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# Diversity by Design

Building diversity into cyber security



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## Executive summary

Gender imbalance in the cyber security profession is well recognised and demonstrated in surveys such as the (ISC)<sup>2</sup> and Frost & Sullivan 2017 report on the Global Information Security Workforce.<sup>1</sup> This survey found that women made up 11% of workers. It seemed to our community that there was still something to say on diversity more generally. We found in this research that there is plenty of advice available for those seeking to address gender diversity and that we could potentially add to the discussion by building on our neuro-diversity research.

The research aimed **to develop practical steps for making diversity a natural part of our cyber security profession**. The idea was to find ways to bake diversity into the way we work and organise ourselves, as if it were diversity by design. Using the design analogy, the research workshops would identify ‘user stories’ regarding our work-based ‘system’. Through this we would aim to establish diversity ‘requirements’ and identify measures that they might be easily adopted to address those requirements.

This research led to a definition of a good work system as **one that sustains a diverse workforce, instilling diversity of thought within an organisation**. User stories were created for a black female graduate, working class young man, female graduate in STE(A)M and an 18- year-old skilled autistic woman.

Through the user stories, the research identified four areas where interventions are necessary to reduce bias, namely:

1. Help find, recruit and develop talented people, whoever and wherever they may be.
2. Communicate in a way that is attractive to the individual candidate, considering their specific motivations and preferred incentives.
3. Employ mechanisms by which personal and business goals can be aligned, even as goals change.
4. Employ processes that support, mentor and provide advocacy through each stage of the career lifecycle – and that effectively redress grievances should they arise.

This report briefly reviews interventions that could design biases out of these tasks and makes a link with the role of education and awareness training. It makes four recommendations. Firstly, put diversity on the agenda for the board and business leadership. Monitor, survey, measure and report on it regularly. This simple act starts to embed thinking about diversity and shapes follow-on activity. Secondly, have a critical eye for biases in processes in, for example, recruitment, promotion and flexible working. Identify where might the biases be, and how can they be mitigated through adaptation. Thirdly, we argue there is utility in thinking beyond education, training and awareness, to include notions of design for diversity. Finally, recognise the value of diversity in creating more effective teams in cyber security.

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<sup>1</sup> The report is available at <https://iamcybersafe.org/wp-content/uploads/2017/03/WomensReport.pdf> Accessed 5 July 2018

## Introduction and context

Gender imbalance in the cyber security profession is well recognised and demonstrated in surveys such as the (ISC)<sup>2</sup> and Frost & Sullivan 2017 report on the Global Information Security Workforce.<sup>2</sup> This survey found that women made up 11% of workers. Moreover, 51% of women reported some form of discrimination in the cyber security roles. There are a range of initiatives that seek to address this problem. Some are part of the wider context for women in Science, Technology, Engineering and Mathematics (STEM), such as WISE, campaigning for 'gender balance'.<sup>3</sup> Another, the Tech Talent Charter was launched in March 2017 to recruit companies to pledge action in tackling diversity. They claim that only 17% of the Tech/ICT workforce are women.<sup>4</sup> Note that the cyber security work force is not even representative of the wider tech workforce.

Other initiatives focus on the specific gender issues in cyber security, such as the Women in Cyber (WinC) network. Industry associations and publications promote diversity in cyber security, for example, SC Magazine's 'Women of Influence in UK cyber security 2017: 20 women to watch.'<sup>5</sup> The founder of WinC, Kirsty Phillips was featured, as was Jane Frankland, who also in 2017, published an excellent book addressing the issue. Her book is complete with 'golden rules' at the end of each chapter and is recommended for a more detailed analysis than is practical in this report. We highlight some of her golden rules later. As Jane's book title states, she makes the case that the 'failure to attract and retain women into cyber security is making us all less safe.'<sup>6</sup>

2017 was perhaps the year when the cyber security profession started to take diversity seriously. It was also the year when we, IAAC, managed somehow to run an almost completely male annual symposium. This was a timely prompt for us to join in the discussion and review our own policies, despite, with perhaps some complacency on our part, our belief that we were doing more than most to address diversity. In fact, we had been working on neurodiversity through 2016 and 2017.

It seemed to our community that there was still something to say on diversity more generally. We found in this research that there is plenty of advice available for those seeking to address gender diversity and that we could potentially add to the discussion by placing gender diversity in the context of the broader agenda and our findings from our neuro-diversity research. The following research aim was established.

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<sup>2</sup> The report is available at <https://iamcybersafe.org/wp-content/uploads/2017/03/WomensReport.pdf> Accessed 5 July 2018

<sup>3</sup> See <https://www.wisecampaign.org.uk/> Accessed 5 July 2018

<sup>4</sup> See <https://techtalentcharter.co.uk/about-the-tech-talent-charter/> Accessed 5 July 2018

<sup>5</sup> Kate O'Flaherty, Women of Influence in UK cyber security 2017: 20 women to watch, SC Magazine, 5 September 2017. Available at <https://www.scmagazineuk.com/women-influence-uk-cyber-security-2017-20-women-watch/article/1474152>. Accessed 5 July 2018.

<sup>6</sup> Jane Frankland, In Security: why a failure to attract and retain women in cybersecurity is making us all less safe. Rethink Press, 2017.

## Research aim and approach

The research aimed to **develop practical steps for making diversity a natural part of our cyber security profession**. The idea was to find ways to bake diversity into the way we work and organise ourselves, as if it were diversity by design. Using the design analogy, the research workshops would identify ‘user stories’ regarding our work-based ‘system’. Through this we would aim to establish diversity ‘requirements’ and Identify measures that might be easily adopted to address those requirements.

We also wanted to examine this from a systems and design perspective to see if we might be able to broaden participation in addressing the diversity problem amongst a largely male technology and engineering community. This might also utilise a perspective that could lead to alternative ideas beyond the body of work already published.

It was felt that much of the advice available related to good education and awareness training for personnel. We don’t disagree with this essential aspect of shaping the workplace. However, we felt there was utility in examining measures that could be adopted that mitigated people’s bias, whether or not they were positively affected by education and awareness training. In other words, even the hardest reactionary individual might be able to act in support of diversity simply by applying good processes, thereby circumventing, or mitigating, their bias. Adoption of these measures could make us more diverse. This research sought to find out what those measures might be in the context of cyber security.

## The system and user stories

Adrian Gorham from O2, Cath Leggett from the National Autistic Society, and Caitlin Egen from Crossword Cybersecurity started the first workshop with excellent presentations. Lyndsay Turley, then at (ISC)<sup>2</sup>, provided insight from survey data and other research. A broad discussion took place with a view to describing what a good work system would look like from a diversity perspective. Several dynamics arose which are important to understand when thinking about their influence on the system and interventions in improving the system. These are described briefly in turn.

## Recruitment on the basis of skills versus representativeness.

On the one hand, in the area of neurodiversity for example, we wish to target people on the basis of their skills. On the other, we want the workforce to be broadly representative of the communities we serve. These ideas may not be in opposition but can present some tensions. Take the following two perspectives:

**We need more women in cyber security.** If it is true that woman bring better skills in some areas, targeting the recruitment of those skills could also increase representativeness. However, it is not clear what the evidence is, if any, for women and men having better or worse skills. For some time, many scientists have argued for the notion of female and male type brains, where stereo-typically, men are predisposed to spatial awareness skills, and women to relationships and

communications, for example. Other research suggests that there is no such biological difference, and that the skill differences we perceive may be the result of highly gendered social roles and expectations in life, that shape the development of brain function. Indeed, there may be as much or more difference within the same sex, as there is between the sexes.<sup>7</sup> If organisations or individuals assume that women are better at relationships and communications they may nudge or maintain women in particular roles. How should this impact on skills versus representativeness interventions, if at all? Frankland discusses left and right sided thinkers, where tendencies towards creativity and associated skills are on the right side, and analysis and associated skills are on the left. This is in fact another problematic assertion for which evidence is contested. Nevertheless, she argues that cyber security needs a mix of right and left sided thinkers, which are neither male or female. She points towards differences in risk-taking as having some biological basis between sexes.<sup>8</sup>

**We would like to utilise the skills of neuro-diverse people in cyber security.** 1.1% of the population has a diagnosis (Source: NAS), but it is believed that neuro-diverse people in technology companies may constitute 10-15% of the workforce. Whilst these latter statistics are anecdotal, some studies provide evidence of clusters of autism diagnosis in regions that are tech hubs, such as in Silicon Valley and the ‘tech rich’ area of Eindhoven in the Netherlands.<sup>9</sup> However, only 16% of autistic people are in full-time employment compared to 48% of all disabled people. Adrian Gorham discussed a company’s headline figures that illustrated a good gender balance as a whole but disguised some gendered roles within sub-units of the organisation. From what data do we take the notion of representativeness and with what granularity do we apply it?

### Moral cases versus business cases

Whilst moral and business cases are not in opposition, they are sometimes inadvertently portrayed as such. For example, a strong business case for diversity is seen as a stronger

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<sup>7</sup> If you want to explore this further, here are two articles which may be of interest:  
<http://www.sciencemag.org/news/2017/04/study-finds-some-significant-differences-brains-men-and-women>

and

<https://www.newscientist.com/article/dn28582-scans-prove-theres-no-such-thing-as-a-male-or-female-brain/>

<sup>8</sup> Jane Frankland, *In Security: why a failure to attract and retain women in cybersecurity is making us all less safe*. Rethink Press, 2017, pp 76-77.

<sup>9</sup> See University of Cambridge, *Diagnosed autism is more common in IT-Rich regions*, Website, 20 June 2011. Available at <http://www.cam.ac.uk/research/news/diagnosed-autism-is-more-common-in-an-it-rich-region> Accessed 6 July 2018 and Steve Silberman’s 2001 article in *Wired* which led to his book on ‘Neurotribes’ <https://www.wired.com/2001/12/aspergers/> and reviewed here <https://www.theguardian.com/books/2015/aug/23/neurotribes-legacy-autism-steve-silberman-book-review-saskia-baron>. Both Accessed 7 July 2018.

message for change, even when a strong moral case should arguably be enough on its own. If there were no skills dividend in neuro-diversity, shouldn't we be employing neuro-diverse people anyway? It risks reinforcing that people need only change when they perceive business benefit in performance or economic terms. It can play to people's prejudice rather than address it.

Associated with this is the notion that 'I don't care what people are, as long as they can do the job.' This generally positive statement can suggest that diversity is irrelevant; it is performance that matters. However, it may be as likely to get people to care about diversity, as it is to suggest that no change is needed. It is therefore important that we challenge our own assumptions. Fortunately, diversity is good for business – but one shouldn't have to write 'fortunately' in a moral argument. Perhaps the position to take is that business arguments bolster the moral case in any diversity campaign, and help reduce the 'preachiness' of moral arguments.

### Why is diversity good for business?

From the perspective of the workshops participants, more research needs to be done on this (which may exist elsewhere<sup>10</sup>). We know there is a clear correlation between diverse workforces and profit. For example, as Adrian reported, McKinsey shows that Companies in the top 25% for ethnic diversity were 33% more likely to achieve profit above the industry average EBIT (earnings before interest and taxes) margin than those in the bottom 25%.<sup>11</sup> It was discussed at the workshop that diversity is good for business because it creates a happier workforce and increased diversity of thinking. These are known to be associated with productivity and innovation. So perhaps employee diversity statistics are a proxy measurement of diversity of thought and productivity.

### Quotas and targets

Why not simply have quotas and targets as a way of developing diversity by design? There is a legal difference between legal positive action and illegal positive discrimination in the UK.<sup>12</sup> Likewise targets can be legal, but quotes not. Our discussion should have ensured that we focussed on targets and positive action, but often the word 'quota' was used interchangeably. The workshop attendees were divided on this issue of targets and quotas. For those who accepted that quotas might be acceptable, it was in two ways; either as an intervention because it is ESSENTIAL to create change, or as a tactic when all else has failed. No one in the room seemed to like the idea of them personally being selected on the basis

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<sup>10</sup> See <https://www.inc.com/ian-altman/5-reasons-why-workplace-diversity-is-good-for-business.html>

<sup>11</sup> See <https://www.mckinsey.com/business-functions/organization/our-insights/delivering-through-diversity>

<sup>12</sup> Louise Peacock, Equality Act explained: positive discrimination versus positive action, The Telegraph, 2 December 2010. Available at <https://www.telegraph.co.uk/finance/jobs/8177447/Equality-Act-explained-positive-discrimination-versus-positive-action.html> Accessed 7th July 2018.

of a quota. After the workshop, in further discussion, it was argued that this could be reframed positively. For example, where targets exist, it is because they ensure that skilled people from underrepresented groups have a fair chance of selection, alongside the typical employee profiles that the business may subconsciously or consciously be inclined to select. In other words, targets are to keep the businesses selection process honest, not to lower the bar for candidates.

### Social class or socio-economic status

Social class and social mobility were interesting aspects of the research discussion. Three key aspects were highlighted. Firstly, there is the idea that computer science is dominated by middle classes because young people who have access to IT at home are more likely to take it up or succeed. Secondly, the culture of tech start-ups may be geared towards people with money who can afford to take the risk. Thirdly, in recent times there has been much discussion about elite women in, for example Hollywood and the BBC, but little around the socio-economic status of the majority. Many, if not the majority of people in unskilled, low paid, insecure employment, are women – some of the most vulnerable in society. Do we address diversity from a socio-economic perspective? How do we move people from unskilled work to skilled work in IT/Cyber?

### Definition of a good work system from a diversity perspective

Taking into account the dynamics described above, the workshop developed a statement defining what would be a good work system with regard to diversity.

**A good work system is one that sustains a diverse workforce, instilling diversity of thought within an organisation.**

This is a moral position that is good for business because it is shown to create innovation, better understanding of customers, and happier environments through thoughtfulness in aligning individual and business goals. It may increase profitability too, compared to less diverse organisations.

### User Stories

So, who uses this work system? It should be noted that the workshop attendees were truly diverse and could credibly be considered a panel of experts regarding the user stories developed below (except where noted). The group's diversity included race, gender and neurodiversity, and parents of those in the user stories. The intention was to develop a series of statements for each user such as:

As <user persona>,  
I want <what?>  
so that <why?>

However, a more general discussion emerged which have been adapted into a narrative

form below.

### Black female graduate

The black female graduate experiences conscious and unconscious bias throughout their career. She requires that it is confronted at every stage of her career. She needs mentoring and other forms of support through the recruitment process, in role, promotion and senior management. She will be confronted by complex blends of bias, being both a woman and black, perhaps combined with other characteristics. She will need to have this 'intersectional' disadvantage recognised, and some thought will be required to its implications. Theories of intersectionality take account of how, for example, black women experience racism or sexism differently, from say, black men or white women, because of the unique [intersectional] interplay of race and sex:

*"For instance, a black man and a white woman make \$0.74 and \$0.78 to a white man's dollar, respectively. Black women, faced with multiple forms of oppression, only make \$0.64. Understanding intersectionality is essential to combatting the interwoven prejudices people face in their daily lives" <sup>13</sup>*

### 'Working class' young man with limited access to computers and IT knowledge

It was assumed that the individual has:

- limited or no awareness of technological capability or opportunities.
- lack of role models – working class? Also young? (note intersectionality here again?)
- some enthusiasm or obstruction from peers – or from teachers (and other pillars of the community)?
- Limited access to technology - in school, libraries, home (other peoples' homes) - but an individual nevertheless attracted to technology

An example of the three-part user story was: "I, as a working class young man, despite some peer pressure, want to increase my knowledge and skills so that I can learn about technology – good or bad – so that I can help others to show what's possible – perhaps join a fast-moving growth industry. Good for community (future role model?)"

The group assumed that the young person wants to improve their position – economically and in social standing – and, having done so, might wish to encourage greater take-up from subsequent generations within a disadvantaged community. (This was recognised as risking an idealised view.)

There is a need to recognise the importance of role models who have a characteristic to which the young man relates. These role models should not carry an unachievable status, but can be real people, with flaws, carrying a status to which the young man can aspire.

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<sup>13</sup> Quote taken from <http://www.ywboston.org/2017/03/what-is-intersectionality-and-what-does-it-have-to-do-with-me/>

## Female Graduate in STE(A)M (Science, Technology, Engineering, (Arts), Mathematics)

Careful thought in how to attract this person is required, including imagery and models of what the role and environment is like. A new graduate might change their interests or ambitions after a year or two, simply as a function of age, economic maturity and relationship forming. As she moves up the organisation, she may become more generalist, spending less time in technology, the implications of which need to be understood. If she takes a career break, she will need to stay in touch with developments so that she does not stagnate, or fear stagnation.

### 18 year-old skilled autistic women

This 18 year-old autistic woman has a series of traits as follows:

- Actively looking for work - wants jobs, friends and salary.
- Wants to know how to bring value to the company
- Needs to feel comfortable in their self-expression in work
- Needs to know where and how they will work.
- Wants to help others
- Wants to feel good about themselves
- Wants to increase their knowledge
- Needs stability

Reading this list, one might be of the view that this is simply something everyone wants. It might also be read as something that every young woman would want. However, the point above about intersectionality is interesting here, because although these needs are expressed in similar terms to the needs of others, how they are experienced by an autistic young woman may be very different. For example, imagine that levels of anxiety may be more acute in certain circumstances. Or imagine, that the need to bring value may be felt in a very sincere and genuine way, without any hint of cynical baggage that others might carry.

### Characteristics of user stories

In going through the process of user stories, one takes the ideas of groups (such as young men or black people) and expresses user needs in highly personal terms. A benefit of doing this is that the groups become less abstract and more like real individuals. This helps us think about our planned interventions in terms of their personal impact. It also helps us avoid thinking about groups as 'them'. In doing so we highlight highly specific issues that need consideration such as the intersectional dynamics of someone who is young, black and female. One risk is that this might inhibit the development of workable policies for groups, when everything seems to need to be tailored to the specific needs of individuals (Paralysis through analysis?). These perspectives are not necessarily in tension. Based on an analysis of the user stories, interventions designed to sustain our good work system should:

- Help find, recruit and develop talented people, wherever and whenever they may be.

- Communicate in a way that is attractive to the individual candidate, considering their specific motivations and preferred incentives.
- Employ mechanisms by which personal and business goals can be aligned, even as goals change.
- Employ processes that support, mentor and provide advocacy through each stage of the career lifecycle – and that effectively redress grievances should they arise.

To intelligently implement the bullet points above requires education and awareness in diversity. They aim to improve people's judgement skills and knowledge to perform these tasks. This is because it is in these tasks that personal biases and assumptions can have undesirable effects. For example, one might think there is only one place the right people for a role may be found. One might assume that all personnel are motivated by the same thing. One might try to recruit people who are 'just like me'. One might find that the level of thought required is just too difficult.

So what are the design interventions that may take account of some of these biases and assumptions? Jane Frankland provides many golden rules that address the judgement skills and knowledge targeted by good education and training. For example:

- 'Everyone has social bias, Understand the extent of yours...' (Frankland, Page 30).
- 'Recognise and accept the cultural differences between...generational cohorts' (Frankland, Page 52)
- 'Recognise that cyber security is all about challenging how the world around us works, so look for talent that can think well.' (Frankland, Page 52)
- 'Understand that the perceptions of failure and risk aversion are extremely important for girls and women' (Frankland, Page 89)

Frankland also provides a range of interventions that are more like design interventions since as:

- 'Recognise that by adding at least two female candidates to a final pool of job applicants, the status quo bias can be changed, and women in cybersecurity can have a fighting chance of being hired. (Frankland, Page 30)

## Design interventions

During the first workshop a number of proposed interventions were captured in discussion. These included:

- Measure and survey. Measuring and surveying not only provides data, but embeds thinking about diversity into the processes of the organisation through the act of measuring and surveying. It makes a difference in itself by enabling reporting and agenda setting. The impact of this in revealing the state of diversity should not be underestimated in an educational sense. Equally, this might be a reason some will want to avoid it!

- Ask – Do we look like our customers? There are problems for customer service and innovation if we do not.
- Recruit for teams and not just select individuals. Diverse teams work better. This, however, requires an excellent relationship with HR who will normally wish to recruit against a specific job role alone, without looking at the qualities required in the team as a whole.
- Craft job descriptions and job profiles carefully – to avoid unintentional self-exclusion. For example, women are more likely to rule themselves out of job if they don't match all criteria (Note: this can also apply to people with autism).
- Promotion- take into account that some people are better at self-promotion than others who may feel that doing a great job is enough. This was portrayed at the first workshop as alpha-male types being more likely to self-promote, and where an advocacy role for those who do not speak up is important.
- Neurodiversity – use direct language and avoid hypothetical discussions in adverts, job descriptions and interviews. (See IAAC Guidance for employers regarding neurodiversity – available on the IAAC website<sup>14</sup>)

The second workshop introduced a pack of cards which had over ninety interventions gathered from a web search of approaches to increasing diversity. The cards were distributed to the workshop and participants were asked to sort the card against the needs expressed in the user stories. There were a number of general observations emerging from the discussion. Firstly, many of the 'top tips' for increasing diversity are focused on gender issues. Secondly, many of them are relevant to any sector of employment, and not simply cyber security. Whilst this to some extent may reflect weaknesses in the web search, it may also be a characteristic of the diversity material on the web and stories in the news. For example, Paul Avis writing in 'Personnel Today' in June 2018 states:

“Gender pay inequalities may be making the headlines, but the UK’s “disability gap” – the poor rate of employment and retention in employment for people with disabilities – remains stubbornly high”<sup>15</sup>

Avis highlights issues in hiring and retaining, insufficient adjustment for people at work, and the problem of return to work after becoming disabled. By and large, these issues apply across all protected groups in the UK Equality Act. Other news stories show similar diversity issues in other sectors and field, such as gender imbalance in economics. To some extent a 'find and replace' could be done on Fleischer and Schoder's article on 'the gender gap in economics' and it would become a cyber security article<sup>16</sup>.

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<sup>14</sup> See <http://www.iaac.org.uk/wp-content/uploads/2017/07/Autism-and-careers-in-cyber-security-FINAL.pdf>

<sup>15</sup> Paul Avis, Diversity and Disability: the equality challenge, Personnel Today, 1 June 2018. Available at <https://www.personneltoday.com/hr/diversity-and-disability-the-equality-challenge/> Accessed 7 July 2018.

<sup>16</sup> Chris Fleischer and Diana Schoder, The gender gap in economics: Swathmore's Amanda Bauer discussed sexism in the profession and what to do about it. American Economic association, 8 September 2017. Available at <https://www.aeaweb.org/research/gender-gap-economics-profession-interview-with-amanda-bauer> Accessed 7 July 2018

We could therefore approach diversity in cyber security as a symptom of a wider problem of gendered roles and prejudices in society. So why shouldn't we try to address the whole society problem? It is true that we all have a part to play, but our problem, within the cyber security community, is a lack of skilled people today, and if we don't promote the job opportunities how is anyone meant to know that there is a satisfying career waiting for them. They might become economists instead! This does not mean that we simply adopt interventions that are specific to cyber security skills. Rather we examine how interventions that might be appropriate to all sectors matter in our own businesses, as well as considering the specific skills and attitudes required for cyber roles, whilst recognising the dynamics of a society in where diversity can be seen as a general problem in many sectors of the economy. For example, in communication after the workshops, one industry expert who has worked extensively with schools made the following statement, which points towards systemic issues in schools:

"All the work I have done with schools over the years points to the almost universal reality now of co-education which puts girls off STEM in general and IT (particularly cyber security) because of peer pressure – only the geeks and nerds do IT or cyber...So if you are a girl who wants to be part of the in-crowd at school, as seen by other girls, and by boys,...you do not do IT. This means that girls have more or less ruled themselves out of a technical job in IT by the age of 8/9 and almost entirely by 15/16. So if you want a more diverse pool to select staff from, you have to address the issue in primary school."

In some of IAAC's other work on diversity, in support of this co-ed dynamic, we have heard how competition for time on computers needs to be managed carefully and assertively by teachers, so that boys don't dominate.

As the card deck used in the workshop had ninety suggested interventions, we won't review each of them here. Rather we provide an indication of some of them chosen by the workshop participants against the user stories outlined above. The others are available in full text at the links given in the footnotes.

### **Black Female Graduate**

In addition to the advocacy and mentoring roles mentioned above the following were noted:

- In teaching, 'your posters and handouts should reflect positive images of all sections of society'.<sup>17</sup> Note: This comes from a web resource described as an equality and diversity tool kit for teachers. One attendee at the second workshop stated, there is 'lots of good practice in education for teaching STEM. It can easily be applied in cyber security as well, but this isn't having a great impact in recruitment to STEM Jobs. Teaching is a small part of a diverse work system'. This is a useful reminder of a point expressed in the next quote.

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<sup>17</sup> <https://www.stem-e-and-d-toolkit.co.uk/top-tips/anyone-developing-teaching-resources>  
Accessed 7 July 2018.

- “No single action dominates the list of effective tactics. Every tactic, properly executed, strengthens the effort, similar to the way links in a value chain strengthen each other.
  - The best diversity recruiting takes place at organizations that embrace and promote diversity as a competitive advantage, in companies where the business case is made to prove it.
  - Excellent diversity recruiting includes an understanding of the communities in which the company does business, and ways in which its relationship with those communities benefits from a diverse workforce.
  - Diverse candidates believe inclusion is just as important as diversity, and look for it throughout the organization.”<sup>18</sup>
- “ Diversity breeds diversity, so from a representation point of view, the more diversity we have the more that sends a message that “you can do it too.”<sup>19</sup>

### Working class young man

- “Work with your network to reduce discrimination. Do you co-operate with employers who ask for a postcode of your pupils or a telephone conversation with them before offering a work placement? Are you aware that they could be a screening for a particular accent or ethnicity? Are your training events attended by different agencies?”<sup>20</sup>
- “One partner in conjunction with an academic institution developed a scholars’ program to attract outstanding undergraduate students and to recognize excellence among academically gifted students from diverse backgrounds.”<sup>21</sup>
- Recruitment – “Words can make all the difference. Avoid superlative terms like asking for “experts”, candidates who are “assertive”, or “best of the best” implies that you are looking for someone at the very top of their field. Using these phrases may deter applicants who recognise that they are advanced in their skills, they may even be the best among their peers, but not necessarily the most experienced in their field or outspoken. Phrases such as “resilient, collaborative, creative and must be highly competent” are more likely to attract diversity.”<sup>22</sup>

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<sup>18</sup> <https://hiring.monster.com/hr/hr-best-practices/workforce-management/workplace-diversity/stem-diversity-tactics.aspx> Accessed 7 July 2018.

<sup>19</sup> <https://digitalguardian.com/blog/innovation-diversity-cybersecurity> Accessed 7 July 2018

<sup>20</sup> <https://www.stem-e-and-d-toolkit.co.uk/top-tips/anyone-developing-teaching-resources> Accessed 7 July 2018.

<sup>21</sup> <https://govinfo.library.unt.edu/npr/library/workforce-diversity.pdf> Accessed 7 July 2018

<sup>22</sup> <https://techtalentcharter.co.uk/> Accessed 7 July 2018

## Female Graduate in STE(A)M

- Women “with higher levels of access to sponsorship and leadership programmes report feeling valued in their role and confidence in their success...They tend to demonstrate less of a tendency to change jobs in pursuit of a promotion or higher salary, for example”.<sup>23</sup>
- “There should be on-going open discussions between managers and their line reports on their career development and career vision, with review milestones. Be transparent about promotional opportunities. As a manager, sponsor your females if they are aspiring to be promoted.”<sup>24</sup>
- “Gender neutral flexibility in the workplace. Whilst it is the case that women are more likely to take longer leave when they start a family it’s important to promote flexible working to both genders as a way to enhance the overall flexible working practices in your business. When leave is attributed to women rather than both genders it’s more likely to be marginalised or seen as a blocker to career progression.”<sup>25</sup>
- “Don’t schedule interviews when you are time pressured as you will be far more likely to make quick decisions and biased decisions when you are not fully engaged and thinking about what’s on your “to do” list.”<sup>26</sup>

### 18 year-old skilled autistic woman

- “Showcase training opportunities. Highlight learning opportunities like formal training and mentor programs. This implies that you are willing to hire candidates who do not meet every single listed job qualification. It also shows a commitment to helping employees gain new skills on the job. Both of these messages can help alleviate concerns of under- qualification.”<sup>27</sup>
- “Focus on skills. Within the technology sector jobs descriptions can be very narrow and focus on specific technologies, coding languages, platforms...etc. These will only create a narrow applicant pool and may deter women who don’t necessarily have the specific experience with each of the technologies from applying. However, a well-educated, dedicated, quick learner who is also adaptable will be able to pick up new technologies with ease. Focus on those skills in your job description to ensure you continue to attract high- calibre candidates, without deterring women.”<sup>28</sup>

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<sup>23</sup> Lyndsay Turley, ‘Why gender diversity is so elusive when there is a workforce gap in cybersecurity.’ EMEA (ISC)<sup>2</sup>.

<sup>24</sup> <https://techtalentcharter.co.uk/> Accessed 7 July 2018.

<sup>25</sup> Ibid.

<sup>26</sup> Ibid.

<sup>27</sup> [https://techtalentcharter.co.uk](https://techtalentcharter.co.uk/) Accessed 7 July 2018

<sup>28</sup> Ibid.

- For other tips regarding autism and careers see our report at:  
<http://www.iaac.org.uk/wp-content/uploads/2017/07/Autism-and-careers-in-cyber-security-FINAL.pdf>

## Conclusion

This research has highlighted that there is a growing range of initiatives and guidance on promoting workforce. Within the constraints of the workshops and report, we have tried to illustrate the distinction between matters of judgement, aided by education and training, and the options of design approaches that mitigate bias through better tactics and processes. Of course, intelligent application of such measure requires good judgement and knowledge. This has several implications for organisations and businesses, considering the dynamics and tips described throughout this short report.

Firstly, put diversity on the agenda for the board and business leadership. Monitor, survey, measure and report on it regularly. This simple act starts to embed thinking about diversity and shapes follow-on activity.

Secondly, have a critical eye for biases in processes in, for example, recruitment, promotion and flexible working. Where might the biases be, and how can they be mitigated through adaptation.

Thirdly, we argue there is utility in thinking beyond education, training and awareness, to include notions of design for diversity.

Finally, value diversity in creating better teams for working in cyber security. Our contest with intelligent adversaries requires it. In doing so we should aim to create **a good work system that sustains a diverse workforce, instilling diversity of thought within the organisation.** Report Author: Nigel Jones, CEO IAAC

## IAAC Contact:

Information Assurance Advisory Council  
1st Floor Block D, North Star House  
North Star Avenue  
Swindon, Wiltshire  
SN2 1FA United Kingdom  
**Telephone:** +44 (01793) 417453  
**Email:** info@iaac.org.uk

**Disclaimer:** The views expressed in this report are the results of IAAC research and analysis by the report author. They are not necessarily those of IAAC sponsors or supporters.

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