

# CANADA'S CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING

Catherine Mavriplis  
University of Ottawa  
On behalf of  
The National Network of NSERC CWSE Chairs



**NSERC**  
**CRSNG**

Chairs for Women in Science and Engineering  
Chaires pour les femmes en sciences & génie

**Réseau National Network**



# NSERC CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING

The **Chairs for Women in Science and Engineering (CWSE) Program** was launched by **Natural Sciences and Engineering Research Council of Canada (NSERC)** in 1996.

The goal of the program is to increase the participation of women in **Science, Technology, Engineering, and Mathematics (STEM)**, and to provide role models for women active in, and considering, careers in these fields.

## From Coast to Coast



**BC/YUKON**

Dr. Lesley  
Shannon



**PRAIRIES**

Dr. Annemieke  
Farenhorst



**ONTARIO**

Dr. Catherine  
Mavriplis



**QUÉBEC**

Eve Langelier,  
Ing. Ph.D.



**ATLANTIC**

Dr. Tamara  
Franz-Odendaal

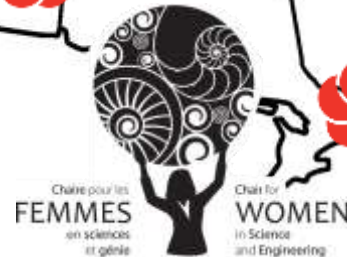


Chairs for Women in Science and Engineering  
Chaires pour les femmes en sciences & génie

**Réseau National Network**



# NSERC CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING



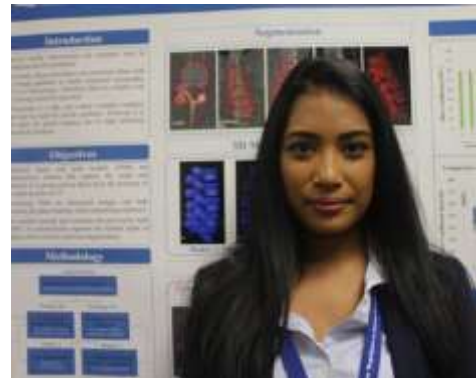
# NSERC CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING

We serve a vast clientele in addition to our vast geography:

- From girls to professionals
- All of Science and Engineering



**YOUTH**



**UNIV  
STUDENTS**



**ACADEMICS**

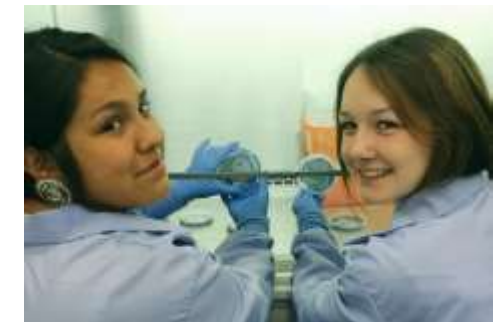
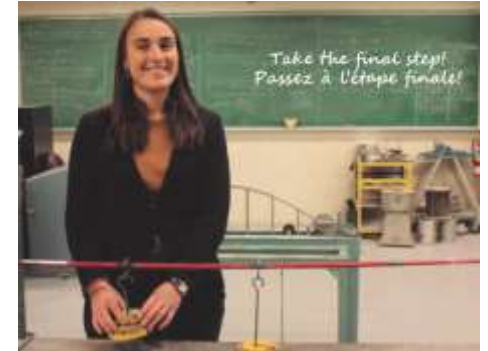


**INDUSTRY  
PROFESSIONALS**

# NSERC CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING

## Example Network activities as a result of cross-fertilization:

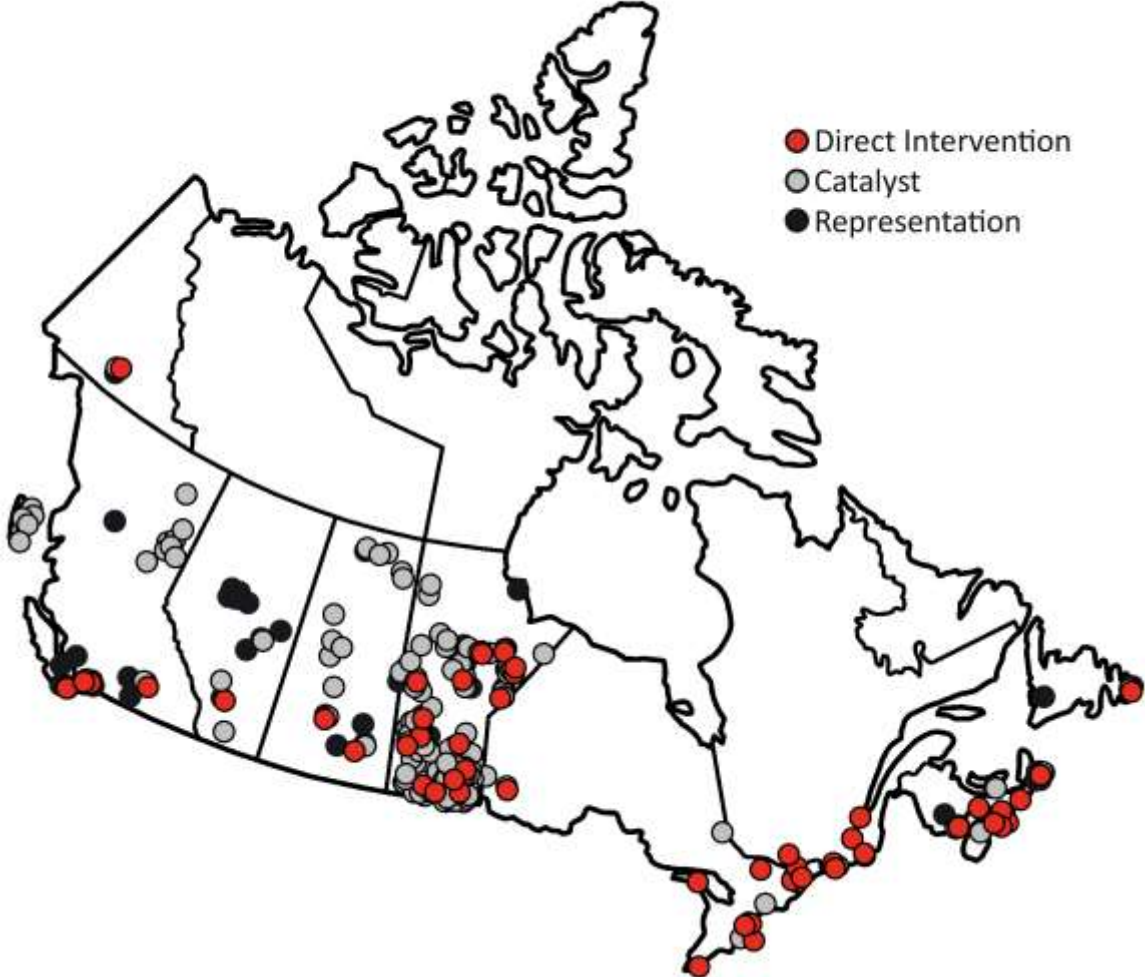
- promotion workshops for aspiring and current women professors across Canada
- through the Prairie Chair's pioneering programs with indigenous youth, new programs are starting
- through the Atlantic Chair's partnership with Techsploration, created a bank of English- and French-language videos for girls/young women to explore STEM careers
- in collaboration with historians, archivists: create an Archive of women scientists and engineers in Canada.





# NSERC CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING

January 2016 to September 2017



<b>Direct Intervention</b>	Communities where Chairholders and/or their regular staff have directly visited for some type of intervention or activity.
<b>Catalyst</b>	Communities where some type of intervention occurred as a result of a Chair program, including locations visited by programs Chairs fund.
<b>Representation</b>	Communities Chairs have accessed by bringing community members to more central locations for interventions or programming. This is often more cost-effective than direct interventions in remote communities.

# NSERC CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING

January 2016 to September 2017



## SHARING PROVEN PRACTICES

- 42 committees
- 181 lectures, panels, courses, and workshops
- 5 conferences



## SHINING A SPOTLIGHT

- 121 academic publications
- 60 mainstream media features and interviews
- 8 regional and national awards



## REACHING OUT

- 14119 youth and parents
- 3561 post-secondary students
- 3163 industry professionals
- 4761 academics and teachers
- 25604 direct interactions**



## BUILDING MOMENTUM

- 11 major grants received
- \$4.9 million** leveraged beyond the original NSERC and matching grants



## BUILDING NETWORKS

- 24 companies
- 72 non-profit organizations
- 7 international partnerships

## WIDE ENGAGEMENT



2399  
Facebook  
likes



3103  
Twitter  
followers



1270  
newsletter  
subscribers



60772  
unique  
web views



Social Sciences and Humanities Research Council of Canada  
Conseil de recherches en sciences humaines du Canada

# NSERC CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING

Many thanks to NSERC and all our partners





Setting the historical scene:  
National initiatives to promote the full participation of girls and  
women  
in Canadian STEM, 1970's-2000's:

**Ruby Heap, PhD**  
**University of Ottawa, Ontario, Canada**  
**Gender Summit11, Montréal, QC**

# 1960's-1970's

## Identifying the « problem » of women in STEM:

- Key role of the « **second wave** » **women's movement** in the late 1960's and 1970's:
- Landmark 1970 Report of the **Royal Commission on the Status of Women**, established in 1967 by federal government: encourages women to « *work in jobs formerly filled by men* », since the « *full use of human resources is in the national interest* ».
- The **underrepresentation of women in the STEM** defined as a « problem » of serious concern that government, the educational sector, policy-makers and activists must address.
- Call for full access of women to «male-dominated professions » is rooted in an **equal rights and social justice framework**

# 1970's-1980's: Women Fulfilling Canada's « manpower » needs

- **Changing economic context** raises federal government's explicit concern with women's participation in STEM

2 major developments:

- Growing fear that serious shortages of university-trained engineers and scientists will affect **Canada's economic competitiveness**

- Increasing number of middle class women graduate from university: defined by government as a reserve of untapped talent

## 1970'S-1980'S: Reaching out to girls and young women: Tackling the «problem» in the classroom

- Supported by the women's movement, teachers, activists and policy makers conduct research and develop initiatives to improve the attitudes towards, and the achievement of girls and young women in science and technology subjects, with the goal to increase their interest in related careers.

**Main barriers identified:** sex-role socialisation of girls at home and at school, «masculine » image of science and technology, lack of inspiring role models

- **Recommended measures:** include appropriate career guidance, measures to change negative attitudes toward STEM; role modelling; hands-on experiments.



# Approach is championned in landmark National Policy Statement

- Science Council of Canada (established in 1966 to advise federal government on science and technology policy)
- **REPORT: Who Turns the Wheel? (1981)**

## 1980's-1990'S: A strong « economic » case for women's participation in STEM

- Approach focuses on the benefits women can bring to science and technology industries.
- Linked to the perceived economic need for their skills, as recognized by both government and industry.
- 1987: federal government adopts first National Science and Technology Policy, which states that Canada's competitiveness in the world relies on larger supply of STEM professionals in industry and universities.
- Women are integrated in government's new « innovation agenda »

# Development of State-Industry-University Partnership model to address « problem »

- Partnership supports several programs aimed at attracting and retaining women in STEM studies and academic careers.
- NSERC takes on leading role as manager of these programs. Example: Women's Faculty Awards Program, established in 1991, to help increase the number of women in faculty positions

.

## 1989: Partnership leads to creation of national Northern Telecom/NSERC Chair for Women in Engineering

- Funded jointly by the federal government and NORTEL; managed by NSERC.
- First Chairholder based at the University of New-Brunswick: Monique Frize, Professor of electrical engineering.
- Mandate: develop programs and strategies to attract, train and retain more women who will work as engineers in industry and academia



# December 6 1989: The « Montreal Massacre ». A catalyst for change

- Tragedy propels the « problem » of women in engineering in the public arena.
- Renewed and increasing concern for the status of women amongst members of the engineering profession.
- U OF T professor Ursula Franklin, a reputed engineer and staunch feminist, will observe:  
*« It became possible to speak publicly about the chilly climate, about bias, about sexism, misogyny and patriarchy.. »*

Paradigm shift: « **Fix the institutions, not the women** »

Report: **More than Just Numbers**, 1992

- Report submitted by CCWE, chaired by Monique Frize; endorsed by government, industry, professional associations and universities.
- Bringing more women in the educational and professional pipeline is no longer enough: **what is needed is to uncover the systemic social and cultural barriers responsible for the under-representation of women in engineering**
- What needs to be « fixed » are not the women, but the institutions (educational and professional).

1996: NSERC expands government-industry-university partnership to expand Chair Program

Creation of five regional chairs, managed by NSERC

PRESENTATION BY CATHERINE MAVRIPLIS

## Into the 21st Century: focusing on the situation of women faculty/researchers

- 2008: Controversy created by results of the first Canada Excellence Research Chairs Competition (no woman in the 19 appointed chairs)
- Federal government asks Council of Canadian Academies (CCA) to strike Expert Panel on Women in University Research. Long-time feminist activist Lorna Marsden chairs.
- Some NSERC Chairholders participate in Panel's activities.



## *Report Strengthening Canada's Research Capacity: The Gender Dimension (2012)*

- Women's progress is uneven by discipline and rank.
- Reports on the paucity of women in leadership positions who can act as mentors and role models, the salary gap, the challenge of work-family life balance, and the persisting « chilly climate » where the « combined effects of seemingly small inequities can create a negative atmosphere ».
- Advocates for « continued institutional transformation »
- Recommends policies ensuring transparency in search processes and allocation of resources, more family-friendly options and more flexible models of career progression, mentorship and sponsorship of new faculty.
- Lorna Marsden shocked and frustrated by the lack of Canadian qualitative and quantitative data, noting the « chronic lack of attention to diversity data ».

# Concluding thoughts

- After more than four decades, the « problem » of women in STEM still exists
- Has become a much more complex one: a multilayered problem which addresses wide range of issues linked to recruitment, retention, and advancement.
- Measures and policies target whole spectrum of educational « ecosystem »: K-12, universities (undergraduate, graduate, post-doc, faculty, administrative functions) as well as a wide variety of workplaces.
- The importance of considering variations in women's numbers experiences according to disciplines and sub-disciplines should not be underestimated.
- Including intersectionality approach is another challenge, but we have to get on board! Goes hand in hand with current efforts to achieve diversity and equity.
- Lack of sophisticated and comprehensive data is of concern to me!

# Concluding thoughts

- The comforting news is that we have entered a new era with the appointment of Minister Kirsty Duncan.
- In an interview with the *Globe and Mail* in 2016, Minister Duncan declared: « I am personally committed to working to improve the representation of women in STEM disciplines, and view this as an important part of my mandate ».

# THE U.S. NSF ADVANCE PROGRAM MODEL



**STEM institutions and organizations that are structured to be inclusive**



**A diverse STEM academic workforce**



**Research-based equity practices in STEM institutions and organizations**



[ADVANCE@nsf.gov](mailto:ADVANCE@nsf.gov)

# Systemic & Organizational Change

ADVANCE focuses on “fixing” STEM systems and organizations  
(not individuals)

Examples of organizational and systemic issues that impact equity include:

- Recruitment, retention, tenure, and promotion policies *and practices*
- Work-life balance and career flexibility policies and programs *and usage*
- Salaries, start-up packages, and access to resources
- Institutional service allocations & requirements (committees, mentoring, etc.)
- Culture and climate of organization
- Accountability of STEM leadership and commitment to diversity

# Organizational Strategies that Work at IHEs

## □ Improvement of Institutional Structures

- Institutional data collection systems; Creating expectations for public reporting of data; Establish processes for using data in decision making; Review and revision of policies, practices, and processes (hiring, tenure, promotion and others) for transparency, clarity, and consistency

## □ Equitable Career Support for Individuals

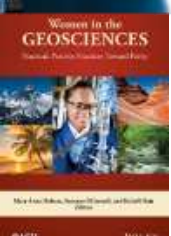
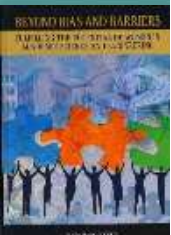
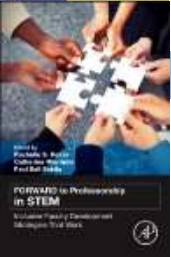
- Formal mentoring programs; Faculty leadership development; Research network development; Policies to support faculty during life events and critical junctures; Checklists for start up packages for candidates

## □ Empowerment of Individuals and Leaders

- Training and awareness building of gender equity issues (implicit bias, micro-aggressions, stereotype threat, tec.); Creating tools and resources for faculty and leadership to use in decision making; Creating accountability measures for leadership and decision makers; combating isolation and creating networks for women in STEM

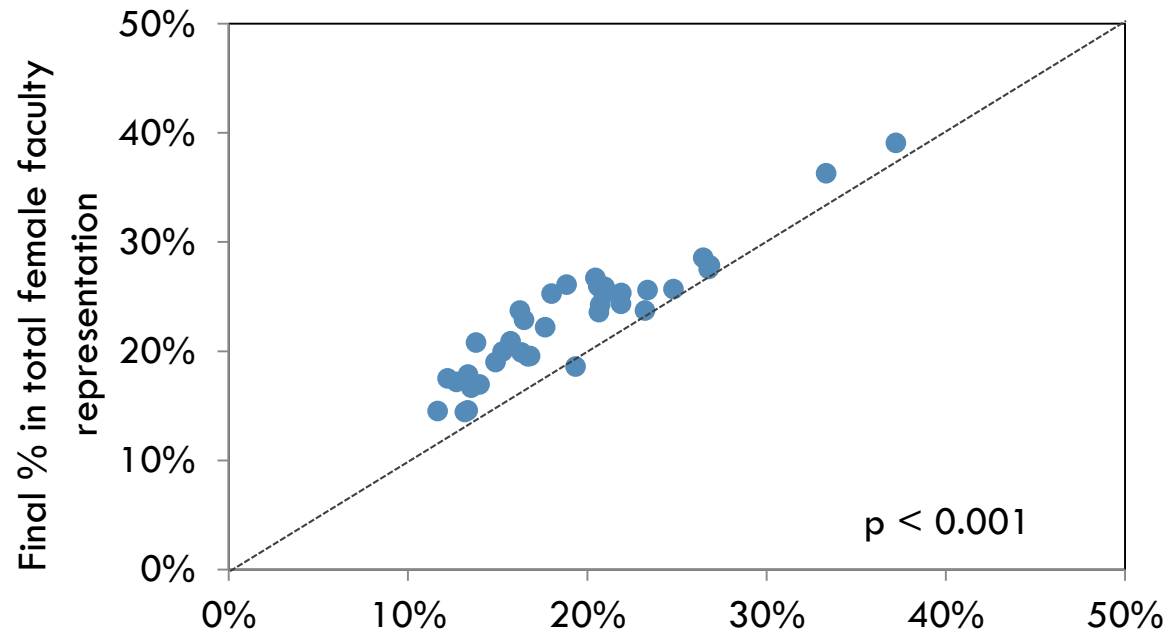
## □ Work Life Support Policies

- Dual career offices and policies; flexible academic career policies; dependent care policies; other work-life balance programs; training for leadership on the implementation of these policies and programs



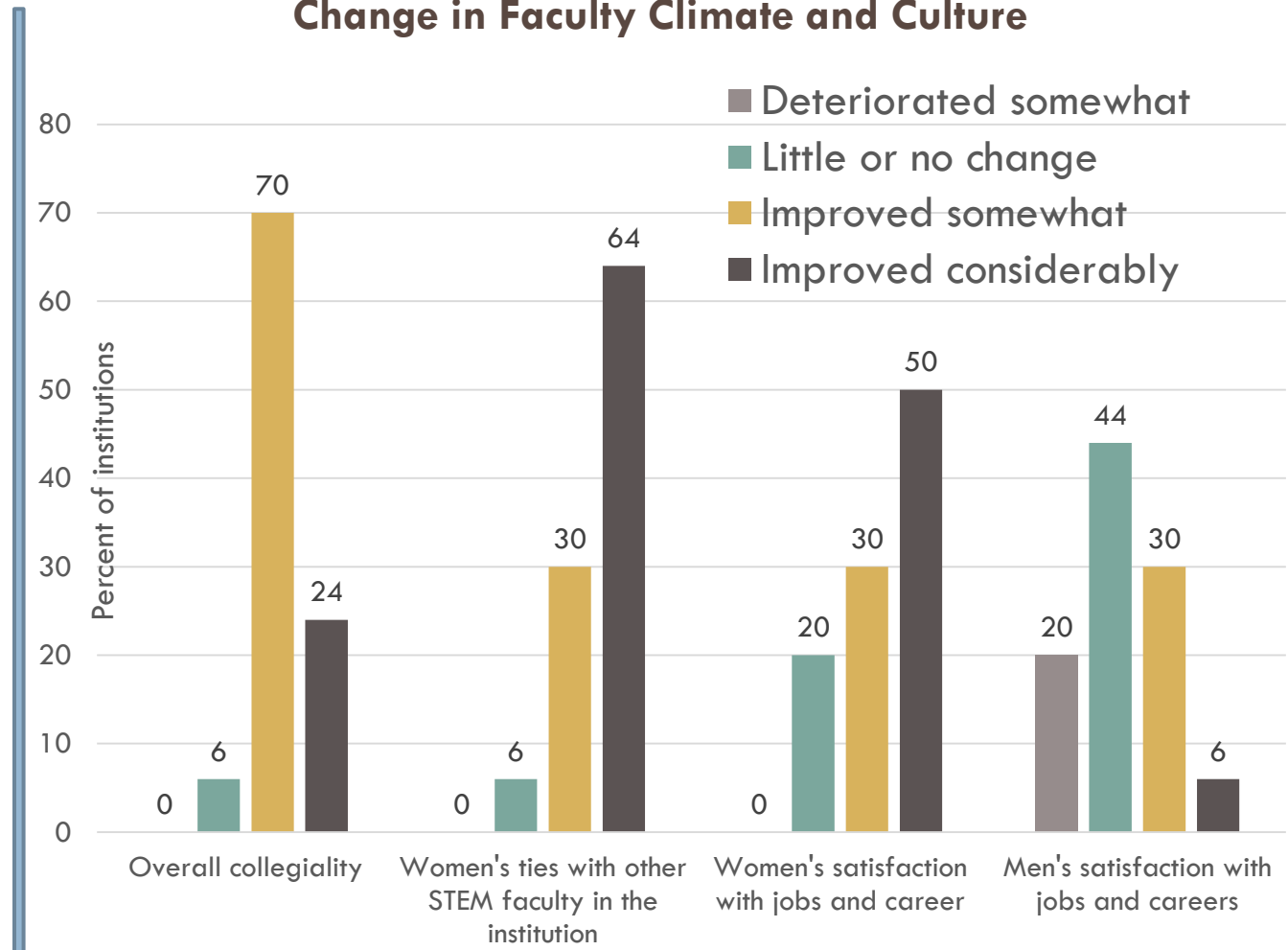
# ADVANCE IT Institutions – Indicators of Change

## Percent Change in Women STEM Faculty



ADVANCE IT Institutions Cohorts 1-4 (n=41)

## Change in Faculty Climate and Culture



# Broader Impacts of ADVANCE

28

- **Movement of ADVANCE Faculty and Administrators** among higher education institutions – transfers best practices with and without grant funds
- **What works to recruit, retain, and promote women in STEM academics improves the institution for all:**
  - Issues for other underrepresented groups can also be addressed
  - Men now enter the work force with an interest and expectation for work-life balance
  - Non-STEM disciplines benefit from institution-wide changes
- **Cost/benefits:** The cost of implementing these programs can be offset by productivity and retention of faculty
- **Institutional peer pressure** to undertake equity efforts to remain competitive with peer institutions to recruit and retain faculty and students
- **Systems to collect detailed faculty data** and expectations that this data will be reported publicly and used in decision making



# Next Steps for ADVANCE

## **Focus on Intersectionality:**

- Barriers to gender equity may not be identical for all groups of women faculty in STEM
- All ADVANCE proposals are expected to offer strategies to promote gender equity for all faculty and address intersectionality

## **More and better sharing from ADVANCE:**

- ADVANCE Resource Coordination Network project – AWIS recent grant
- Strategies for Effecting Gender Equity and Institutional Change  
<http://www.colorado.edu/eer/research/strategic.html>

## **The role of other systems and organizations on equity:**

- STEM professional societies, leadership councils, funding agencies, etc.

# NSF's Career Life Balance Initiatives



- All NSF grant principle investigators have:
  - ▣ Flexibility in timing of the start and end dates of research grants
  - ▣ Access to grant supplements for research technicians to sustain research
  
- Family-friendly policies in early career programs: Graduate Research Fellowships, CAREER, and post doctoral fellowships.
  - ▣ Deferrals for family related situations
  - ▣ Grant supplements for research technicians
  
- Increased use of virtual peer review panels to broaden participation of panelists who cannot easily travel

[www.nsf.gov/career-life-balance](http://www.nsf.gov/career-life-balance)

# ADVANCE Resources

## Individual ADVANCE project websites, for example:

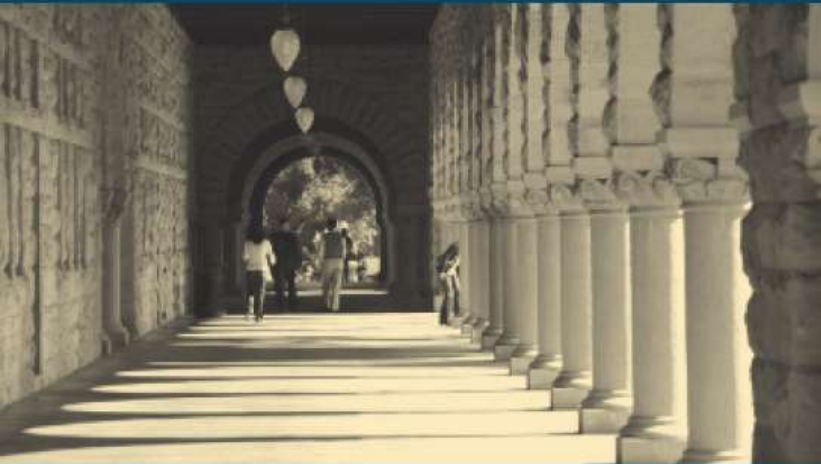
- University of Michigan <http://advance.umich.edu/>
- WISELI <http://wiseli.engr.wisc.edu/>
- Hunter College <http://www.hunter.cuny.edu/genderequity/>

## Synthesis or collections of ADVANCE products and strategies:

- Strategies for Effecting Gender Equity and Institutional Change <http://www.colorado.edu/eer/research/strategic.html>
- ADVANCE Portal <http://www.portal.advance.vt.edu/>
- ADVANCE Implementation Mentors (AIM) Network <http://advanceaimnetwork.org/>



# ADVANCE



Increasing the Participation and  
Advancement of Women in Academic  
Science and Engineering Careers



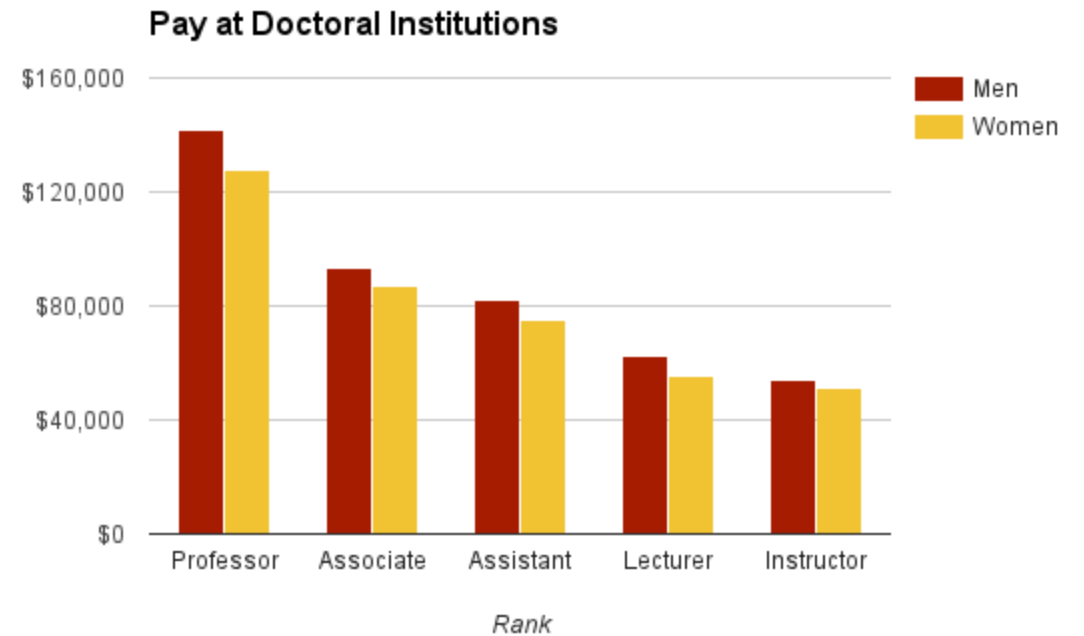
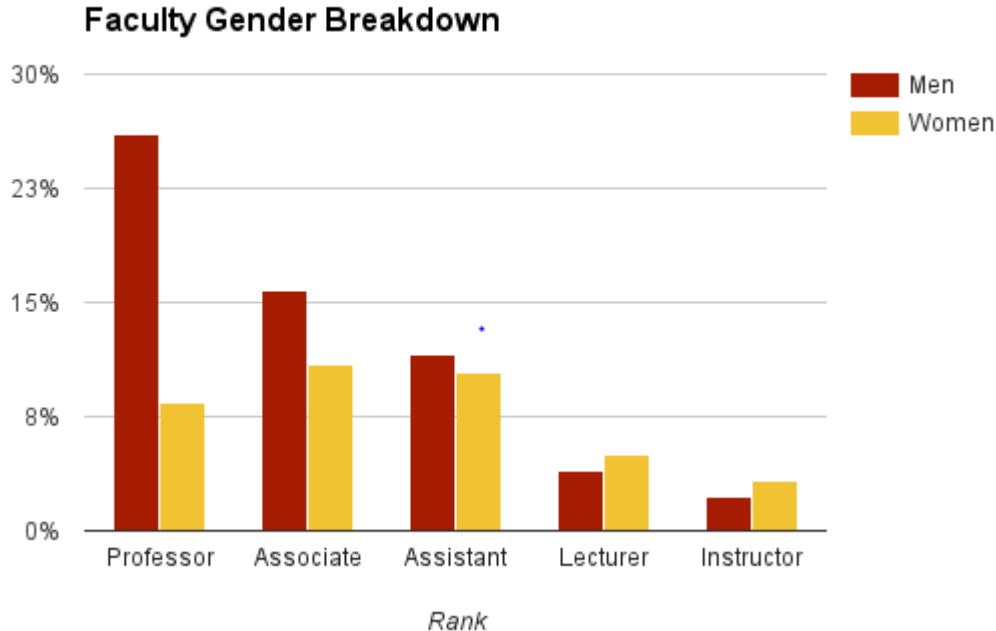
## THANK YOU

# THE ADVANCE MODEL: Systemic Change to Enhance Equity in STEM Academic Careers

[ADVANCE@nsf.gov](mailto:ADVANCE@nsf.gov)

# Equity (or Equal Opportunity)

- Equity issues may exist even if proportional representation is achieved.
- Pay gaps are an example of a gender equity issue in academics that may persist even with full participation of women:



# ADVANCE Institutional Transformation Example

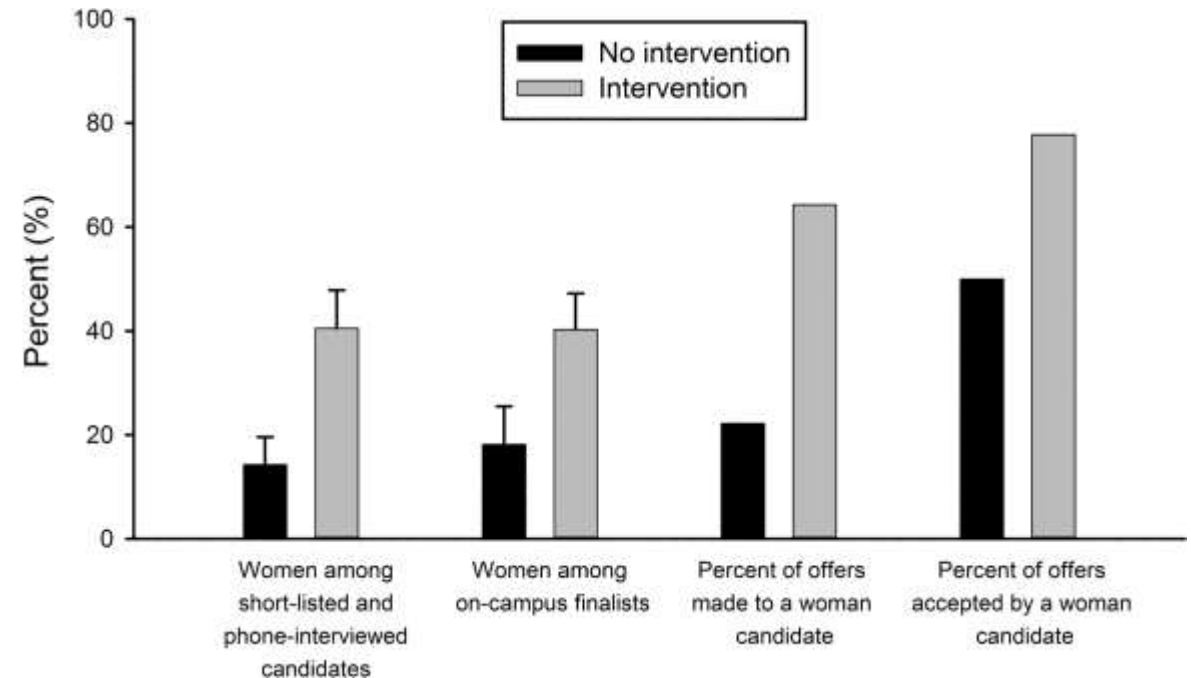
## Montana State University

Intervention with search committee chairs had impact on hiring of women compared to control search committees (total searches=23):

- 6.3 times more likely to make an offer to women
- Women were 5.8 times more likely to accept an offer if made

The intervention was provided by a faculty peer:

- 1) Tip sheet and search toolkit overview
- 2) 30 min overview of implicit biases
- 3) Discussion of work-life integration and suggestion to have candidates meet with a family advocate for 15 mins



Jessi L. Smith et al. *BioScience* 2015;65:1084-1087



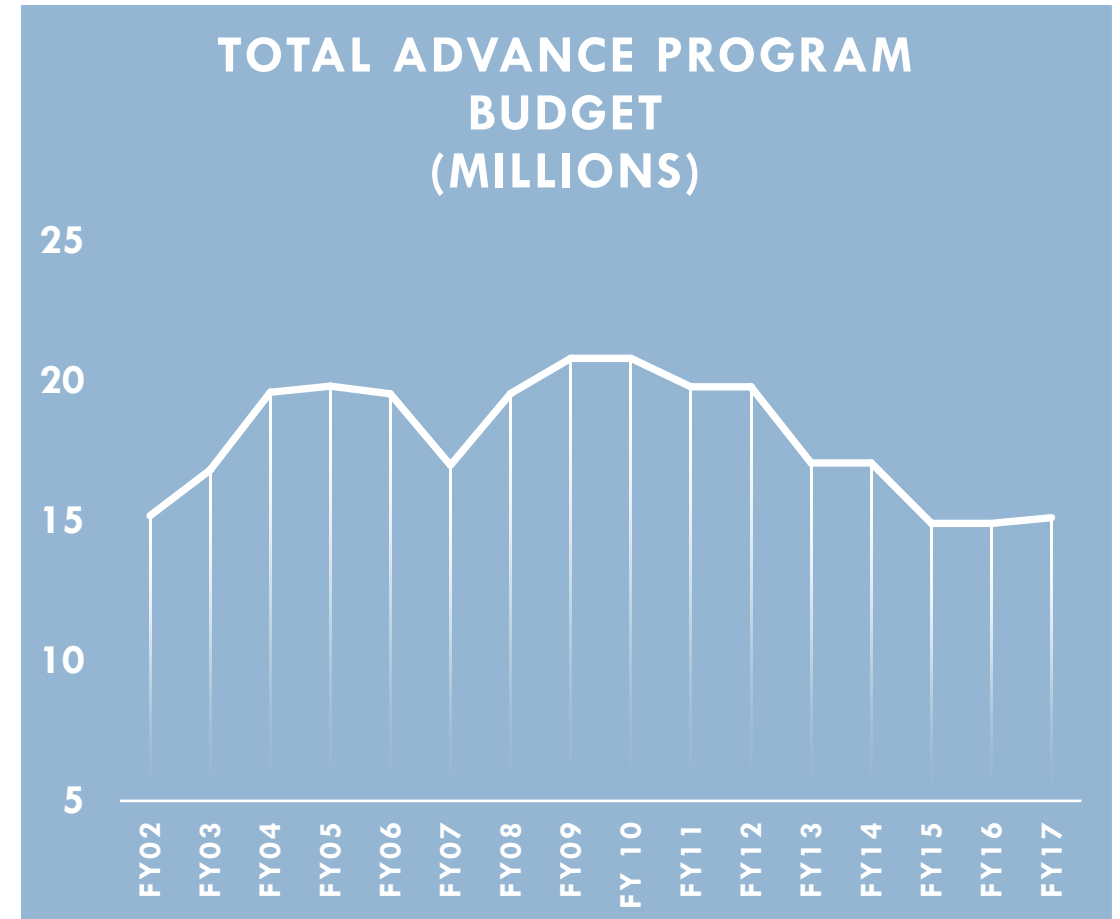
# National Science Foundation's ADVANCE Program

## 65 Institutional Transformation awards

- ~2% of all non-profit IHEs in U.S.
  - But 28% of very high research IHEs
  - 17% of ITs are to minority-serving institutions

## *Adaptation and Partnership* awards to spread promising practices

- 99 additional non-profit IHEs in U.S.
- 10 STEM professional societies



# ADVANCE Grant Types NSF 16-594

## *Institutional Transformation (IT)*

- Develop, implement, and study innovative organizational change strategies to foster gender equity
- Up to \$3M over five years
- Single IHE that has not had IT before (all STEM)
- Preliminary proposal April 12, 2017\* (required)
- Proposal (if invited after preliminary) Jan. 17, 2018\*

## *Adaptation*

- Adapt proven organizational gender equity strategies
- Up to \$1M over three years
- Single IHE that has not had IT before (all STEM)  
or
- Single non-profit org. (one or more disciplines)
- LOI Aug. 9, 2017\* (required)
- Proposal Sept. 13, 2017\*

## *Partnership*

- Scale-up proven systemic gender equity strategies for national or regional impact
- Up to \$1M over 3-5 years
- Two or more partner orgs.
- One or more disciplines
- LOI Dec. 14, 2016\* (required)
- Proposal Jan. 11, 2017\*

\*These deadlines will recur every other year until the solicitation is replaced.



# HeForShe at National Autonomous University of Mexico (UNAM)

Cecilia Noguez  
Instituto de Física UNAM



# UNAM

is the oldest and largest university in Mexico with campuses in all the country, as well as in Canada, China, Costa Rica, France, UK, Spain, and USA



Main campus in Mexico City UNESCO declared World Heritage in 2009



Library in main campus in Mexico City

## Students 349,539

205,648 Undergraduate

30,363 Graduate

112,624 High School

## Professors 40,184

12,292 Full time

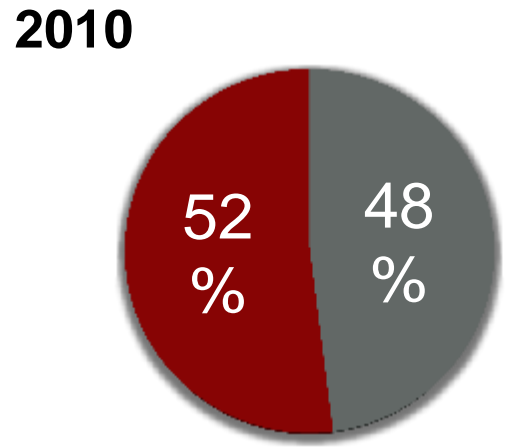
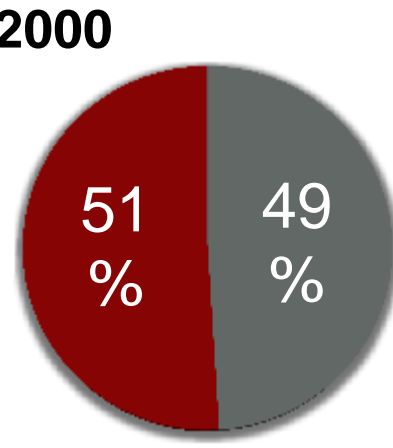
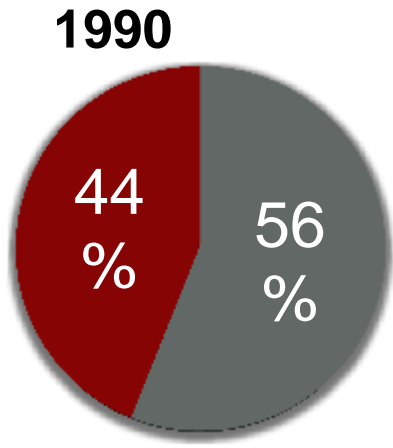
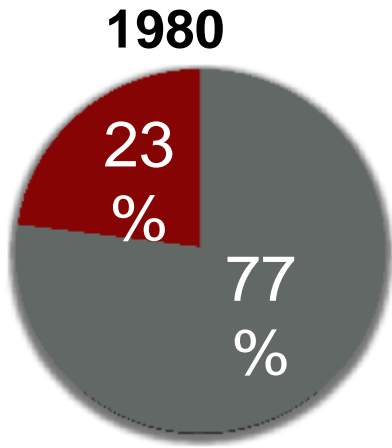
27,892 Part time

## Schools 26 + 48 Research Centers

121 Undergraduate programs

41 Graduate programs

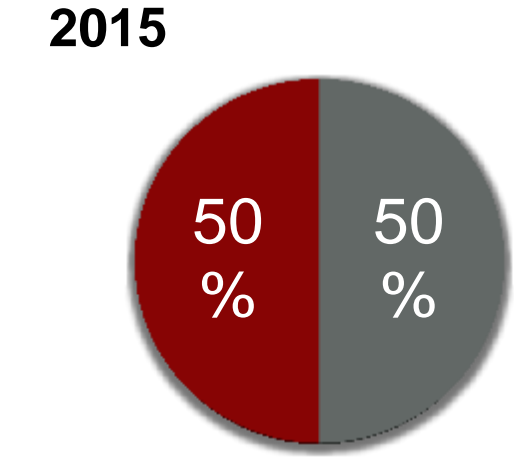
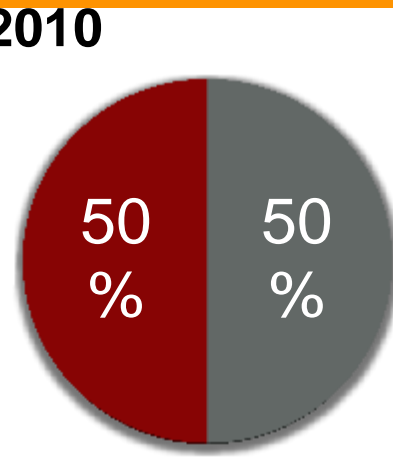
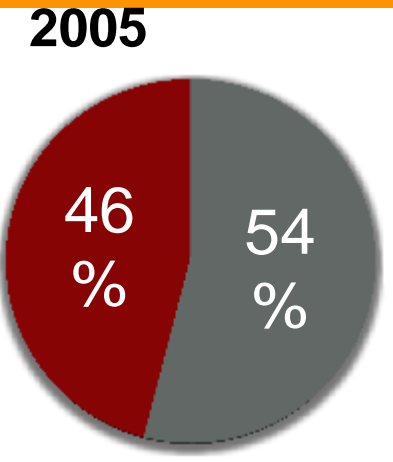
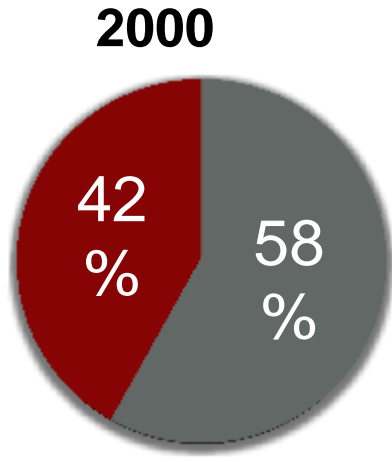
# Undergraduate Population



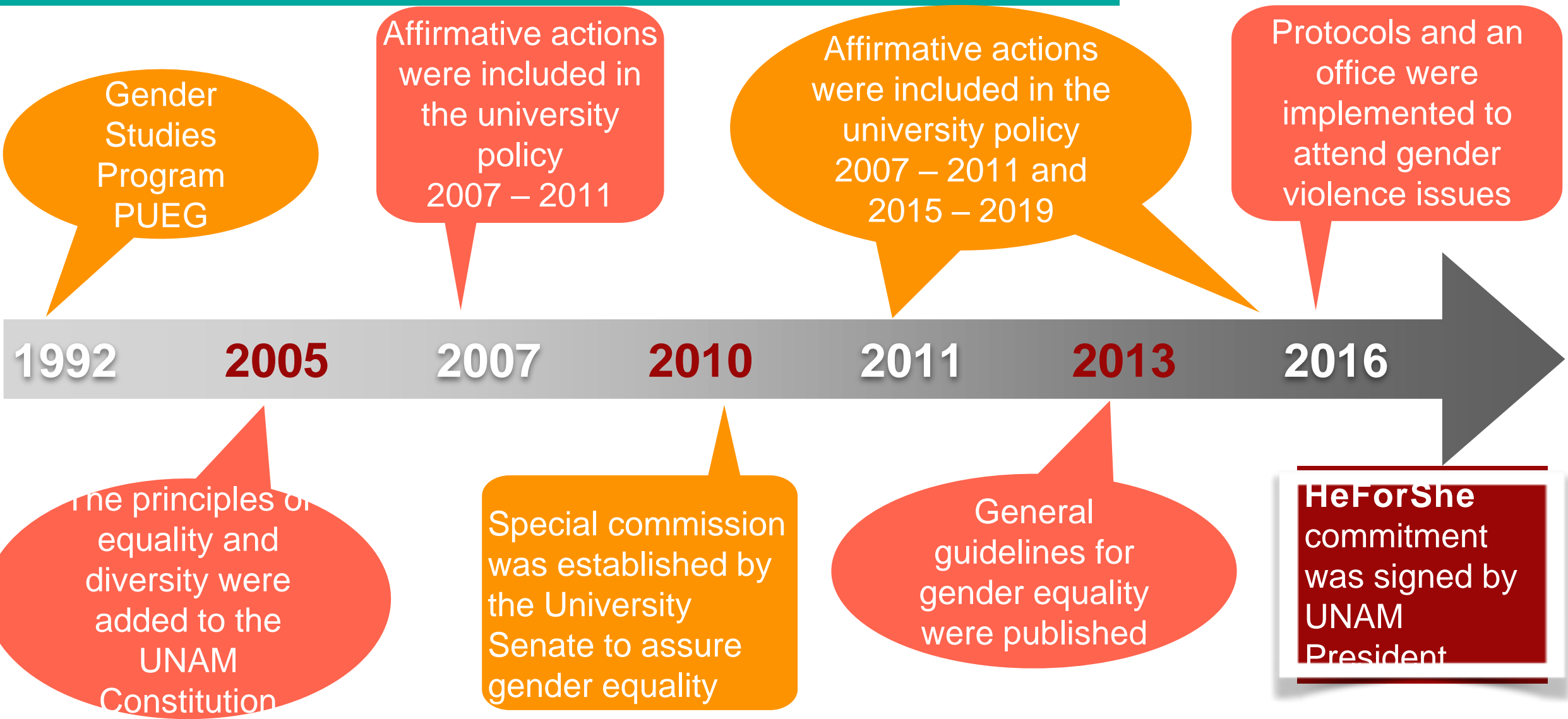
Men

Women

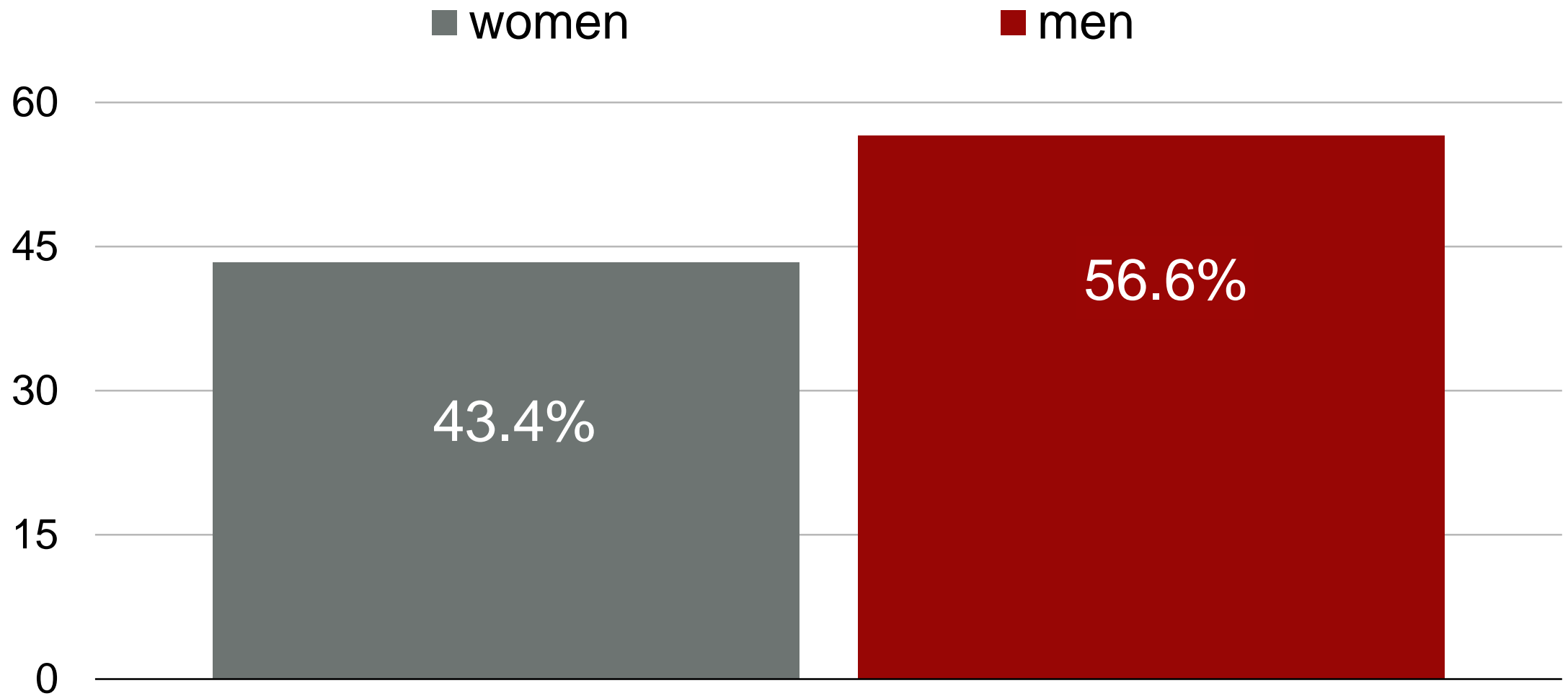
# Graduate Population



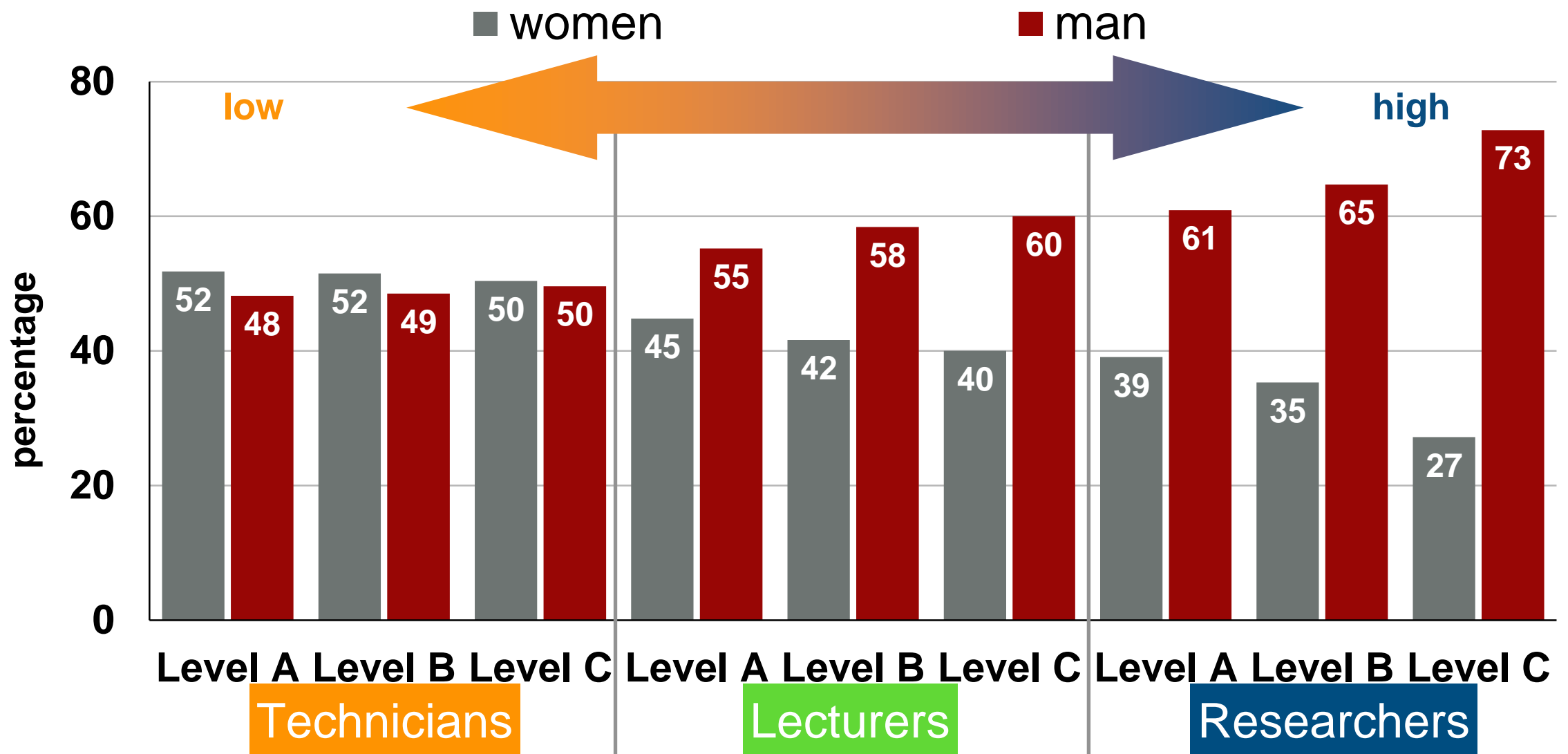
# What we have done at UNAM



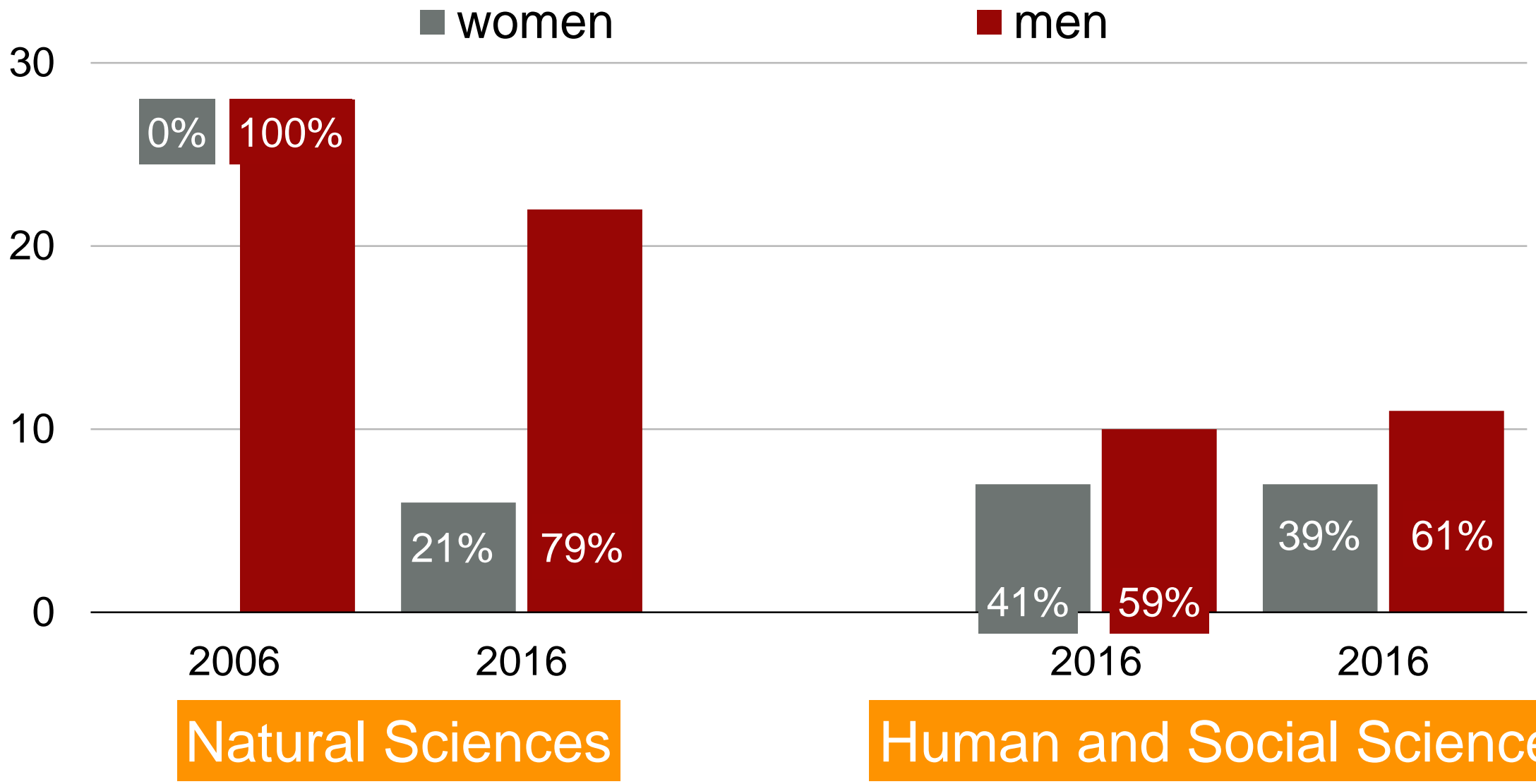
# Faculty and staff in 2012



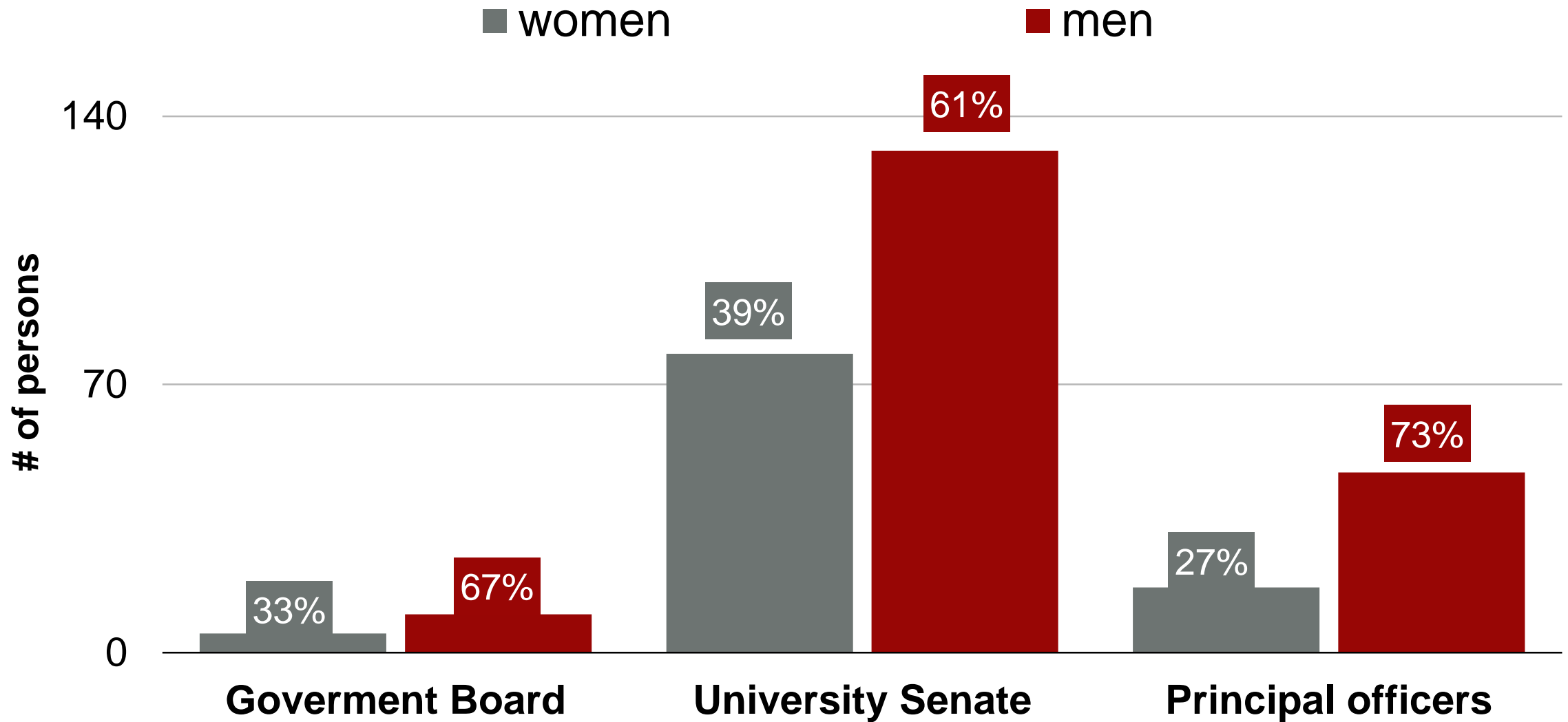
# Faculty and staff in 2012 by rank



# Chairs of Research Centers

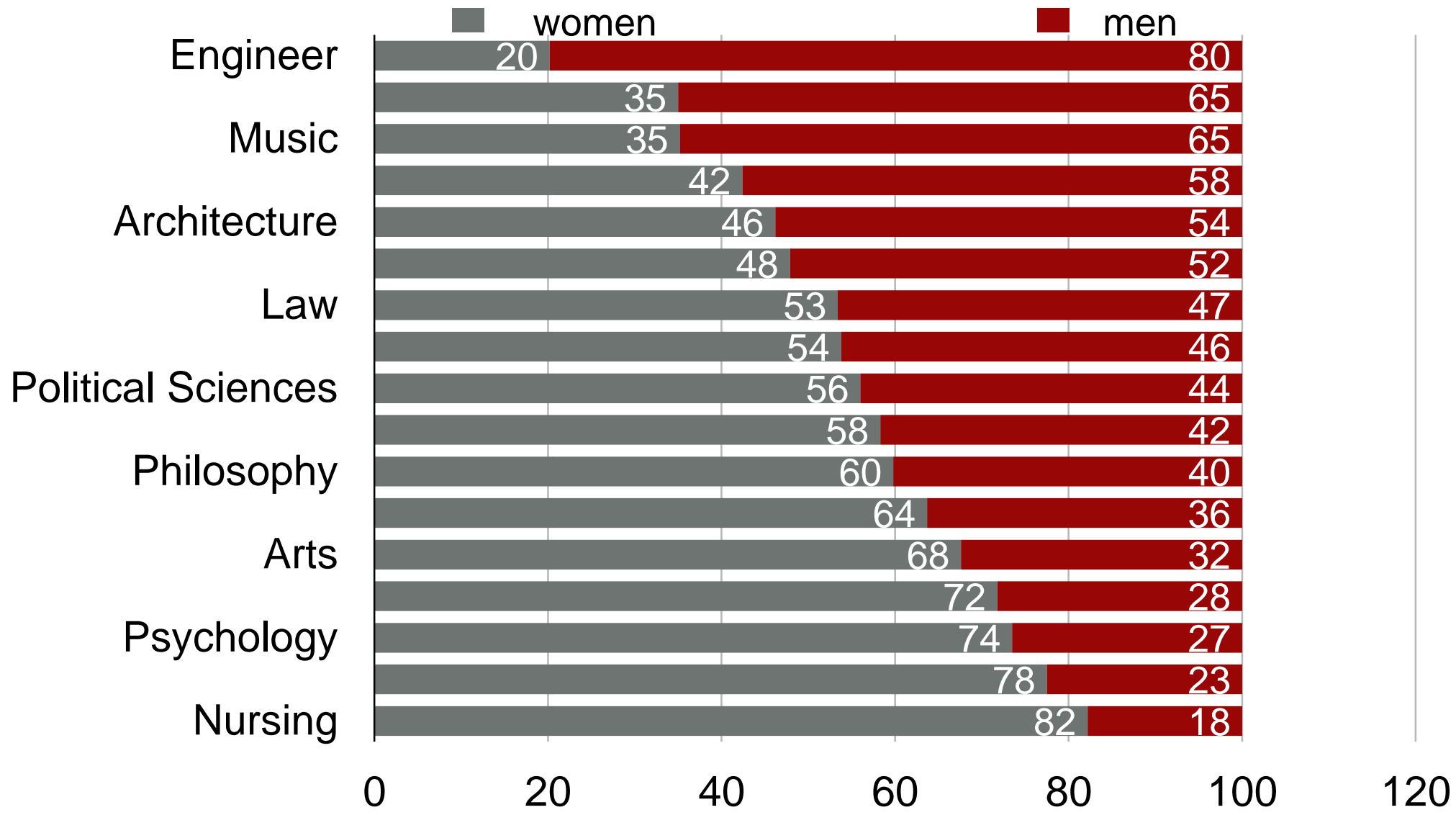


# University Governance





# 2012 Undergraduate Population (%)



# Ad Campaigns: printed, radio, etc.



# Ad Campaigns: printed, radio, etc.



**UNAManera**  
de respetarme es decirme  
ingenier<sup>a</sup> en vez de ingeniero

Igualdad entre mujeres y hombres  
Nuestra manera de ser Pumas

Los maestros demostramos  
**UNAMe** mejor formación  
si también compartimos  
las tareas de la casa



Igualdad entre mujeres y hombres  
Nuestra manera de ser Pumas

**UNAM**ente abierta  
reconoce que las mujeres  
tienen los mismos derechos  
que los hombres



Igualdad entre mujeres y hombres  
Nuestra manera de ser Pumas

**UNAM**anera de ser justos:  
Puestos directivos para las mujeres



Igualdad entre mujeres y hombres  
Nuestra manera de ser Pumas



# HeForShe IMPACT 10x10x10

## 10 Global Universities



## 10 Corporate Leaders



## 10 Heads of State



# COMMITMENTS AND PROGRESS



## Commitment 1: STEM Outreach

Boost female student participation in STEM outreach experiences and activities to build the pipeline of future female leaders to **33 per cent by 2020**.

**We exceed this goal and reached 35 per cent in 2017.**



## Commitment 2: Female Faculty

Enhance female faculty representation to **30 per cent by 2020** to improve the campus environment today and drive towards parity in the future.

**We are just shy of our goal at 29 per cent in 2017.**



## Commitment 3: Female Leaders

Attract and advance female leaders into senior academic and administrative university positions to **29 per cent by 2020**.

**We are at 27.5 per cent in 2017. Up from 24.5 per cent in 2014.**

# TAKING ACTION

- HeForShe IMPACT Scholarships
  - 18 recipients of IMPACT Scholarships since 2015
- Establishment of Faculty and Campus Advocates
- Leadership and Mentorship Roundtables
- Gender Equity Research Grants
- HeForShe Writing Contest and Anthology
- Positive Masculinity Workshops
- New STEM Outreach Programs
  - *Girls in Indigenous Communities*
  - *STEM Outreach Website*
  - *Physics: Girls Matter*



## #CountMeIn Social Media Campaign

The #CountMeIn social media campaign was launched on June 12, 2017 to help raise awareness and show others that you stand for gender equity