Gender imbalance in IT has been recognized as an issue since at least 2005. One might have expected some improvement since then, and perhaps even faster change since 2010, when there was a surge in articles about women in technology jobs. That has not been the case.

For example, in the eight years between 2005 and 2013 the percentage of women in IT jobs in Sweden fell from 23 percent to 22 percent (although the percentage of women in senior IT roles did rise from 16 to 21 percent). In the US, which has five million IT jobs, the ratio of female IT workers also fell from 25 to 24 percent from 2010 to 2014, with the proportion of women in more senior roles declining three percentage points to 27 percent in 2014. In the UK, with 1.2 million IT posts, the percentage of women in IT jobs in Sweden fell from 25 percent to 18 percent between 2010 and 2015. In each market, the total number of IT jobs increased by over 20 percent in the last five years.

The education pipeline
Not every current IT worker has an educational background in computer science or other similar field. But in those fields of study, and especially in computer science, there are clear problems with gender diversity in the educational pipeline.

Only 18 percent of US university computer science (CS) graduates in 2013 were women. And that was down from 1985, when 37 percent of graduates were women. UK figures are very similar: in the 2013/14 educational year, only 17.1 percent of computer science students were women. That is much lower than overall female participation in higher education in the UK of 56 percent, and actually down very slightly from 17.4 percent in the 2012/13 educational year.

The percentage of women enrolled in mathematics, computer and information sciences at universities and colleges in Canada is higher, at 25 percent in 2014, but that is down two percent since 2009, when it was over 27 percent.

But at the best known computer science school in the country, the University of Waterloo, women made up only 13 percent of 2010 enrollment in computer science, down from 33 percent in the late 1980s although they now have a number of programs to get more women to enroll, and to retain them once they are in the program. In Sweden as of 2010, women were 24 percent of computer science graduates, down from 30 percent in 2000.

Women in IT jobs: it is about education, but it is also about more than just education

Deloitte Global predicts that by end-2016 fewer than 25 percent of information technology (IT) jobs1 in developed countries will be held by women, i.e. women working in IT roles (see Figure 1). That figure is about the same as 2015, and may even be down. Lack of gender diversity in IT is both a social and economic issue. Global costs may be in the tens of billions of dollars; according to one study, the gender gap in IT costs the UK alone about $4 billion annually. Given that cost, gender parity (roughly 50 percent women in IT jobs) seems a reasonable goal over the long term. Why are the 2016 numbers less than half that goal, and why aren’t they improving faster?

Figure 1: Women as percentage of total IT workforce by country for US, Sweden, Canada and UK

Source: The statistics for the chart above were obtained from government websites or documents. The US data is for 2014, Sweden data is for 2013, Canada data is 2011 and UK data is for April-June 2015. See endnotes for information on sources.

1. This category refers to the professions identified by governments in the US, UK, Canada, and Sweden. The US list of professions includes: Computer programmer; Software developer, applications and systems; Computer support specialist; Database administrator; Web developer; Computer systems analyst; Network and computer systems administrators. The UK list includes: Computer support specialists; Database and information security analysts; Computer network administrators; Network and computer systems administrators. Sweden data is for 2013, Canada data is 2011 and UK data is for April-June 2015. See endnotes for information on sources.

2. Deloitte Global estimate based on a publicly disclosed data from governments, and thus population weighted.


4. Women are ‘just off the back of the BBC’, BBC, 5 September, 2010: http://www.bbc.co.uk/hi/technology/12276760.stm


6. The jobs classifications in the US changed between 2001 and 2011, and have been reclassified several times since then, so costs for the UK are based on population weighted.

7. The job classifications in the US changed between 2001 and 2011, and have been reclassified several times since then, so costs for the UK are based on population weighted.


10. The US data is for 2013, and will be updated for 2014. The Deloitte Global report uses data for 2013, and will be updated for 2014. The gender gap figures used in the report are population weighted.


12. Table 2 University enrolment by field of study and gender, Statistics Canada, 7 May 2011: http://www.statcan.gc.ca/tables-tableaux/sum-sst/p1f2-en/p1f2 Sai-11297502-eng.htm

13. See Where the boys are and aren’t, University of Waterloo Magazine, 14 December 2015: https://uwaterloo.ca/alumni/alumni-publications/waterloo-magazine/where-boys-aren-t-and-are/


But the gender gap in the educational pipeline precedes university (tertiary) education. Only 18 percent of US students taking the Advanced Placement Exam for Computer Science in 2013 were women20. Once again, UK data is roughly similar: a 2012 survey showed that only 17 percent of girls had learned any computer coding in school, about half the level of the 33 percent of boys who had coded21. And some argue that girls are often steered away from science and math courses in primary school18. Other experts go earlier still, stressing the role parents need to take in encouraging girls younger than school age to be interested in science and technology19.

Challenges beyond the education pipeline

Recruiting. According to a 2014 study among UK firms, half of all companies hiring IT workers stated that only one-in-twenty job applicants were women21. Gender-neutral job descriptions are an important first step, but may not be sufficient, since the various algorithms driving online recruiting advertisements may mean women do not see the job placement ads21. In several studies, researchers found that the software showing ads for certain senior jobs targeted users tagged as men nearly six times as often as users labeled as women.

Hiring. Hiring more female recruiters may help, but will likely be an insufficient step. Various studies from multiple countries show that both men and women are twice as likely to hire a man for an IT job as a woman. And in the US a quarter of all IT workers – the pay gap for that role29; and while female computer and information systems managers have a narrower gap of 87 cents to the dollar, a pay difference is still prevalent30. The single largest category of IT workers in the US is ‘software developers, applications and systems software’ at over one-in four of all IT workers – the pay gap for that group is 84 cents to the dollar21. In the US a quarter of women with IT roles felt stall in their careers. In India the proportion is much higher, at 45 percent32. The issue of senior women in IT roles may all play a role.

Retention. Women in IT roles are 45 percent more likely than men to leave in their first year, according to a 2014 US study21. The study found that retention was a problem after the first year as well: one in five women with a STEM degree is out of the labor force, compared to only one in 10 men with a STEM education31. Issues that may be contributing to this lack of retention include pay and promotion (see below). A hostile or sexist ‘bro-grammer’ culture can also be an issue: in one study, 27 percent of women cited discomfort with their work environment, either overt or implicit discrimination, as a factor in why they left their IT job27. Further, workplace policies not suited to women, whether marathon coding sessions, expectations around not having children (62 percent of female IT workers don’t have children, compared to 57 percent of men29) or lack of childcare may all play a role.

Paying and promoting. A US female web developer makes 79 cents to the dollar man make for the same job25; and while female computer and information systems managers have a narrower gap of 87 cents to the dollar, a pay difference is still prevalent30. The single largest category of IT workers in the US is ‘software developers, applications and systems software’ at over one in four of all IT workers – the pay gap for that group is 84 cents to the dollar21. In the US a quarter of women with IT roles feel stall in their careers. In India the proportion is much higher, at 45 percent32. The issue of senior women in IT roles may all play a role.

21 Women in Technology: No Progress on Gender Parity for Two Decades, ThinkProgress, 10 September 2013: https://thinkprogress.org/indie/2013/09/10/3858048/women-in-technology/
The percentage of women in IT varies significantly by specialization and that variation also varies by country. As an example, in the US over 35 percent of web developers are female, while only 12 percent of computer network architects are women. Canada has a similar pattern, with web developers at the very high end of the diversity range and computer and network operators and web technicians at the lower end. On the other hand, the UK data shows that the percentage of web design and development professionals who are female is only slightly higher than the UK average for all IT jobs, likely one of the factors (along with the low number of women in senior IT positions) that contributes to the UK’s poor performance on gender diversity in IT roles compared to all the other countries mentioned\(^\text{35}\).

It is important to note that diversity and inclusion are about much more than gender. As an example, ethnicity appears to be a significant factor in reaching senior levels in leading Silicon Valley tech companies: all of Hispanics, Asians and blacks are at a disadvantage to white men or white women at executive levels, as of 2014 the proportion of women in tech roles in US companies was 24 percent in 2014, and 27 percent of IT managerial roles were held by women\(^\text{42}\).

And speaking of leadership, there have never been more senior women in tech\(^\text{41}\), particularly high-profile female C-suite executives\(^\text{42}\): this is providing leadership, role models and mentors for women and girls considering a career in IT.

Another positive is that the IT job categories with the lowest female representation are shrinking over time, and the more balanced categories are growing\(^\text{43}\), suggesting that we may be nearing a tipping point in diversity. Further, tech companies are leading the broader IT industry: the US tech companies that released their gender diversity numbers in 2013 had an average of 30.3 percent female employees, and that number rose in 2014 by 0.15 percent\(^\text{44}\).

Although some of the numbers on gender diversity in IT may appear disappointing, there are also hopeful signs. At one leading US technology school, computer science is now the most popular degree for women\(^\text{33}\).

Furthermore, education may not be the gating factor that some think it is. While less than a fifth of US computer science graduates were women in 2013, as of 2014 the proportion of women in tech roles in US companies was 24 percent in 2014, and 27 percent of IT managerial roles were held by women\(^\text{42}\).

### Women in IT companies

Although the focus of this prediction has been on women in IT professions, there is a distinct but related topic of gender diversity within IT companies, specifically at the large American (usually Silicon Valley-based) companies. There are tech companies that currently publish their diversity numbers on an annual basis\(^\text{37}\) and they average about 32 percent female employees in 2014.

These companies are a key part of the technology sector, likely represent the broader tech company employment picture, and are likely to be an important source of IT jobs for women going forward. But these companies have many workers in many different occupations, not all of which are IT jobs. One sample of six US tech companies showed that although their total workforce was 30-39 percent women, the number of women in “tech jobs” was only 10-20 percent\(^\text{38}\). Increasing the gender diversity at these companies is likely an important goal, but only tangentially connected to the larger picture of women in IT jobs.

Because of the considerable public spotlight on these companies as bellwethers for women in technology, it seems a reasonable prediction that the gender diversity numbers at high-profile publicly traded companies are likely to rise at a faster rate than for women in IT functions or jobs. Therefore it will be important to recognize that even if some Silicon Valley companies have 50 percent female employees that may not mean that the diversity of women in IT jobs across the US or developed countries in general has improved to the same extent.
Bottom line

Getting more girls and young women into streams that will lead to careers in IT will likely be difficult. Initiatives are under way to depict more positive female IT role models in the media45.

But even if real progress is made immediately in improving gender parity in STEM at levels of the educational pipeline, it may take time (possibly decades, in the case of improvements to primary education) for those improvements to translate into IT job parity.

Recruiting: firms could use software to screen for job descriptions that use words that are likely to turn away women: major technology companies are already doing this46. Another barrier can be tenure-related requirements: given the IT gender gap, requiring 20 years of IT experience shrinks the pool of qualified female candidates enormously. If lengthy tenure is a genuinely necessary requirement for the position, then it is appropriate, otherwise it would be an artificial barrier to hiring women.

Hiring: having both men and women as part of the hiring process is likely to help. At one tech company, women who were interviewed only by men were more likely to turn down a job offer47. Now that at this company every female candidate meets with at least one woman from the company during the hiring process, more women are being hired. Women are sometimes less likely to promote themselves in interviews, and the same company now gets hiring managers to ask more detailed questions to paint a fuller picture.

Retention: the attrition rate for mothers at one tech company was double that for employees as a whole: extending maternity leave from three months to five, and from partial pay to full pay, led to the attrition rate following childbirth falling by half48. A number of technology companies are looking at the role of mentoring: having more senior women support more junior IT workers is likely to lead to better retention49.

Paying and promoting: IT prides itself on being a merit-based field. But gender differences need to be overcome: one company had its employees nominate themselves for promotions, and women were less likely to do so. In response, there are now workshops where women encourage other women to nominate themselves, and they are now being promoted proportionately50.

The role of government: one possible solution may be for governments to take the lead, and attempt to increase the percentage of women in IT jobs in the public sector. Across all job types, the public sector tends to be more diverse than the private sector. According to the OECD (Organization for Economic Co-operation and Development), women make up 45 percent of the total employment across all industries in 2013, but 58 percent of public sector employment, and the figure is 70 percent in Sweden51.

Government leadership in IT employment of women does seem to work partially. Public sector IT jobs are 15 percent of all IT jobs in Sweden52. While 22 percent of Swedish IT jobs are held by women, for public sector IT workers it is a third, which suggests that government initiatives can at least help narrow the tech gender gap. On the other hand, that also means that private sector IT employment for women in Sweden is only a fifth. It seems likely that this dynamic also holds true in other developed countries: the public sector IT gender disparity is less pronounced than the national averages, and the private sector is therefore worse (by some amount) than the national average53.