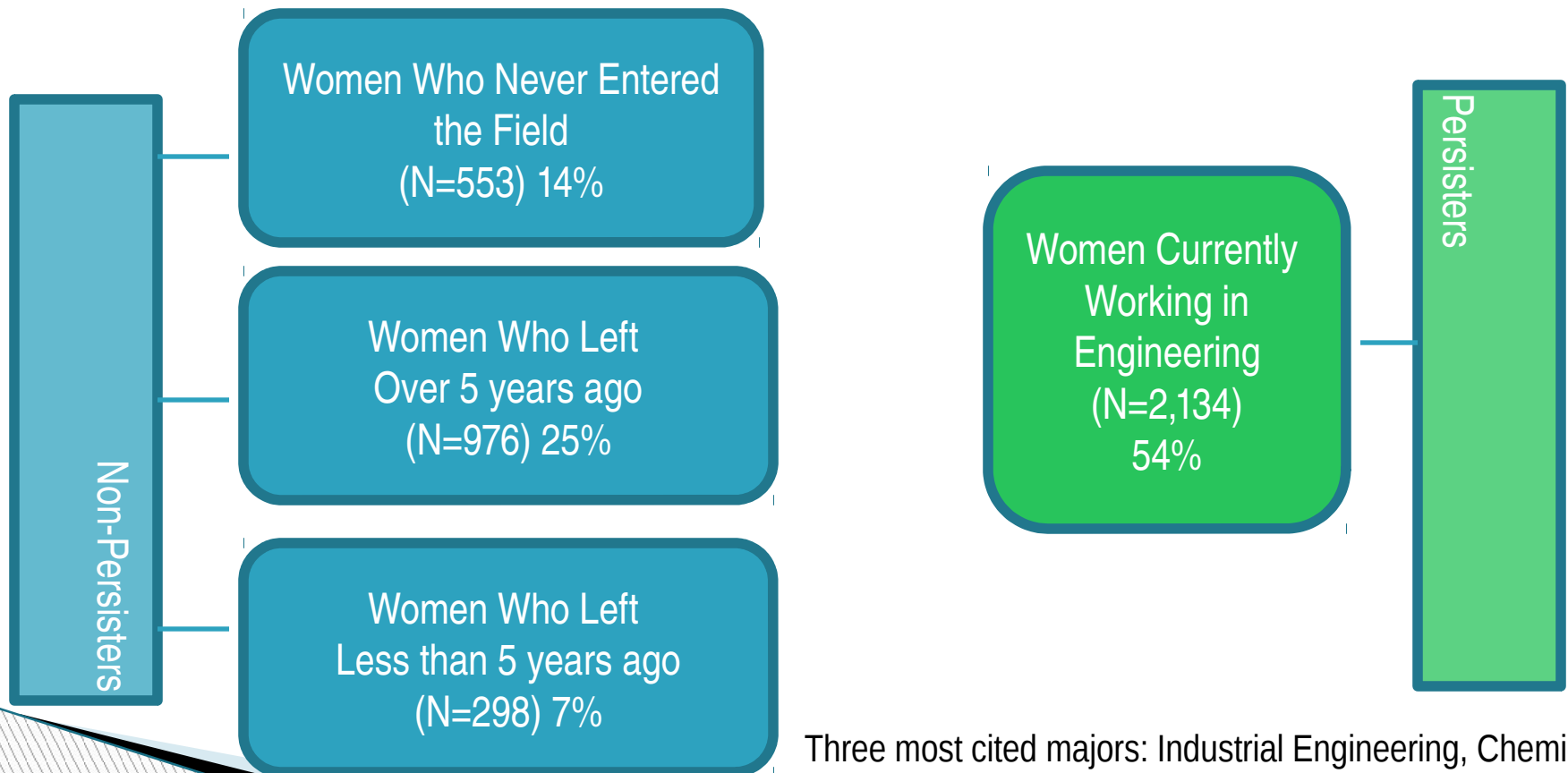
University of Wisconsin-Milwaukee

University of Wisconsin-Platteville

Virginia Tech

Profile of Participants

Four group of women engineers



Three most cited majors: Industrial Engineering, Chemical Engineering, and Mechanical Engineering

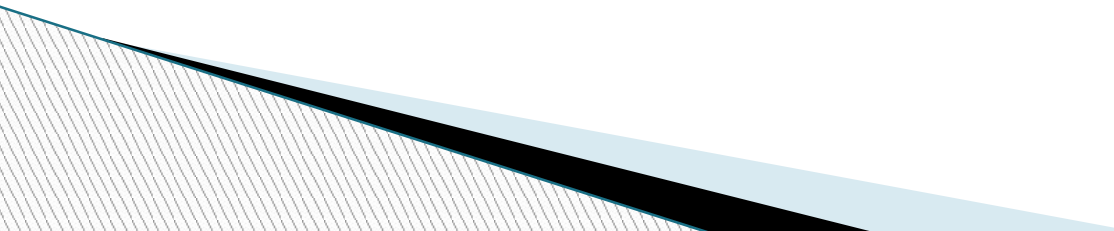
Why do Women Engineers Leave?

- ▶ Before we look for reasons why women leave the engineering field, let's consider this:
- ▶ A substantial group of women engineers (*14% of our sample of 3,961 women engineers*) never even entered the engineering profession after earning their undergrad in engineering.

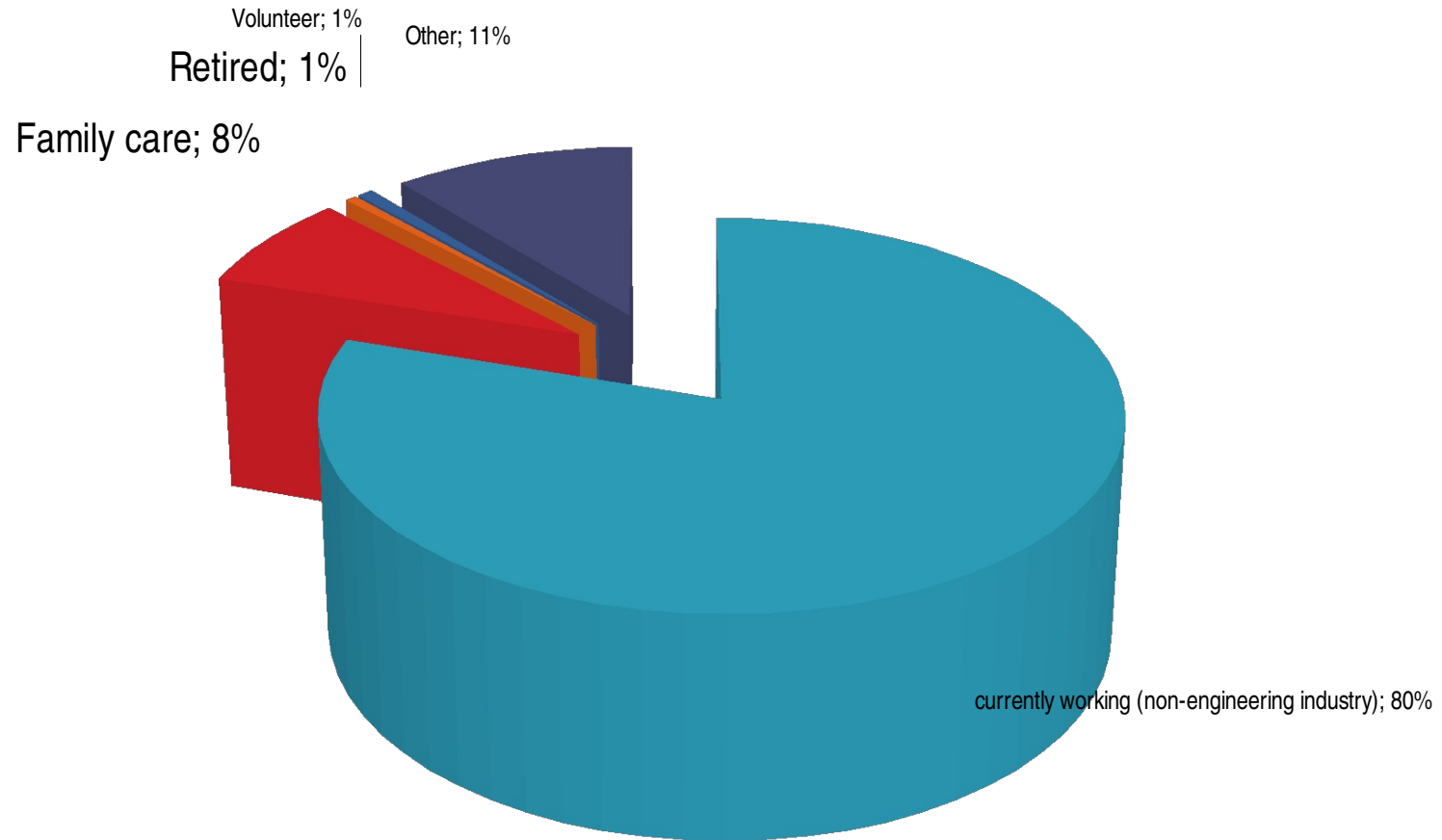
WHY?



Top 5 Reasons for **Not Entering Engineering**

- ▶ Not interested in engineering (24%)
 - ▶ Wanted to start their own business (18%)
 - ▶ Didn't like the engineering culture (17%)
 - ▶ Had always planned to go into another field (15%)
 - ▶ Low salary (7%)
 - ▶ These reasons did not differ significantly across different age groups or years of graduation.
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Women Who Never Entered: What are They Doing?



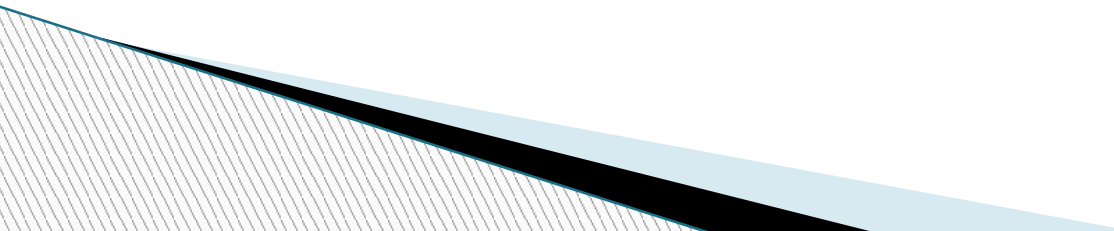
Women Engineers Who Left: 2 Groups

- ▶ What about women who pursued their careers in engineering?
- ▶ Of the women who started in engineering --
 - 1 in 4 left *more* than 5 years ago (out of 3,961 women)
 - 7% left *less* than 5 years ago (7% out of 3,961)

So *Why* Did They Leave?



Top 5 Reasons Why Women Engineers Left (Over 5 Years Ago)

- ▶ 17% of the women reported that they left the field to spend more time with their family.
 - ▶ 12% left because they were not offered any opportunities for advancement.
 - ▶ 12% reported that they lost interest in engineering
 - ▶ Some said they did not like the engineering tasks (10%), the engineering culture (7%), their boss (7%) or the working conditions (6%).
- 

In their Own Voices:

Women Engineers Who **Left Over 5 Years Ago**

“ TO ADVANCE, seems as though you must be willing and able to work 50+ hours/week and often be on-call 24/7.”

– *Caucasian Chemical Engineering Graduate*



In their Own Voices:

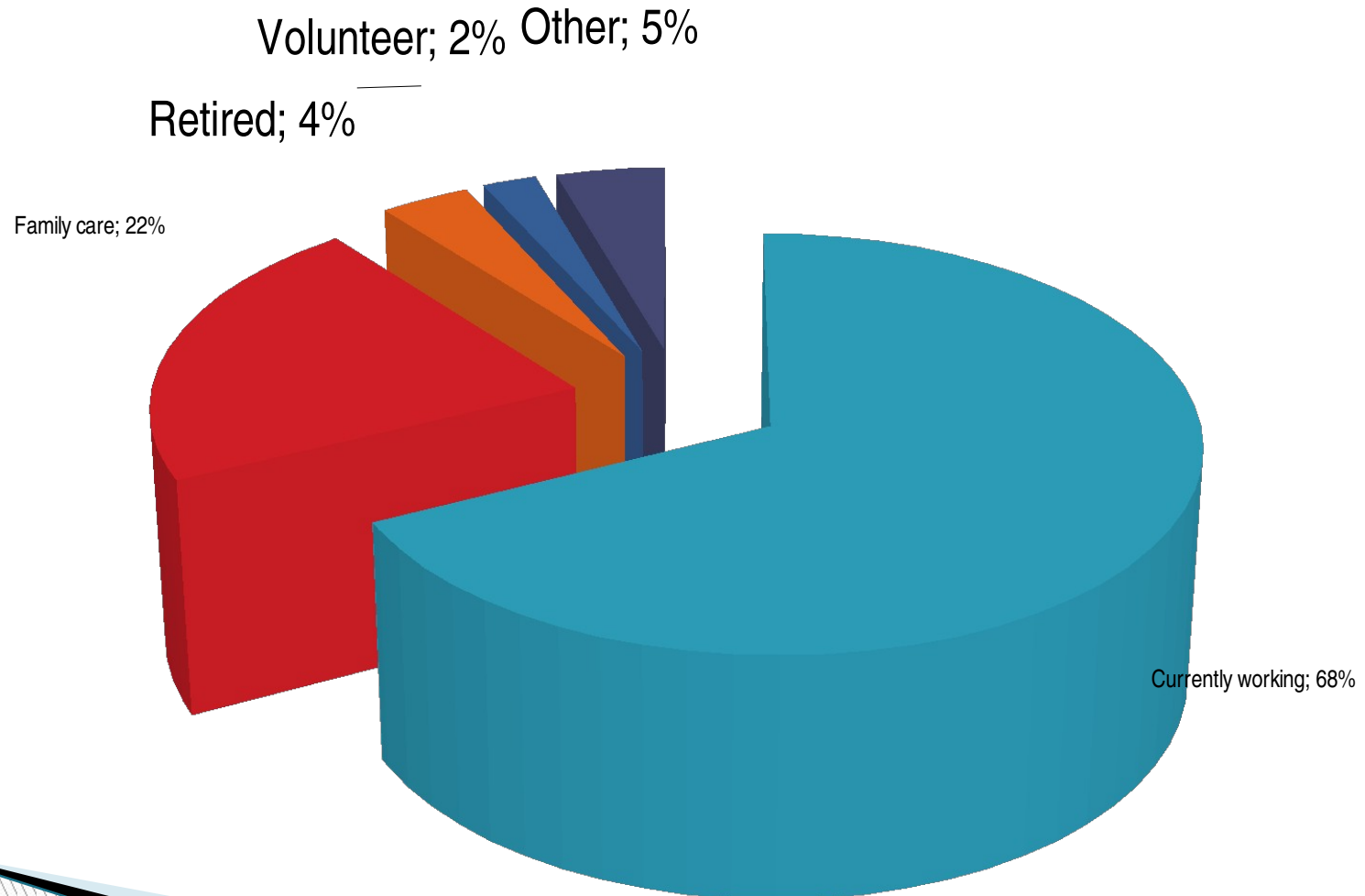
Women Engineers Who **Left Over 5 Years Ago**

“ There isn’t a strong network of females in engineering. You either need to learn to be “one of the guys” or BLAZE THE TRAIL YOURSELF, which is very difficult. I deviated from engineering... but work now in construction, where I am the only female executive officer.”

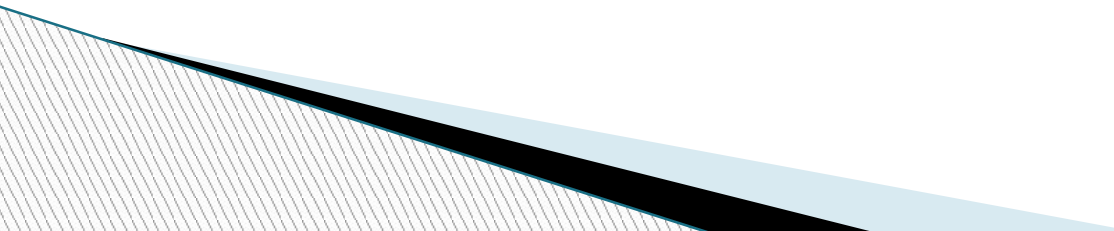
– *Caucasian Agricultural Engineering Graduate*



What Are they Doing Now?



Reasons Women Engineers Left (Less than 5 Years Ago)

- ▶ *A third* of the women left to *stay home* with the children (*because their company wasn't flexible enough with accommodating work-life concerns*)
 - ▶ *Two-thirds* left to pursue *better opportunities* in other fields and organizations
- 

In their Own Voices:

Women Engineers Who **Left Less than 5 Years Ago**

“ Women leave engineering due to a lack of job satisfaction, lack of reliable female role models, inflexible work schedules, workplace discrimination, white mid-western men syndrome, and glass ceiling issues.”

– *Latina Civil Engineering Graduate*



In their Own Voices:

Women Engineers Who **Left Less than 5 Years Ago**

“Most of management is a male-dominated culture (male conversation topics, long hours, demanding lifestyle, career-focused expectations).... Women usually choose to leave WITHOUT FIGHTING THE UPHILL BATTLE to make improvements. It is a self-sustaining cycle!”

– *Asian American Operations Research and Engineering Graduate*



In their Own Voices:

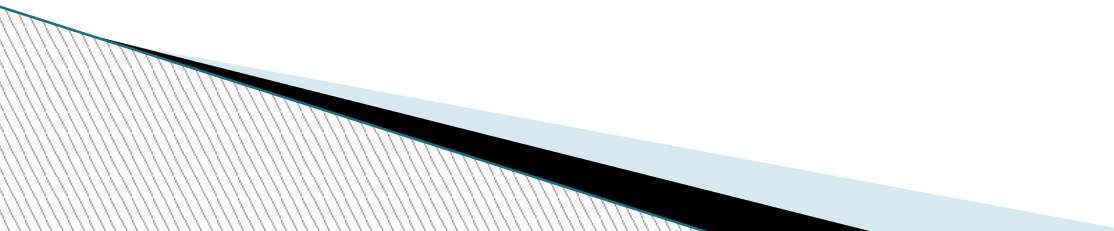
Women Engineers Who **Left Less than 5 Years Ago**

“...what ultimately led me to B-school and a non-engineering job was the LACK OF A VIABLE CAREER PATH (i.e. advancement) within the engineering organizations where I worked. In addition to that, most engineering organizations have promotion/leadership funnels that are very, very narrow.”

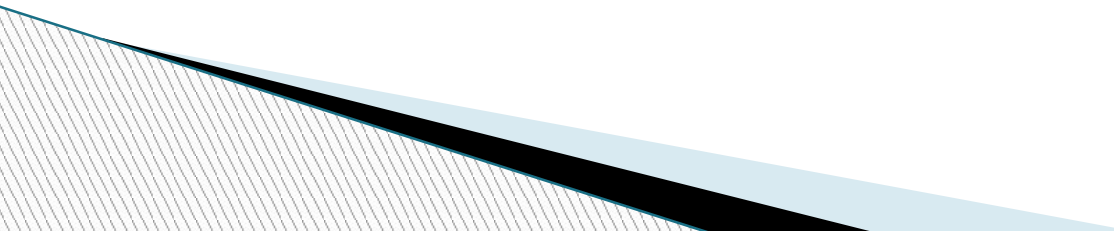
– *African American Mechanical Engineering Graduate*



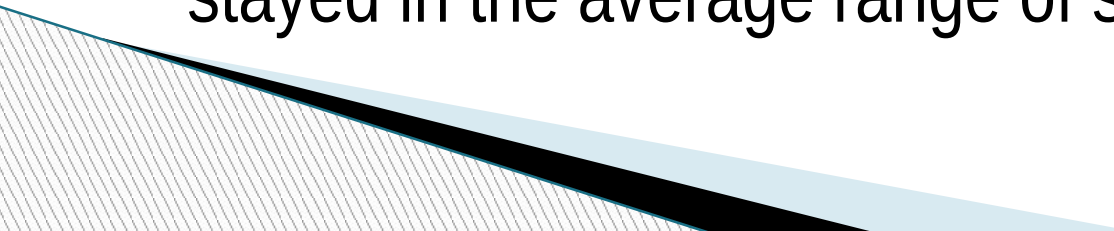
Differences Between Those who Stayed and Those who Left

- ▶ Are current engineers less likely to be married or to be parents? **NO.**
 - ▶ The groups were not significantly different in race, marital status, or parental status.
 - ▶ Both groups were over 80% White, with two thirds married, and 40% had children living at home with them.
 - ▶ Both groups of women were relatively evenly distributed across the different age groups.
- 

Differences Between Those who Stayed and Those who Left

- ▶ Are current engineers more likely to have majored in a particular area? **NO.**
 - ▶ The two groups of engineers, for the most part, did not differ by disciplinary area.
 - ▶ The top three majors for both groups were Chemical, Mechanical, and Civil Engineering.
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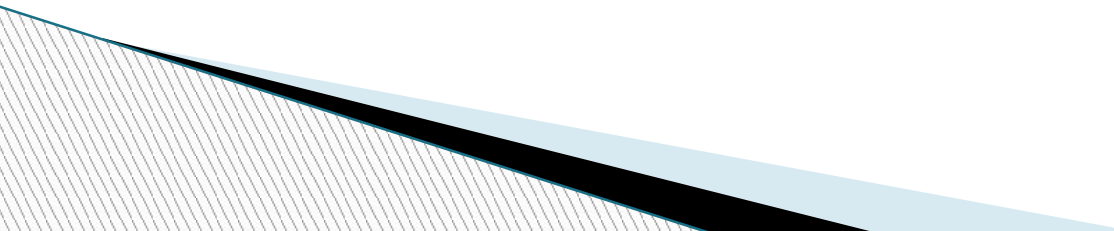
Differences Between Those who Stayed and Those who Left

- ▶ Did women leave engineering to stay home with children?
 - ▶ **Yes** – a third did
 - ▶ **But**, 67% working full time in another field,
 - ▶ 78% of those are working in management or executive level positions.
 - ▶ For those who are currently working, no significant differences between those who left and those who stayed in the average range of salary.
- 

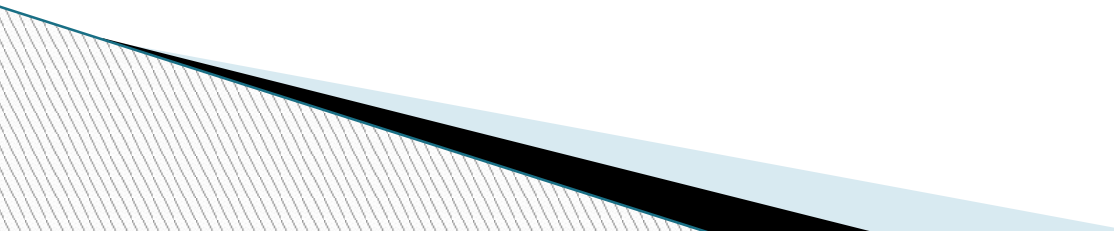
Differences Between Those Who Stayed and Those Who Left

- ▶ Are current engineers more likely than women who left engineering less than five years ago to:
 - ▶ be confident of their abilities as an engineer or what they expect from performing engineering tasks? **NO.**
 - ▶ be confident of their abilities to navigate the political climate or what they expect from managing these dynamics? **NO.**
 - ▶ be confident of their abilities to manage multiple work-life role demands or what they expect from managing multiple roles? **NO.**
- ▶ have interests in engineering related activities? **NO.**

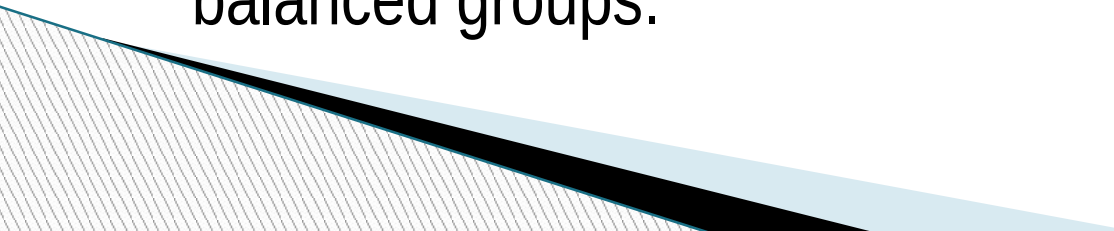
So Why Do Women Leave?

- ▶ Not due to lack of confidence
 - ▶ Not due to lack of interests
 - ▶ Not entirely due to care giving responsibilities
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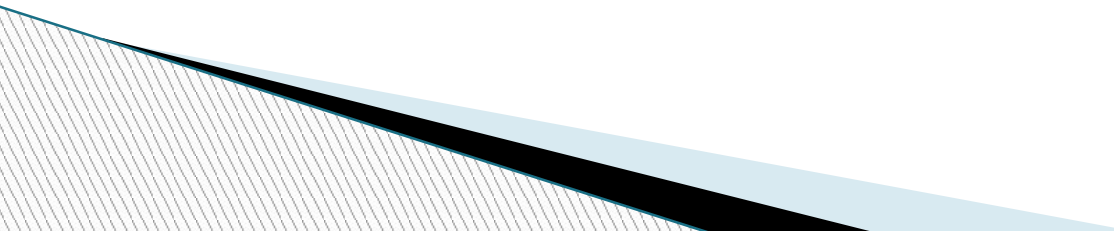
So Why Do Women Leave?

- ▶ Due to unsupportive climate,
 - ▶ Unsupportive supervisors and coworkers.
 - ▶ Due to organizational level barriers in the work environment (sexism, time demands, undermining)
- 

Profile of Women Currently Working In Engineering

- ▶ 87% Worked more than 40 hours a week, avg. tenure at organization- 8 years, and reported earning salaries ranging from \$76,000 to \$125,000.
 - ▶ About half of them were “individual contributors,” one-third were managers, 16% were in executive roles.
 - ▶ For those in management positions, a majority of engineers supervised between 1 to 5 individuals.
 - ▶ Most worked in groups that were predominantly male with a smaller number (18%) reporting working in gender balanced groups.
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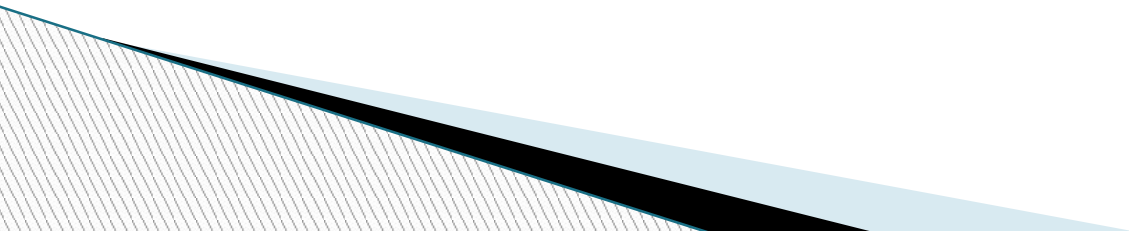
Why Do Women Stay in Engineering?

- ▶ They are satisfied with their jobs and careers
 - ▶ They have supportive bosses and co-workers
 - ▶ Their organizations “get it”- how do they show it?
 - They recognize women’s contributions and care about their well-being
 - They invest in their training & professional development
 - They provide clear, transparent paths for advancement
 - They have supportive work-life policies and a work culture that supports work-life balance for all
- 

In their Own Voices: Women Who are Currently Working in Engineering

“I was fortunate to work with senior male engineering officers who gave me fantastic opportunities and provided outstanding SUPPORT.”

– *Caucasian Civil Engineering Graduate*



In their Own Voices:

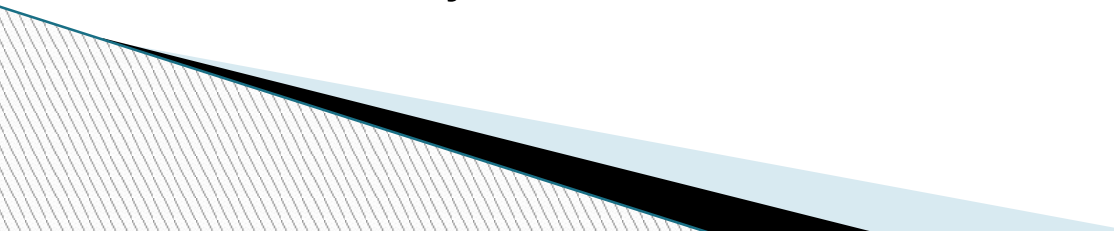
Women Who are Currently Working in Engineering

“ In leaving the technically focused roles, I believe it's because advancement and money are not there. You can ONLY GO SO FAR before you have to shift gears to more business type roles.”

– *Caucasian Mechanical Engineering Graduate*



Are Current Women Engineers a Flight Risk?

- ▶ Yes, they are. And here's why:
 - ▶ Women who thought about leaving their organizations experienced :
 - excessive workload without enough resources, conflicting work demands, and unclear expectations about work goals and standards
 - a career plateau with few advancement opportunities
 - low satisfaction with their jobs and careers
 - a variety of climate related barriers
- 

Workplace Climate that Hinders Persistence: Undermining & Incivility at Work

- ▶ Undermining behaviors targeted at women by their managers and co-workers:
 - Being belittled, insulted, talked about behind the back
 - Being pulled back when trying to succeed at work
- ▶ Working in companies where women are treated in a condescending, patronizing manner by senior managers and co-workers

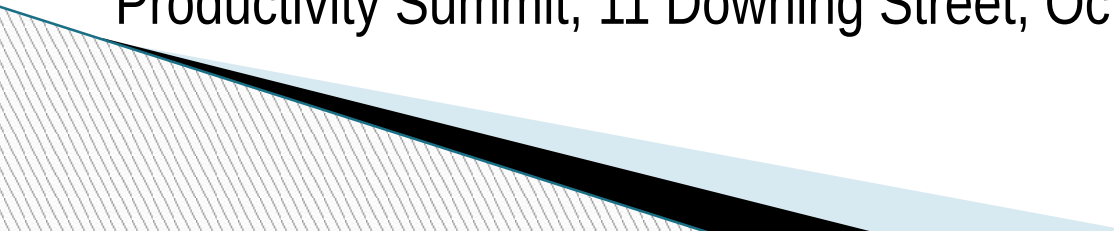
Workplace Climate that Hinders Persistence:

No Support for Managing Multiple Life Roles

- ▶ Companies that did not offer flexible work-life policies
- ▶ Companies with poor work-life cultures stressed:
 - Face-time;
 - Taking work home on weekends and evenings;
 - Working more than 50+ hours/week to get ahead;
 - Regularly putting work before family
- ▶ Companies need both - supportive climate and work-life policies - to attract and retain employees

Women = Dispensable Talent?

“The stock market would not allow the waste of capital in the way we tolerate the waste of female talent and ability.”

- Lord Myners, in his keynote speech at the Report of the Gender & Productivity Summit, 11 Downing Street, October 2004
- 

What Can be Done?

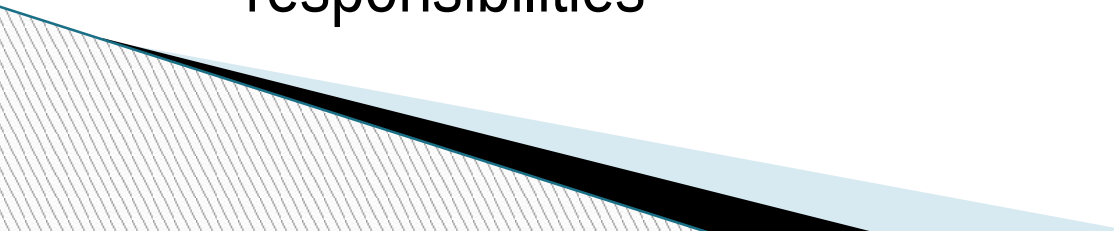
How to Retain Women Engineers

Step 1: Recognize the problem

- ▶ Recognize that --
 - turnover is *not* a woman's issue
 - it is not about women wanting to spend time with their children or taking time for care-giving obligations
 - the reasons why women stay are very similar to why they leave--
 - **Advancement opportunities**
 - **Climate issues**

How to Retain Women Engineers

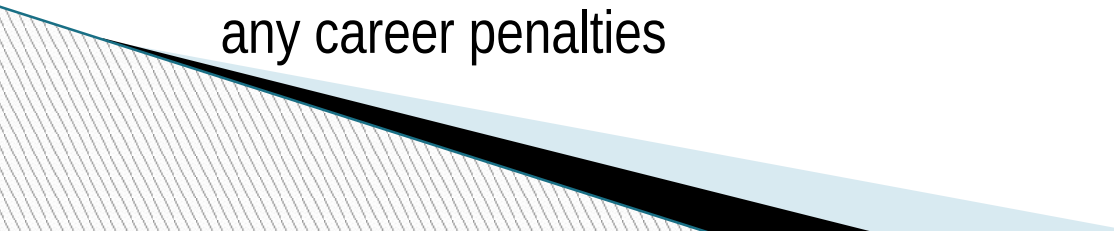
Step 2: **Change starts from the top,**
but leaders all the way down to the front-line supervisor must model the change.

- ▶ Create a culture that --
 - has zero-tolerance for incivility and undermining
 - recognizes employees' contributions and cares about their well-being
 - respects employees' work-life obligations and responsibilities
- 

How to Retain Women Engineers

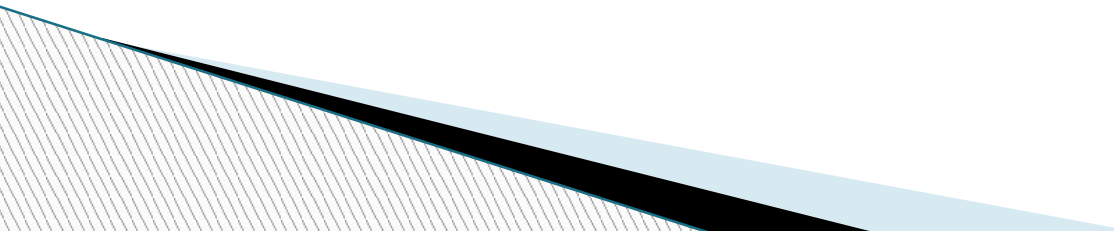
Step 3: Implement system-wide changes;

reinforce the change with metrics and reporting systems that track performance and accountability

- ▶ Create systems and policies that --
 - Invest in skills-based training and overall professional development
 - Provide transparent paths with clear, fair criteria for mobility and advancement
 - Provide opportunities for formal and informal mentoring; other networking opportunities
 - Offer a variety of options to manage multiple life responsibilities, without any career penalties
- 

How to Retain Women Engineers

Step 4: Implement role-level changes

- ▶ Communicate clear work goals and relevance of tasks to the corporate objectives
 - ▶ Clarify what needs to be done, how, and when it needs to be done
 - ▶ Eliminate, when possible, conflicting demands, expectations, and role disruptions
 - ▶ Infuse new resources or reallocate existing ones to streamline work procedures
- 

Summary: Why Would Women Want to Leave

- ▶ Current engineers' desire to leave engineering stems from role-related pressures, hostile climate, job dissatisfaction, inadequate training and development opportunities, and lack of advancement opportunities.
- ▶ No difference in self-confidence possessed by women engineers, regardless of whether they stayed or left.
- ▶ Women engineers who contemplate leaving their organizations also think about leaving the profession:
attrition from organization=attrition from profession

Final Thoughts..

- ▶ All evidence points to one fact: women's departure from engineering is not a woman's issue after all.
- ▶ Women want the same things as men do:

respect and advancement opportunities. When they don't get it, they leave, or bide their time till they can leave.

- ▶ To learn more about the study, please visit:
 - <http://www.studyofwork.com>

Next Steps...

Please contact us:

Dr. Nadya Fouad (nadya@uwm.edu)

Dr. Romila Singh (romila@uwm.edu)

Thank you!



Questions?

- **Remember:**
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