

---

# Maximizing Workforce Participation by Women in Science & Engineering

---

*Cecilia Moloney*

NSERC/Petro-Canada Chair for Women in Science  
and Engineering (Atlantic Region),  
Memorial University of Newfoundland

---

# Outline

- Overview of NSERC Chairs for Women in Science and Engineering (CWSE) program
- Why women in science and engineering?
- The challenges illustrated
- Opportunities and key players
- Guidelines for successful strategies
- Workplaces that work, with increased women in science and engineering
- Conclusions

---

# The NSERC CWSE Objectives

- Develop, implement, and communicate strategies to raise participation rates, viz.
  - To encourage careers, increase enrolment, increase profile, improve retention, eliminate roadblocks, promote integration
- Provide role models
- Have regional and national impact on opportunities for women in S&E

# National Set of CWSEs

<b>Region</b>	<b>Chairholder &amp; University</b>	<b>Corporate Sponsor</b>	<b>Term</b>
Atlantic	Dr. Cecilia Moloney Memorial University	Petro-Canada	2004-2009
Quebec	Announcement pending		
Ontario	Dr. Valerie Davidson Univ. Guelph	Hewlett-Packard (Canada)	2003-2008
Prairie	Dr. Julita Vassileva, Univ. Saskatchewan	Cameco	2005-2010
BC & Yukon	Dr. Anne Condon UBC	General Motors of Canada	2004-2009

[www.nserc.gc.ca/programs/wise\\_e.htm](http://www.nserc.gc.ca/programs/wise_e.htm)

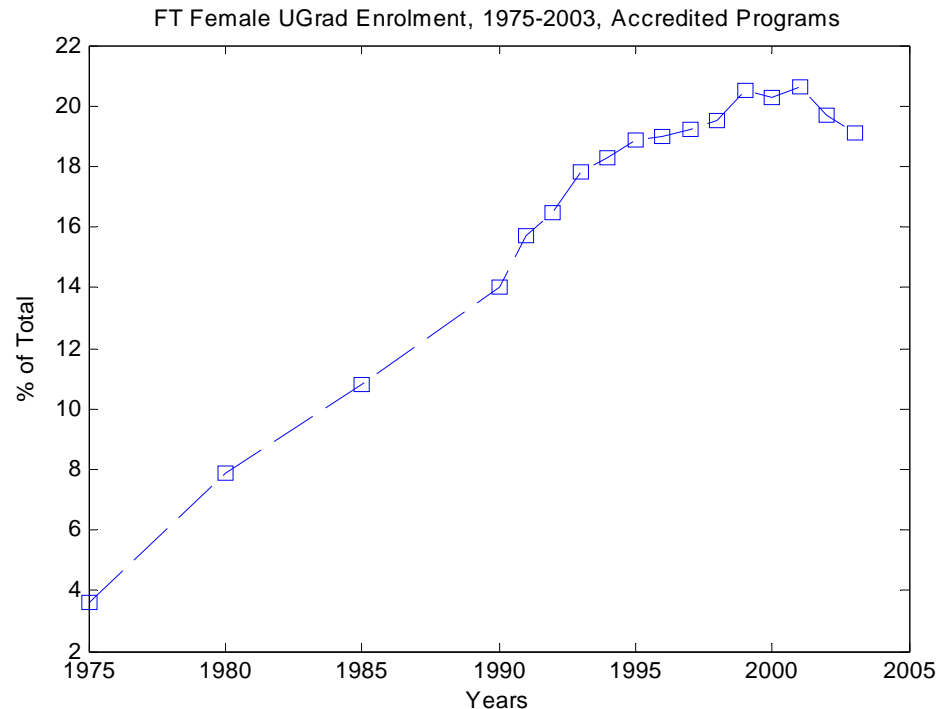
# Why women in science and engineering?

- For individual - opportunities for personal satisfaction and economic success
- Industry - skilled workers
- Governments - job and wealth creation
- Society - an enriched culture; fairness and equity; broader set of perspectives in design and decision-making
- Universities – to further societal goals; maintain or increase enrolments

---

# Women in science and engineering: The challenges illustrated

# Participation by women in engineering, in undergraduate programs, Canada



**Note:**  
**Max**  
**20.6%**  
**in**  
**2001**

Full-time Female Undergrad Enrolment in Accredited Engineering Programs, 1975-2003. Source: CCPE “Canadian Engineers for Tomorrow”, 2003 & 2005. Table U.1.2. Available [www.ccpe.ca](http://www.ccpe.ca)

# Participation by women across academic levels, science and engineering, Canada

% women	Bachelor degrees MUN, 1999-2003	Master FTE enrolment, 1999-2000	Ph.D. FTE enrolment 1999-2000	Full-time Faculty, all ranks, 2000-01	Full-time Full professors 2000-01
Biology	64.8%	54.6%	40.6%	23.8%	15.7%
Math	50.7%	38.5%	22.6%	13.1%	7.0%
CS	18.0%	26.9%	19.5%	15.7%	5.3%
Physics	17.1%	25.4%	18.9%	8.1%	2.5%
Electrical Engr	22.5%	19.1%	13.6%	4.9%	1.6%

Sources of data: Aggregated, 1999-2003, from MUN Factbook 2003, Table 4A, available [www.mun.ca/ciap/factbook/](http://www.mun.ca/ciap/factbook/); CAUT Almanac 2004, Table 5.10; CAUT Almanac, Table 4.9, available [www.caut.ca/en/publications/almanac](http://www.caut.ca/en/publications/almanac).

# The larger challenge, e.g. engineering

“... neither women nor men will choose engineering for the right reasons unless the profession can reach out to a broad population with a full portrait of the richness of its culture and practice, and with a clear map of its intersections with and divergences from bench science.”

- Clifford Adelman, US Dept of Education, 1998

Adelman, C. (1998). Women and men of the engineering path: A model for analyses of undergraduate careers, US Department of Education (PLLi 98-8055). Available [www.erc-assoc.org/nsf/engrg\\_paths/](http://www.erc-assoc.org/nsf/engrg_paths/)

# Opportunities

- To recruit women into science and engineering, all academic levels, all disciplines
- Key players:
  - K-12 school system
  - Universities
  - Governments
  - Industry
  - Professional organizations
  - Outreach programs by community groups
  - Etc.

# Opportunities, con't

- To retain women in science and engineering, all levels and disciplines, all sectors of industry, government, academia
- Key players:
  - K-12 school system
  - Universities
  - Governments
  - Industry
  - Professional organizations
  - Outreach programs by community groups
  - Etc.

# Guidelines for Successful Strategies

- For both recruitment and retention, need to develop two types of strategies
  - Encouragement of the individual
    - E.g. academic: Programs to introduce girls to science and engineering, scholarships, mentoring, etc.
  - Institutional change
    - E.g. Academic: Diversity in teaching styles and course content, educating administrators and staff to gender schemas. E.g. careers: Promoting balance, flexibility in career paths, etc.
    - Institutional funding of good management practices
- Implement strategies to address all levels
  - School girls, to faculty, to corporate offices

---

# Guidelines for Successful Strategies

- Do a good job by those girls and women already “in” science and engineering
  - While recruiting more ...
- Fund programs...
  - Don't just rely upon the efforts of keen volunteers, especially for programs to engage young people
- Work together, across university, school boards, government, the corporate sector, professional organizations, community groups, etc.

---

# Workplaces that work

“Management practices and workplace cultures that are good for women are also good for men and for the employer’s financial results.”

McLean, D. (2003). Workplaces that work: Creating a workplace culture that attracts, retains and promotes women, a report prepared 2003 for the federal/ provincial/ territorial ministers responsible for the status of women Available [www.exec.gov.nl.ca/exec/WPO/eng/wpo\\_publ.htm](http://www.exec.gov.nl.ca/exec/WPO/eng/wpo_publ.htm)

---

# Workplaces that work (2003 Status of women report)

- Support positive relationships among all people
- Do not reinforce gender stereotypes in occupations and roles
- Support good working conditions for all, including work schedules, physical environment, etc.
- Have a “critical mass” (~33%) of women in all groups, at all levels
- Provide opportunities for advancement for all
- Have good policies and procedures to deal with workplace harassment
- Promote work-life balance

---

# The business case for women in SETT (2005 CCWESTT report)

Based on a pan-Canadian consultation with stakeholders (Phase I)

Report details the benefits of gender diversity in science, engineering, trades, and technology (SETT)

Re. Solutions to skills shortages

“It is clearly critical to attract more students and professionals, especially women, to these fields if we are to address shortfalls in the science and engineering workforce and strengthen our global economic competitiveness.”

CCWESTT, “Increasing Women in SETT: The Business Case”, December 2005. Available [www.ccwestt.org](http://www.ccwestt.org)

---

---

# The business case for women in SETT (2005 CCWESTT report)

Re. Increased innovation capacity

“Not only do we need the numbers; we need the diversity of perspectives at all levels that a more inclusive S&T community can provide.” Arthur J. Carty, former National Science Advisor  
(Cited in report)

CCWESTT is presenting this business case to decision makers, along with the details of a national model for influencing policy and for increasing women’s participation in SETT

CCWESTT, “Increasing Women in SETT: The Business Case”, December 2005. Available [www.cctestt.org](http://www.cctestt.org)

---

# Global institutions that work (2006 Interacademy council report)

- Show commitment from senior administration
- Have open and transparent management structures
- Regularly review policies and procedures for gender implications
- Provide leadership training and mentoring
- Gather sex-aggregated data and routinely monitor progress

Report details in References

---

# Conclusions

- Maximizing workforce participation by women in scientists and engineers requires
  - Further recruitment into educational programs and into the workplace, at all levels
  - Retention of women, through good management practices, both in academic institutions and in workplaces
- We must all work together
- Anything that we do for women will be good for everyone

# References

- Adelman, C. (1998). Women and men of the engineering path: A model for analyses of undergraduate careers, US Department of Education (PLLi 98-8055). Available [www.erc-assoc.org/nsf/enrg\\_paths/](http://www.erc-assoc.org/nsf/enrg_paths/)
- McLean, D. (2003) Workplaces that work: Creating a workplace culture that attracts, retains and promotes women, a report prepared 2003 for the federal/ provincial/ territorial ministers responsible for the status of women. Available [www.exec.gov.nl.ca/exec/WPO/eng/wpo\\_publ.htm](http://www.exec.gov.nl.ca/exec/WPO/eng/wpo_publ.htm)
- Canadian Coalition of Women in Engineering, Science, Trades, and Technology (CCWESTT), Increasing women in SETT: The business case, Dec 2005. Available [www.ccwestt.org](http://www.ccwestt.org)
- Interacademy Council (2006), Women in science: An advisory report. Available [www.interacademycouncil.net](http://www.interacademycouncil.net)