Girls in IT

A White Paper

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FirstOption Software

Part One – the problem

Pic: Richard Turner

Participants discuss the issues at the recent #GirlsinIT seminar at First Option Software's offices in Hampshire

"80% of all tech decisions are influenced by women yet only 3% of all advertising creative directors are women"[1]

"Almost six in ten (59%) of women respondents think that starting a career in tech is a less attractive prospect for a woman than a man"[2]

"While women make up 49% of the UK labour force, they account for just 17% of IT and telecom professionals"[3]

"Girls still perceive computing to be 'for geeks' and that this has proved a 'cultural' obstacle, impossible to overcome"[4]

Given statements like this, is it any wonder that there is a dire shortage of women in technology? It is certain that there appear to be more issues than answers; in fact one question I was asked recently (and I won't say whether it was a male of female who asked it) was "Does it really matter?" to which I had to scratch my head before I answered, for fear of offering up the knee jerk reaction of "yes, of course it does" without actually considering why.

Indeed, in a recent survey[5] almost half (46%) of the men questioned do not actively believe there should be more women in tech. In addition, a surprising three in ten (30%) of women believe women in tech is a 'non-issue'.

So just why is it important to address this issue and does it, in fact, really matter or is it just one of those things – that boys will be boys…?

The benefits of gender diversity are many: economically and culturally, efficiency is proven to be far higher in teams that include women; by the same token women, once in the industry, are every bit as good as their male counterparts and have the same salaries and opportunities for promotion. And generally speaking, there is a remarkable shortage of good engineers and

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[1] *Lady Geek (website)*
[2] *Mortimer Spinks/Computer Weekly Women in Technology Survey 2013*
[3] *Jemima Kiss, The Guardian*
[4] *Professor Dame Wendy Hall, University of Southampton*
[5] *Mortimer Spinks/Computer Weekly Women in Technology Survey 2013*

scientists, full stop – why reduce that deficit further by discouraging half the population from applying? Finally, why shouldn't women make a career in tech? "If any other comparable industry had a female workforce of only 17% there would be an outcry".[6] According to Karen Spärck Jones, the British computer scientist who campaigned rigorously for more women to enter computing before her death in 2007, "computing is too important a subject to be left to men'.

Quite apart from knee-jerk, anecdotal or subjectively emotional reactions, there is ample evidence that gender imbalance in IT is a problem that needs redressing. Hence our research into the subject and the #GirlsinIT initiative we started at First Option Software (one of those employers with a huge gender imbalance), starting with our breakfast seminar symposium in early October 2013.

How big is the problem?

In the UK and US it is endemic; indeed in the 'western' world in contrast to, for instance, SE Asia where the figures generally are almost 50/50, the statistics make pretty gloomy reading. In 2008, males outnumbered females in the IT industry in the UK by 4:1. That ratio has now risen to nearly 6:1 and continues to do so.

Some countries do not seem to suffer from a gender imbalance in the same way as the UK and US

The proportion of female candidates sitting Computing A level in 2013 was a mere 6.5% and yet those females gained higher grades than their male counterparts (21.2% A*-A for girls, compared to 15.4% for boys)[7]. Indeed, just 3,758 people – male and female – sat Computing at A level this year, the tenth consecutive year showing a decline, which is worrying in itself. Interestingly this decline is not mirrored by the increasing interest in STEM subjects as a whole – Science, Technology, Engineering and Maths – which saw a 1.9% rise in 2013.

It is hardly surprising that the number of girls (and boys) taking A level Computing is low and continues to deteriorate further at degree level: pre-sixth-form school curriculum was described only a few years ago as "a disaster as far as computing is concerned".[8] The majority of Key Stage 3 ICT was "heavily orientated towards IT (spreadsheets, databases etc.)" and there wasn't a GCSE in Computing until 2010, only ICT qualifications which were described at the time as "boring and de-motivating". This trend, following the change in the National Curriculum, has altered, thankfully – both Dan Gardner and Carrie Anne Philbin, KS3/4 Computing teachers and participants in our recent #GirlsinIT seminar have seen huge increases in the uptake of girls taking Computing Science at GCSE since the recent realignment of those subjects. This comes with a warning, however – it was mainly through personal intervention by them both that these figures were achieved by enthusiastically spreading the word, in and out of school hours, that Computing is Not Boring and Should Be Considered As An Option.

Even countries such as Saudi Arabia, not known for their sexual equality policies, say that 'more Arab women than men are now enrolling for science degrees at university –

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[6] *Belinda Parmar, Lady Geek*

[7] *e-skills UK 15/8/13*

[8] *Computing at School*

and completing the courses successfully'.[9] In Saudi Arabia, 'women picked up 73% of the bachelor's degrees taken in science in 2010'. They still have issues getting women to play a bigger part in STEM careers but at least there is a demand by women for STEM subjects in education.

So the problem is significant, is geographical, heavily influenced by different cultures, is especially bad in the UK and is getting worse year on year.

Difficulties in definitions - exactly what is IT?

And how does it differ from ICT, technology, computing, developing, programming, coding and all those other definitions that mean different things to different people and industries?

Is the lack of definition part of the problem? In the same way as 'Science' is an over-arching headline subject that includes Physics Chemistry and Biology (with further sub-divisions under those), should we call for over-arching headline for our industry? It would seem that it is not that simple.

Computing is a discipline, like physics, but is not ICT, which is focused on the use of applications. Neither is it programming, or the science of crafting software that make the computers work the way we want them to.

If the definition of someone who 'works in IT' is, to the man (or woman) on the street – and importantly the parent of a child taking their GCSE options – someone who uses computers, then it is no wonder that a year 8 child cannot comprehend what the subject is really all about and therefore envisage a career in it. Even TechTerms.com describes IT (Information Technology) as 'anything related to computing technology, such as networking, hardware, software, the Internet or the people that work with these technologies'. Oh dear, how confusing is all this to adults, let alone children?

The other problem with definitions is what do we mean by 'working in the IT industry'? A colleague of mine works at Sky and exclaimed to me, when I told him what the subject of this project was, that "Oh, there are plenty of women in IT in Sky". "Really?", I replied. "Yes, loads of them and they all use computers and software". Here is the problem – that there is a big difference between using computers and technology and creating it in the first place. We all use apps, programs, software but how many of us have actually created it, by writing code? Not that many.

My wife, an admin officer in a primary school, uses a software program which was created for the LEA (as it was then); it is probably accepted by most people that most admin officers in schools are women – and yet, according to a lady at the county council who has trained people to use it for the past 13 years, no woman developer has ever been near it. It seems it was developed by men for women to use, which is probably a very common story.

Some clearer definition of the terms is needed. Even the word 'technology' is confusing and means different things to different people. Apparently it is the 'process of using scientific, material and human resources in order to meet human need or purpose'[10]. Perhaps in this context, the closest we can get to what we mean is 'Computer Technology' or 'the activity of designing and constructing and programming computers'[11], even though in software development we only need the last third of that definition. 'Computer Science' is equally vague but is the definition used by schools and colleges when labeling GCSE and A level. Further, there are at least 10 different Bachelor degrees in Computer Science and a further half dozen related degrees ranging from Bachelor of Software Engineering to Bachelor of Information Technology[12]. No wonder our kids are confused. And it is no wonder that men (and women) tend to regard the stereotype of the

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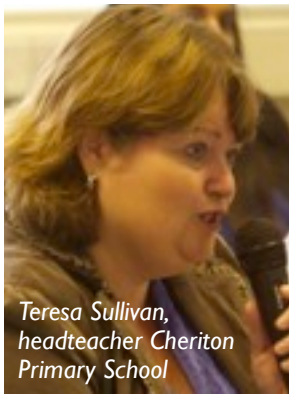
[9] *The Economist Intelligence Unit Limited 2012*
[10] *Ray Tolley, Maximise Excellence in Education*
[11] *Wordnetweb.princeton.edu*
[12] *Wikipedia*

male geek, and reinforce it rigorously without even thinking.

It starts at school

Ironically, there is a gender imbalance in UK primary school teaching too – in this case in favour of women by a long way – but that is another story. Whether that imbalance might have any bearing on the problem is difficult to prove, but one thing Teresa Sullivan, head teacher at a local primary school told us was that "girls and boys are equally adept and willing to learn computer skills at primary level".

Pic: Richard Turner



Teresa Sullivan, headteacher Cheriton Primary School

Girls enjoy the same interest and opportunities to engage with technology as boys.

The as yet unlabeled cohort that follows Generation Y is now equally at home with computers as the Baby Boomers were with transistor radios. Many a parent will ask their under 10s to help them find their way around an app as a first resort, not a last one. It seems that, at primary school at least, the imbalance is not as pronounced as when the children go on to secondary school.

Boys and girls now choose their GCSE options early – in Year 8 mainly, or when they have only just entered their teens. This is awfully young to choose a selection of subjects that will shape their career paths for the next eight years or so, until some of them emerge from university. Peer pressure, lack of information about what computing science/ICT/technology, poor parental guidance and a lack of careers advice in some schools and colleges, do nothing to help girls gain an insight into what the subject – let's call it Computer Science if you like – is really all about. The perception is that it is all about spreadsheets and 'boring stuff'. Hear what one 17-year-old woman, Nicole Arnold, says about her experience:

Pic: 123RF

"I encouraged myself into IT, always have. Nobody encouraged me; at school it felt like some of the teachers ignored me because mainly the boys wanted to be good at IT so they left us small amount of girls to do things for ourselves. This is how I ended up becoming stronger in IT: I taught myself, tried, tried, and tried again until I picked up new things and felt confident that what I was doing was correct. Now I am working in an IT Security company and I couldn't be happier".

Nicole is not alone in experiencing this, or eventually making it despite others rather than because of them. Carrie Anne Philbin, admits that the increase in numbers of her girls taking GCSE Computing Science has been largely down to her personal involvement by taking time out (and out of school time often) to encourage and educate girls into what Computing Science is and how it can be exciting, fulfilling, related to their interests and often closer to science fiction that some preconceived notions.

"The way computer science is taught in schools needs to change. It needs to be more creative and inclusive. I despair at the number of male teachers I observe who use masculine examples to explain a concept to a class.", says Carrie Anne.

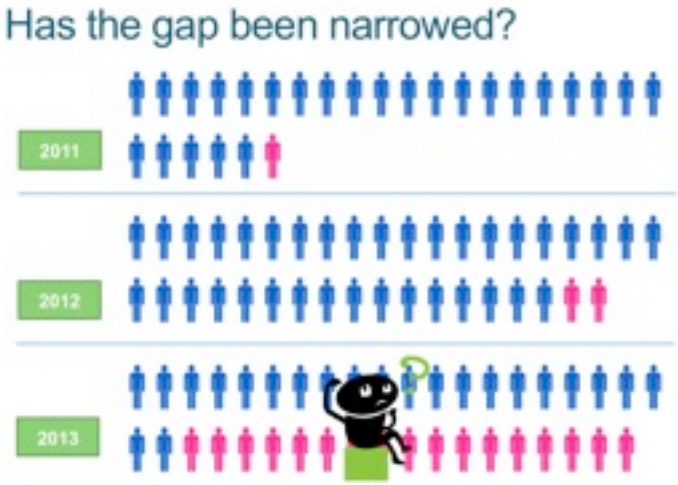
"When I got to this school it was an all-male IT department. Now, out of a department of six I am the

most 'technical person' in it; for example I am the only person in my department who can program."

Pic: Richard Turner

Dan Garner, IT team leader and Computing teacher at Perins School, Alresford

Dan Gardner of Perins School noticed a link between Computer Science skills and MENSA-style tests that sort the logical thinkers from the rest – and using this as a baseline, identified a group of girls he then encouraged to take GCSE Computing by 'marketing' the subject to them. In other words without his personal intervention, they would still be blissfully unaware of exactly what the course is about and what kind of careers they could follow by building upon it.



The uptake of students taking GCSE Computing at Perins School has improved year on year, and the gender balance too - mainly through encouragement and intervention by the teaching staff

Another avid campaigner, Anne-Marie Imafidon, passed GCSE in Computer Science at the age of 10, went on to become the youngest graduate to attain a masters degree at the age of 19 and was one of only three girls in a class of 70 studying maths and Computer Science at university[13]. "Some schools, often girl-only schools, simply don't offer ICT at A level. In other schools, Computer Science often clashes with things like drama or music, meaning the girls can't do both."

Ms Imafidon continues: "aware of their choice of A levels impacting on what they study at university…girls tend to choose 'safe' subjects that they know they will get a good grade in. Choosing Computer Science is an unnecessarily tough choice…unless you are one of the stubborn girls like I was". She founded Stemettes, an organisation like others – determined to get more women into the STEM workforce. Her goal is to raise the number by 30% by 2020.

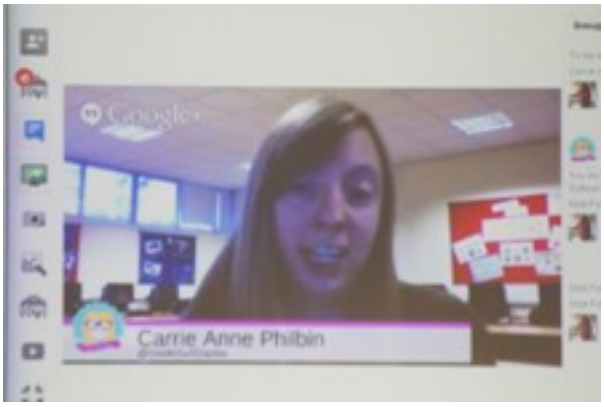
This somewhat contradicts the current trend downwards. Belinda Parmar of Lady Geek, states that the number of women in technology industries in the UK is going down by 0.5% a year – meaning that if it continues unabated, by 2043 the percentage of women in tech will have dropped from the current 17% to less than 1%.

Today's youngsters have grown up with iPads, smartphones, facebook and the world wide web as standard, everyday stuff and real opportunities for careers within IT related industries grow as technology moves forward with ever accelerating speed.

[13] *Jane Wakefield, BBC News [Technology]: Why tech needs a makeover to attract girls*

But public understanding of what those careers opportunities are and what qualifications are needed to serve them fall behind by a long way.

Pic: Richard Turner



Carrie-Anne Philbin, Computing teacher at a London sceondary school, joined the #GirlsinIT seminar by Google Hangout

Teachers with insight and determination like Carrie Anne Philbin and Dan Gardner, are making a difference. But so much more needs to be done if it is to make a difference nationally. "Girls have usually made up their minds about tech by the age of 12" says Philbin. "What we really lack is role models – women who have been successful in IT who are willing to come and talk to girls about what it's really like. So I started a YouTube channel called Geek Gurl Diaries, originally intended to be a way of interviewing women working in technology, and which has now developed into a mix of video tutorials, blogs, interviews – with graduates too – where it seems that a lot of girls have experienced real problems at uni, being so outnumbered. It's become really popular, I get a lot of teenage girls (and some boys, too) watching them. I asked myself 'what would I have wanted to see at the age of 14?' and modeled it on that".

Outnumbered

To a certain extent, the problem is self-perpetuating. Nobody, except perhaps a stand-up comedian, likes entering a room full of complete strangers; for a teenage girl to enter a room full of boys is even more intimidating, especially if the boys are being a bit laddish and unwelcoming. Add to that the stereotypical reinforcement provided by many male (and female) teachers, parents and other adults who should know better, and is it any wonder that girls are put off?

The trend continues right through to top level management: the percentage of women reaching board level and filling roles like CEOs and Chief Technology Officers is even lower.[14] When Twitter recently announced an all-male board prior to flotation and stated that the issue was 'one of supply', CEO Dick Costolo found himself on the end of a right public pasting. Vivek Wadha of Stanford University and who is writing a book about women in tech, responded to the Irish Times: "That's false. So Twitter says they can't find enough women? I went through my Rolodex and found 16 women for them. All of them are qualified to be on that board".

Add to that the poor percentage of female speakers at this year's Web Summit in Dublin (26 out of 200+), a fact that the organisers are 'uncomfortable' with and have tried in vain to redress, and it is obvious that "there aren't enough women in upper levels of technology to choose from"[15] for such a high profile public event.

Apple, on the other hand, has taken the lead by appointing ex Burberry CEO Angela Ahrendts to oversee its global retail division, a move heartily endorsed by Mary Carroll of Women in Technology and Science, who points out that "80% of consumer buying decisions are made by women, and women control $20 trillion of spending globally".

Image problems

IT is not always promoted positively in the media. It is represented as slightly 'geeky' or comedic in TV/film/ popular culture if represented at all.[16] Among some girls there is a perception that IT is slightly 'cold', removed from the human interaction which seems to attract women to other professions. Cindy Gallop, the founder of the

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[14] *Fiona McCann, Irish Times; Where are all the tech women?*
[15] *Fiona McCann, Irish Times; Where are all the tech women?*
[16] *Mark DeBacker, NCS Team Leader for Hampshire & IOW*

website MakeLoveNotPorn, agrees that the damage is done quite early on, as girls hit puberty: "if you are brilliant at maths and science, then by definition you are a geek and not attractive", she says, and adding an economic factor into the argument she continues "the reason health, education and other caring professions are dominated by women is because they are low-status and low paid".

According to the summary of findings from their 'Women in Technology' survey, Mortimer Spinks/Computer Weekly conclude: "From the inside the culture is…dominated by men; however women, by and large, believe that they fit into the arrangement at least as well as men do. From the outside it is often presented as a sexist, nerdy and difficult industry for women to work in. But this perception mainly dwells on problems in the industry rather than highlighting the fact that 95% of women (and men) report that they are extremely happy to have a job in technology".

It seems that the image of the industry, whilst it has some foundation, is a distorted perception – that, although "64% of women have felt discriminated against in their job because of their gender"[17] women are just as happy in their [tech] careers: "they're getting promoted at the same rate, regardless of career/maternity breaks; they share the same views as men on what's important to progress, and by and large they have the same skills needed to move on up in their careers".[18]

Are our brains wired differently?

The knee jerk reaction to this question is "of course not" – possibly for fear of reprisal at making what might appear to be a sexist remark. But there is strong anecdotal evidence that girls' and boys' brains are indeed wired differently. One lady who has worked at IBM for 28 years and is responsible for engaging with education at all levels to secure their future workforce, certainly believes so. Armed with a degree in psychology and a long career in tech, she argues the case that whilst girls are interested in using technology, boys are interested in creating it – the analogy being that girls love driving but it's the boys who like tinkering with the engine.


Pic: 123RF

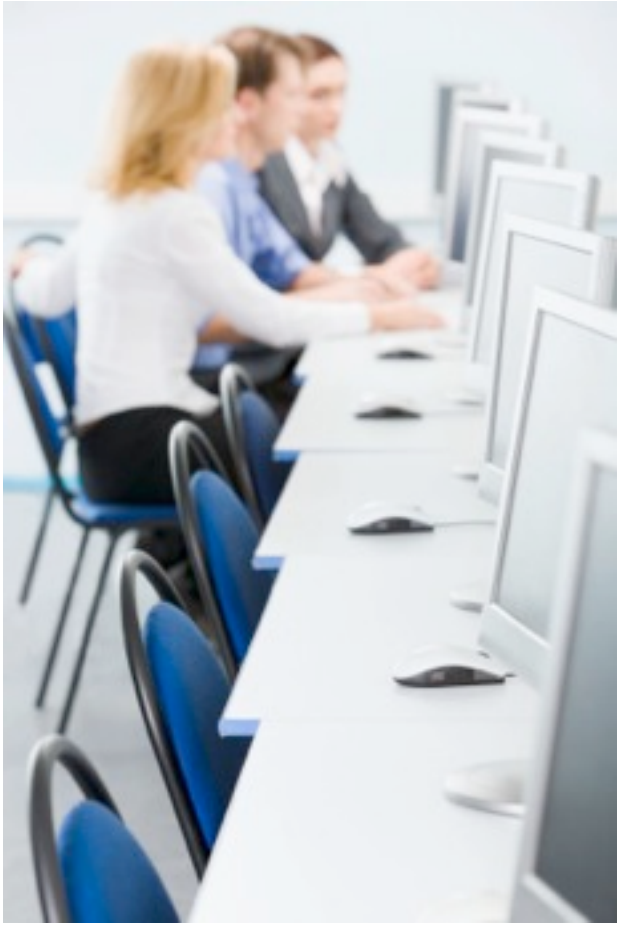
Martha Bridge Denkla PhD, a research scientist at Kennedy Krieger Institute in the US, says "girls outperform boys in the use of language and fine motor skills until puberty". Researchers have also found that boys generally demonstrate superiority over female peers in areas of the brain involved in maths

[17] *Mortimer Spinks/Computer Weekly Women in Technology Survey 2013*
[18] *Mortimer Spinks/Computer Weekly Women in Technology Survey 2013*

and geometry. These areas of the brain mature about four years earlier in boys than girls, according to a recent study that measure brain development in more than 500 children. Conversely, the same researchers found that the areas of the brain involved in language and fine motor skills (such as handwriting) mature about six years earlier in girls than boys.

The physiological differences are maintained during adult life – male brains, it seems, contain 6.5 times more grey (or 'thinking') matter than females, whilst female brains have more than 9.5 times as much white matter, the stuff that connects various parts of the brain. There are differences, too, in the make-up of the frontal and temporal areas of the cortex which may explain the functional advantage in language skills that women enjoy over men.[19]

Pic: 123RF



It appears, then, that there are physiological differences, and psychological/cultural/traditional factors which might combine to create a difference in the way men and women use their brains; it is quite possible that this contributes to the argument that men appear, on the surface of it, to dominate the IT industry in other ways than the obvious imbalance in numbers.

But the indisputable argument remains that "It isn't that girls can't do it, it is that they are choosing not to do it".[20]

Part Two - the outcome

What's to be done?

A few points come straight to the surface:

- As an industry we need to stop gender stereotyping
- Too many people in the industry regard it as a 'non-issue'
- It is not a global problem but a cultural one
- Technology is a gender neutral industry – it's the people within it that aren't
- You have to catch them young – certainly by year 8
- We need to engage with the parents
- There are too few role models
- There are too few opportunities to liaise with industry
- Clearer definition is needed to describe the subject
- Better careers advice is needed at school
- We need to talk up the successes rather than concentrating on the problems
- There is a lot of good stuff going on but it's not particularly joined up

Banter or barrier

Sad as the fact is, there is always going to be an element of chauvinism, sexism, discrimination and other barriers which we consciously or sub-consciously create as both men and women and which muddy the waters when it

[19] *WebMD: How Male and Female Brains Differ*
[20] *Anne-Marie Imafidon*

comes to improving the situation. True, the law and general awareness of what is acceptable in school and the workplace (and what is not) has changed dramatically over the past few decades and nearly always for the better. But what is accepted as cheerful banter can still offend and sway opinions. As an industry we should recognise that the ideal environment for efficient and successful business is not one that is all-male or all-female. It is a blend of the two. Cindy Gallop argues that "women do business differently from men" but that "the best of all possible worlds is one that we build together, 50-50".

Aimee Fahey, Recruiting Consultant and writer, goes further: "Diversity is not just in gender and colour, but about bringing in a variety of personality and work styles to ultimately make the companies more successful… women need to be seen as truly valuable at all levels within companies, not just as an affirmative action or PR initiative".

Sandra Edwards, ex Ordnance Survey Project manager, developer and the lone female member of staff here at First Option Software, reinforces the gender equality argument: "I don't believe in positive discrimination where women are promoted just because they are women. Women have to be seen as equals so no one is surprised to see a woman in an unusual role".

She adds, "some women think that they are not clever enough to have a career in IT. They can all work the technology with speed and efficiency but can sometimes be afraid of technology.

"Men and women bring different skill sets to IT but I think it's more environmental rather than actual. For example the skills are similar when actually programming but different when designing, brainstorming, discussing, organising etc."

Cultural, not global

'Developing' countries like Brazil, India and South Africa do not experience the same imbalance. It seems that the UK, US and much of Europe suffers from a culture problem and a consequent lack of initiative for change. Ms Imafidon: "In India if you go into technology, it is because you want to do well and get ahead in life. If you see a well-dressed woman walking down the street, you don't ask if she is a lawyer or a banker but is she working in IT?".

Stemettes, Lady Geek, Geek Gurl Diaries, Women in Technology, Intellect UK, TeenTech and other organisations have already made huge differences to our attitudes to gender balance in technology-related industries. Some through lobbying parliament for better careers advice and changes in the National Curriculum, others through raising awareness in industry, others still by connecting directly with young people, especially girls, and by giving them practical encouragement and tutoring. It is a busy time for campaigners and change-makers, but much more still needs to be done and it must be 'joined up' to complete the task properly or those fragmented initiatives will never speak with one voice. From the outside, it appears that more collaboration is required and perhaps less competition to bring everyone together.

L to R: Sarah Robinson and Preena Mistry from Intel UK, and Michelle Woolley of IBM Hursley

Pic: Richard Turner

Two corporate giants in this field are IBM and Intel – both of them represented at our #GirlsinIt event and told us of the work they do in bringing educationalists and students – from primary, through secondary to further and higher education

Catching them early

There is no doubt that there is a problem or two later on in the education sector – one A level student student described ICT as… "boring as hell. Seriously. In a 'tear my skin off and boil me in a vat of oil' kind of way".

And it is not a UCAS requirement for someone taking the average tech/computing degree to have studied the subject at A level. But it is at Key Stage 3 we really need to address the problem in earnest. We need a lot more Dan Gardners and Carrie Anne Philbins if the numbers of girls taking Computer Science at GCSE nationally is to get up to the dizzy heights of 50%. The National Curriculum has changed and with it the numbers are changing too, but without active intervention and encouragement from primary and secondary school teaching staff – the situation is unlikely to improve organically.

Traditionally, careers advice has focused on 16 year olds after making the transition after Year 11; however evidence would suggest that career choice starts much younger than that. The National Careers Service will, according to Mark De Backer of the NCS, start to be more involved in schools from October 2014 although what scope they will have is 'still to be defined'. There could be a role, says De Backer, for such a service as NCS to take a more linking role between education and employers.

Meanwhile, employers in industry can help – by offering to go into schools to talk to girls (and boys) about what it is really like out there, that it is not a world full of mind-numbingly boring spreadsheets. There is a huge difference in perception by adults of what technology is and the reality, between spreadsheets, dry Powerpoint presentations and the world of electronic games, 3D TV, problem solving, Formula One telemetry, jet aircraft systems or what makes a nuclear sub work. Take that misconception in adults and you not only have ill-informed parents but children who are totally ignorant of the possibilities.

Role Models

If you have ever heard a presentation by Mandy Hickson, a young lady who not only managed to gain her wings with the RAF but flew a GR4 Tornado in anger on the frontline, you will know what it is to be inspired. Her simple story gives us an insight into the world of a lone female entering the testosterone charged world of the Top Gun genre and somehow finding the self-determination required to overcome failure, discrimination, prejudice and a fair smattering of envy.

Mandy Hickson, ex Tornado pilot, now motivational speaker

Pic: Mandy Hickson

Mandy attended our #GirlsinIT seminar and, although the analogy of her career as a fast jet fighter pilot isn't necessarily wholly representative of the problems facing girls in IT, there are enough similarities to make most people see the link straightaway. She talks to women's groups, business leaders and students with the same simple message: Dream it…believe it…do it!

There aren't that many Mandy Hicksons around to act as role models, but there are many other inspirational women and girls who can help. It is ironic that we are tackling this subject on, or near, Ada Lovelace Day, an international day of celebration founded to help people learn about the achievements of women in STEM and inspire others by 'creating new role models for young and old alike'.[21] Ada Lovelace is widely held to have been the first computer programmer in the 1800s and the

[21] *FindingAda.com*

inspiration for Ada Lovelace Day came from psychologist Penelope Lockwood who carried out a study that found that women need to see female role models more than men need to see male role models. How tragic that in all that time we seem to have made so little progress in this regard. Role models need not be rich, famous and successful; one of our participants at our recent seminar was a year 11 student from the local secondary school who, with amazing clarity and eloquence told us how she was inspired by Mr Gardner's encouragement, has spent the summer on a work experience at IBM and had not only changed her mind about taking Computer Science at GCSE but is seriously considering a career in technology (despite her peers). She is equally as good a role model as any famous entrepreneur and there are lot more like her around to inspire another year group.

Role models do not necessarily have to be female either. If men can encourage girls to get into technology because it is a great industry to be in, and because those same men can assure them that they will be made welcome, that's every bit as useful, surely?

Engaging with industry

If there is a misunderstanding about what IT is, whose problem is that? The National Curriculum has its own definitions, so perhaps we in the IT industry need to take a lead from that, or at least liaise more with education to establish some clearer definitions.

In addition, we have already highlighted the importance of role models; but whilst the odd visit to schools by such role models is valuable, taking schools to industry is equally important. Industry giant IBM addresses this at all levels of education. At their Hursley base, they offer a series of eleven initiatives aimed at local education and eventual recruitment:

IBM's 'Opportunity Roadmap' which outlines the numerous opportunities for schools, colleges, universities and individual young people to engage with the industry and with IBM through their local educational initiatives

XploreIT – aimed at Year 5, offering a day of 'exciting and exhilarating challenges' to promote STEM subjects.
Bright Sparks – for Year 8, this is a one-day event in which school teams compete against each other by participating in exciting technology activities based on 'real life' scenarios such as using technology to guide taxis through congested streets for maximum profit.
Think.IT – specifically for Year 8 girls, this initiative aims to 'inspire and interest' one hundred 12-14 year old girls across four days by setting challenges that use STEM disciplines combined with elements of fun, team building, interpersonal skills, project management, presentation and marketing to encourage them to continue studying those technology based subjects. It is this course that exemplifies the argument that something can, and is being, done at industry level.
MentorPlace – aimed at Year 10/11, this year long volunteer programme connects IBM employees with teachers and 14-15 year old students, providing support and advice leading to GCSEs.
BlueFusion – one of IBM's longest running events aimed at Year 10/11 students and similar to BrightSparks inasmuch as school teams compete in a diverse range of activities including 'hacking into a virtual bank or piloting a spacecraft around gravity wells'.
A large number of Year 10/11 students are also offered 2 week Work Placements between May and September. They learn how the company works, what happens in a professional environment and what skills and knowledge is applicable to the IT industry.
2 year **Apprenticeships** are available for those not wishing to go to university but wish to gain an IT Professional qualification.
The IBM **Futures Scheme** allows Gap Year students to gain work experience and spend the final three months abroad, in another area of IBM or wherever they choose.
Summer Internship – a three month placement aimed at undergraduates – they will spend 12 weeks running their own micro business in teams of four (one business/three technical).
Industrial Placement – aimed at undergraduates wishing to take a year's work placement as part of their degree course.
Finally, of course, a **Graduate Programme** for those leaving university and wishing to follow a career within IBM.

You could say that they have all the bases covered and others might argue that so a company the size of IBM or other industry giants with relatively unlimited resources, should. Newer to the game are 'cool' players like Google who say they 'favour ability over experience' and maintain the 'open culture often associated with startup'. From the outside looking in, 'TGIF' meetings, café breakout areas, games and relaxation all feature highly and might well have more cross-gender appeal than some other, more corporate companies. Whether this was a deliberate ploy to encourage a more equal gender balance within the company is not so easy to quantify: "You can be serious without a suit"[22] is a philosophy that is more about the open culture than any gender dress issue.

On a smaller scale, most IT firms do not have the resources of the IBMs, Intels and Googles of this world but could make contact with their local primary and secondary school to arrange for a visit to the school to explain what they do and what qualifications and qualities they look for when appointing staff. Many such companies might argue that their business is not all that interesting – and that may be true – but others are. How many school children think of IT in terms of space travel, internet games, robots, phone apps, motor racing, aerospace, 3D simulation and other exciting stuff? Anecdotal evidence suggests that most lay people, let alone children, think of dreary, boring spreadsheets, Death by Powerpoint, metastuff, geeks and nerds with glasses who keep the blinds shut and unintelligible gobbledegook, when it comes to the world of computing. Kids love using technology, as many exasperated parents will confirm when attempting to engage in conversation with their children whose attention is engaged exclusively on a smartphone. Anecdotally at least, it is also true that girls

[22] www.google.com/about/company/philosophy

are even more inclined to use technology rather than be interested in creating it.

Pic: Dan Gardner

The onus of responsibility to educate, therefore, is not just on the teachers to take the problem seriously and actively engage with younger children (especially girls) but on parents, industry, careers advisors and all stakeholders. By stakeholders I include investors, business owners – whether in IT or not – and venture capitalists, who create the businesses in which IT plays a major role. It is therefore crucial to the economy at local, national and global levels.

Next time you attend a careers fair at a university to encourage new recruits into your company, think about whom you send – will two male developers help to encourage women to apply for a job with you – or would a man and a women be less intimidating?

Bring back the affordable computer

The BBC recently announced plans to revive the interest in coding, the spirit of which was exemplified in the 1980s when they launched their BBC Micro. "The corporation wants to address the UK's technology skills shortage by inspiring both children and adults to explore computer science and creative technology."[23]

TV presenter Prof Brian Cox says "coding is becoming as essential as reading and writing". Whilst this initiative may not address the gender imbalance it is setting out to tackle the more general problem of a lack of people entering the industry.

A point of interest is that the BBC Micro in the 1980s cost around £400 and you still needed a monitor and storage device. Its computing power, compared to the modern day equivalent, the Raspberry Pi, was crude, slow, tiny; the Pi sells for £35 and even though you need a monitor, keyboard and other peripherals the cost is very modest in comparison. And yet some 1.5m BBC Micros were sold in 13 years, a figure the Raspberry Pi is rapidly approaching. Armed with the modern day Micro at our disposal for the price of a pub meal for two, you would suppose that we would not be short of people to use them. The BBC, according to Cox, "has a transformative role in this – to inspire".

The humble BBC Micro helped to transform education in its day - can the Raspberry Pi do the same today?

Pic: StuartBrady

Inspire – this is the keyword in this debate, whether aimed at getting more girls into IT or just more people. Whether it is a misunderstanding of the industry, a lack of role models, information, confidence or whatever, inspiration has to be one of, if not the most, important factors in encouraging more girls to join our industry. Without inspiration there is little point in making a big noise; people have to be inspired to do something, not just feel they should, and if we start to address this in a joined up kind of way we will be making headway.

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[23] *Jemima Kiss, The Guardian: 'BBC would like to teach the world to code, in perfect harmony'*

Pic: The Web Science Trust

Professor Dame Wendy Hall of the University of Southampton is calling for computer science to be "given a buzz" to all primary school pupils and for less "dumbing down" at secondary level. In the same vein Carrie Anne Philbin claims that once you give a child the tools to make their own program, "the sky's the limit"; that "introducing young people to code unlocks the possibility of an amazing career path"; and that it's cool to be a geek – especially if you are a girl. This is inspiration.

Summary

When I started on this project back some months ago, I thought the problem was a simple one – a lack of encouragement by teachers, careers advisers and peers, mingled with some good old fashioned sexism and chauvinistic attitudes. What I discovered is that, whilst those original thoughts are correct, it is much more complicated:

- The problem is cultural and is much more of a problem for us in Europe and the US than in the Middle East, Far East and Asia especially, despite cultural attitudes towards women generally in those locations.
- The different skill sets women and men have can, and should, complement each other whilst taking advantage of equality in the core skills required.
- Gender imbalances in either direction are unhealthy and unproductive.
- Organisations benefit from where men and women work together.
- Social exclusion and discrimination at school and in adult life can lead to a downward spiral in self-confidence and therefore a tendency to go for the soft option.
- We should not under-estimate the value of parental pressure on our children's choice of subject options.
- There is excellent work going on in education and industry to redress the balance but it is sporadic, inconsistent and fragmented.
- Without clearer definitions of IT, technology and computing, it is difficult to promote them properly.
- IT can be fun, exciting and a very lucrative career path with great opportunities for promotion.
- Finally, it is our responsibility – *all of us* – ***to inspire***.

Pic: 123RF