The Elephant in the Room: The Under-Representation of Women in the MPI Community

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Overview

Why?

What have we found?

What can we do about it?

Why is diversity important?

- Everyone should be given an opportunity irrespective of who they are
- Diverse teams = better team IQ
  - Mixed gender teams are beneficial for output, productivity, improved publication rate and impact of research
- Recruitment
  - US Dept of Labor: 19% increase in computer scientists in workforce is needed between 2010 and 2020
  - Canada needs additional 182,000 IT positions
  - Europe: expects 900,000 IT sector job shortfall by 2020
  - Women are 51% of the population: to exclude them massively limits your potential talent recruitment pool

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What is the problem?

Are there women in HPC? Where are they?

- School age education
- Undergraduate degrees (HESA 2014/15):
  - Despite increased enrollment of women in degrees there was a 40% drop in the number of degrees in computer science awarded to women in the US 2001-2006
  - Women are more likely to study subjects allied to Medicine (81%), Veterinary Science (75%) and Agriculture & Related Subjects (63%)
  - Men are more likely to study subjects including Engineering & Technology (86%), Computer Science (83%) and Architecture, Building & Planning (66%)
- Postgraduate education
- Job sector
  - Young women often leave computer science or terminate their training earlier than men
  - UK Tech sector: 17% female
  - European Tech sector: 16% female
  - USA computational and mathematics: 26% female
  - *But women are 49% of the UK< 55% of European and 47% of the USA workforce*

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What about HPC?

- EASC 2013 – 9%
- PGAS 2013 – 5%
- Supercomputing 2014 – 11% (possibly as high as 14%)
- EASC 2015 – 15% women (only 9.5% when EPCC staff excluded)
- PRACEDays15 – 17% female attendees (averaged across all sessions, 21% of registrants)
- SC15: 11% of technical programme attendees were female

- Authorship for SC16:
  - 265 accepted submissions include at least one female author, 525 include only male on authors or un- known gender. Aggregate acceptance factor (with female author): 0.181 Aggregate acceptance factor (all male/unknown gender authors): 0.158
  - For SC06-SC16 total submissions: 2082 submissions include women, 4579 do not. Aggregate acceptance factor (with female author): 0.311 Aggregate acceptance factor (all male/unknown gender authors): 0.323

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MPI: a specialist HPC community?
Paper authorship in EuroMPI

	Total papers	Papers with M	Papers with F	% paper with F
2010	35	35	6	17%
2011	28	28	5	18%
2012	26	26	3	12%
2013	51	51	11	22%
2014	36	36	6	19%
2015	14	14	1	7.1%
2016	17 (only full papers)	17	3	18%

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MPI: a specialist HPC community?
Unique authors

	Male Authors	Female Authors	Unknown	% F	Total	$P(X^2)$
2006	159	11	3	6%	173	7.3 E-30
2007	169	7	0	4%	176	2.7 E-34
2008	153	10	2	6%	165	4.0 E-29
2009	134	17	11	10%	162	1.7 E-21
2010	115	10	0	8%	125	5.9 E-21
2011	160	8	0	5%	168	9.3 E-32
2012	129	8	0	6%	137	4.8 E-25
2013	173	12	8	6%	193	2.5 E-32
2014	108	8	5	7%	121	1.6 E-20
2015	61	3	0	5%	64	4.2 E-13
2016	157	15	0	9%	172	2.6 E-27

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EuroMPI 2016

Submissions to the conference:

Delegates: 17% female

All		
Male first authors:	53	88.33%
Female first authors:	7	11.67%
Prefer not disclose first authors:	2	
Full papers	37	
Male first authors:	30	85.71%
Female first authors:	5	14.29%
Prefer not disclose first authors:	2	
Short papers	9	
Male first authors:	9	100.00%
Female first authors:	0	0.00%
Prefer not disclose first authors:	0	
ACM published posters	7	
Male first authors:	6	85.71%
Female first authors:	1	14.29%
Prefer not disclose first authors:	0	
Non-published posters	6	
Male first authors:	5	83.33%
Female first authors:	1	16.67%
Prefer not disclose first authors:	0	
Tutorials	3	
Male first authors:	3	100.00%
Female first authors:	0	0.00%
Prefer not disclose first authors:	0	

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EuroMPI 2016 Submissions

Accepted full papers	18	
Male first authors:	15	88%
Female first authors:	2	13%
Prefer not disclose first authors:	1	
At least one male	17	100.00%
At least one female	3	18%

Probability of acceptance	
Male first authors	50%
Female first authors	40%
$P(X^{2})$	0.90
At least one male	49%
At least one female	50.00%
$P(X^{2})$	0.98

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MPI Forum

MPI-1.0 and 1.1: 2 out of 64 female forum members (3%), 0/12editors

MPI 1.2 and 2.0: 8 out of 112 female forum members (7%), 0/12 editors

MPI 1.3 and 2.1: 0 out of 44 female forum members (0%), 0/18 editors

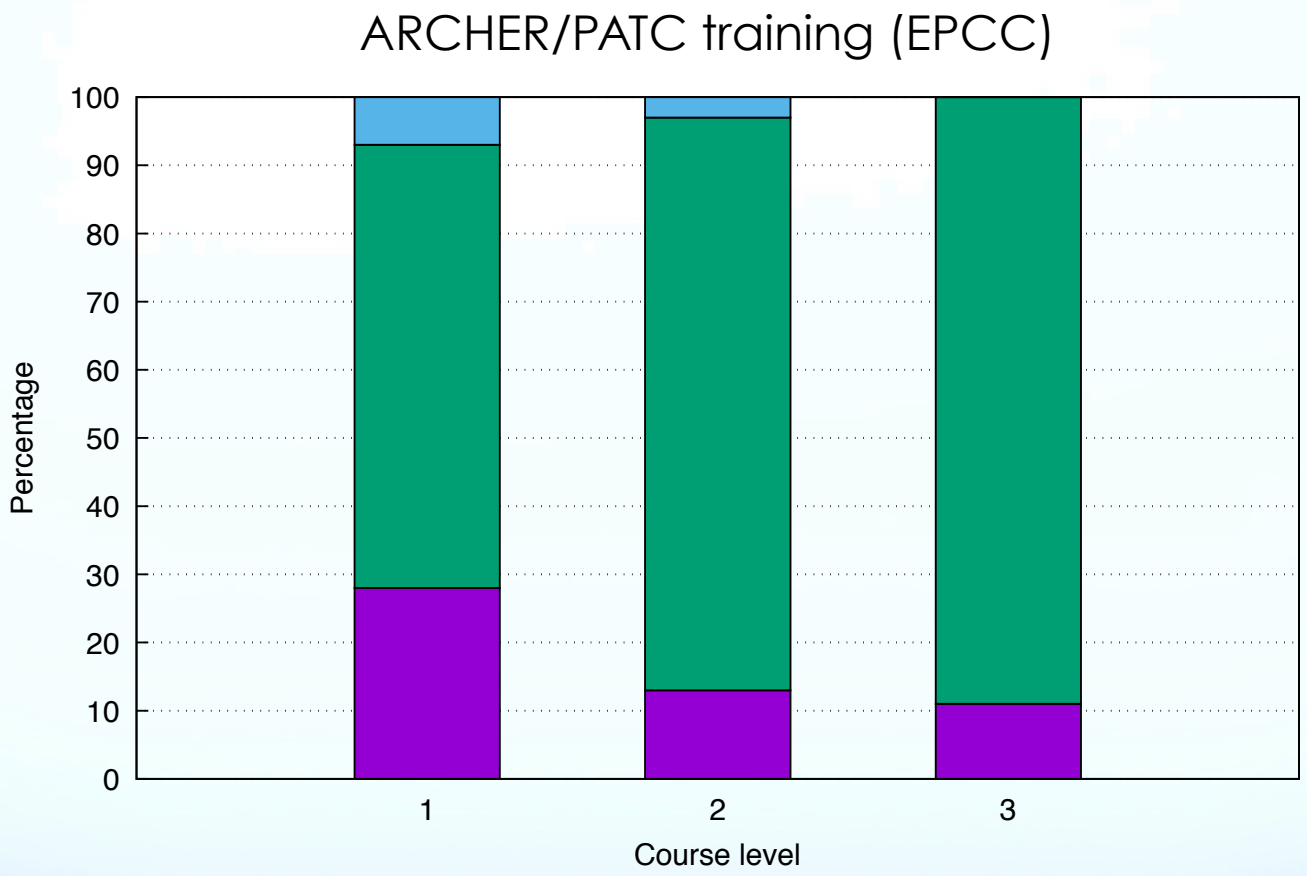
MPI 2.2: 0 out of 63 forum members (0%), 0/13 editors

MPI 3.0: 2 out of 96 forum members (2%), 0/11 editors

MPI 3.1: 2 out of 84 forum members (2%), 1/14 editors (7%)

Total: 14/531= 2.6%

HPC Training and its impact on MPI



All PATC courses from 03/2012 to 12/2015:
5022 participants, 894 female (15%)

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What does this tell us?

- Clearly there is a problem!
- Still unclear where the problem starts, but definitely an indication of a leaky pipeline
- EuroMPI doesn't seem to be attracting as many women as Supercomputing, but training participation is similar.
- The proportion of paper authors is far smaller than the proportion of female attendees

What can we do?

First we need to understand the causes:

Extensive research has been carried out to benchmark and understand the contribution of women to STEM and why it is significantly lower than the proportion of women in the global population. There is no definitive single answer, though commonly cited factors include:

- gendered roles emerging in childhood due to stereotyping;
- stereotyping in the workplace;
- the higher propensity of women to leave STEM jobs than men at every stage of their career path (the 'leaky- pipeline');
- a lack of visible role models for those in under-represented groups; and
- explicit/implicit bias.

What can we do?

- Acknowledge that we are all influenced by gender biases
- Base selection decisions on objective information
- Remove gender information from evaluation scenarios
- Offer mentoring
- Teach networking skills
- Offer events for women (networking, training etc)
- Careers events aimed at women
- Change the way we train to move away from traditional models
- Appreciate that apparently 'confident' people may not be so confident!
- Start counting!

These activities benefit everyone

Source | Solving the Equation: The Variables for Women's Success in Engineering and Computing. Published by the AAUW (American Association of University Women)

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Thank you:

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MPI Forum

EuroMPI 2016 Organisers

Questions?

www.womeninhpc.org