The Alan Turing Institute

Event report: Gamechangers for diversity in STEM

21–22 September 2018

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(The Alan Turing Institute, London, 21-22 September 2018)

Professional isolation, sexual harassment, bullying, discrimination and difficulties balancing work and family life are experiences disproportionately affecting women, ethnic minorities, LGBTQ+ people and people with disabilities working in science, technology, engineering and mathematics.

At the two-day hackathon: 'Gamechangers for diversity in STEM', 40 concerned and highly committed researchers, academics, entrepreneurs, practitioners, students and science communicators from across the sector came together at the Alan Turing Institute in London to tackle the enduring lack of diversity in STEM and develop practical and actionable solutions.

The hackathon was the brainchild of Dr Kirstie Whitaker (The Alan Turing Institute and University of Cambridge), Dr Jess Wade, Dr Hannah Williams, Devjoy Dev (Imperial College London), and Dr Sarah Morgan (University of Cambridge).

Driven by the premise that greater diversity in science leads to better scientific outcomes for all, the event provided a fresh and dynamic forum in which participants could systematically analyse and discuss ways to increase representation and cultivate safe and inclusive working environments for undergraduate and PhD students, post-docs and early career researchers, scientists and practitioners from all social groups and minority backgrounds.

Artificial intelligence: Design and development for all

In her opening remarks, Co-Founder of CognitionX and Chair of the UK government's AI Council Tabitha Goldstaub drew attention to the under-representation of women across artificial intelligence and the implications this has for the development of new AI based products and services. In her call to action on why we must all engage with AI now, she shone a spotlight on specific biases embedded within existing AI technologies, exacerbated by systemic barriers preventing or discouraging women from pursuing careers in the field.

"As children we're often told that women are social butterflies, whereas boys are told they will go on to be great scholars. This is the first barrier we need to overcome in order to allow women to get the skills. But even after this we have to contend with discriminatory attitudes which stop us from getting *that job in Tech*. Then we are presented with problems associated with gender pay inequality, and then finally, if we have families we have to get over the guilt, which never really goes away."

Through a set of provocative and visually engaging slides Tabitha demonstrated real life misogyny in action across STEM related sectors and underlined the exceptional efforts women must make to ensure they are treated fairly and not sexualised or sexually harassed. Going further she observed that when women are absent from spaces where new technologies and products are being created the knock-on effect is innovation that is unfit for purpose – failing to meet the needs of 50% of society.

For example, iPhones have been able to track human heart and fitness rates for a long time, but an app to track menstrual cycles - the most important thing for women - was only introduced in 2015. Outlining her most critical concerns she said:

"What I'm most nervous about is that the lack of women in AI means we're going to have less good products that are suitable for women and so I wanted to flag to people in the room that if we don't have women training our AI, if we don't have women included in data sets, we don't have our goals rightly set for AI this could be seriously dangerous, not only in terms of crappy products, but potentially life threatening as well. "

She finished with the story of three African American female Nasa scientists- Dorothy Vaughan, Mary Jackson and Katherine Johnson- whose contributions were pivotal to the US landing the first man on the moon in the 1969. Until their inspirational stories formed the basis of the Hollywood box office hit '*Hidden Figures',* their experiences had been whitewashed out of history. Tabitha concluded: "We must end the narratives thrown up by Google searches which perpetuate misogynist ideas of 'man and machines'. This must change to 'man and woman and machines'. All the participants here today are Dorothy Vaughans. Like her, we all want and strive to change the world for the better."

Tackling sexual harassment and gender inequality in STEM

Royal Astronomical Society Fellow at Imperial College London Dr Emma Chapman focused her keynote speech on her own deeply troubling experiences of sexual harassment and gender discrimination while studying for her PhD. She recalled the evolution of her incremental awakening which arose at first via conversations she overheard between colleagues in the staff room and then through the hurdles she encountered at an institutional level when she became pregnant in her second year. Emma was forced to resign in her third year after experiencing repeated sexual misconduct from a staff member who had great control over her career. Expecting that the university would deal with her complaints within a matter of weeks, Emma would actually find herself in a painful and protracted struggle for justice that lasted two years. Reflecting on what happened when she reported her experiences, she said:

"I had a very big wake up call. It completely changed my world view because when I reported the behaviours that I had experienced it never occurred to me that justice wouldn't be done. And as the two-year reporting process went on which was extremely traumatic it became very clear very quickly that the rule book was broken.

"The biggest challenge in terms of reforming sexual misconduct in education is the silence because when you report this behaviour you are immediately told that you can't tell anybody and that it's a completely confidential process. And that absolutely has its place because there has to be fair justice. Unfortunately, that imposed silence often extended beyond the outcome of these processes, so even the people complaining won't know what happened in terms of sanctions on the perpetrator, so you cannot defend yourself against false allegations, you cannot defend yourself against retaliation.

You have to stay silent and that has a very negative effect. Not only does it enable a culture of impunity, but even if they are not getting away with it people see no consequence – it just encourages people to keep at it."

Refusing to accept defeat and focusing her activism on breaking the silence Emma embarked on a determined legal campaign to end the university's rules which stop victims of sexual harassment from speaking out. Due to her extraordinary courage and tenacity non-disclosure agreements have now been scrapped and through the 1752 Group, a research organisation lobbying to end staff-student sexual misconduct in higher education, she is working with Universities UK to make this the norm.

Countering the invisibility of the BME scientific community

Shifting the focus to the specific challenges confronting women of colour in STEM, Dr Ozak Esu, electrical engineer at Cundall and IET's Young Woman Engineer of the Year award winner provided insight into the double discrimination that can come with being both woman and a person of colour. In her keynote address she described a childhood experience which saw her overcome traditional patriarchal attitudes within her own family in Nigeria and both sexist and racial stereotypes in the UK.

"At first I didn't want to get involved in any debates around race, since this was not something I could identify with as I had grown up in Nigeria where everyone is black. It was just not something I thought about. It was after I spent time in the UK, that I began to notice I was treated differently because of the colour of my skin. I remember being invited to a conference as a keynote speaker, but people would assume I was there to make the coffee. You can't help but notice when you are at an event with 800 people and you are the only person of colour in the room."

Now motivated by concerns about the under representation of BME people working in STEM, including the fact that qualified BME engineers are twice as likely to be unemployed compared to their white counterparts, Ozak has opted to use her position as a role model and works tirelessly to redress the imbalances. To overcome the lack of equality, diversity and inclusion in STEM, she says increasing visibility and encouraging retention of new talent entering the field is key.

'There are two aspects to overcoming the challenges. First through increased visibility. A lot of organisations are working towards that at the moment but it's not a joined-up effort and what's lacking is a unified approach. Certain regions of the country seem to get more attention than others, so there's no equality in the distribution of STEM programmes and initiatives.

"On the other hand once you are actually in the profession the industry still has a problem with retention. It's down to the culture within the industry at the moment. It's very male dominated and a substantial percentage are quite comfortable with it being that way. But what needs to be recognised is that not as many people are coming through the doors. In the UK especially there is a skills deficit and ageing population. Engineering needs to change to be attractive to more young people and also

to early career professionals like myself. So even after all the hard work has been done to get them in, the focus then needs to shift to looking at how they can be retained."

Being LGBTQ+ in STEM

The final keynote speaker astrophysicist, journalist and social activist Dr Alfredo Carpineti delivered an uncompromising account setting out the reality of what it feels like to be an LGBTQ+ person in STEM.

Setting the context he highlighted the sparseness of available literature investigating the specific issues encountered by LGBTQ+ people in the field. A rare paper published in the *Journal of Homosexuality* in 2013 which explored 'How out are people in STEM?' revealed that just 56% have felt comfortable coming out to their colleagues. The American Physical Society LGBT Climate in Physics Report 2016 found that 11% of LGBT men, 21% of LGBT women, 42% of gender-nonconforming people and 49% of trans people had experienced harassment at work.

Against this unsettling background Carpineti passionately rebutted traditional attitudes across the scientific community which perpetuate the mantra that science should not be politicised. Following through the premise of his presentation that 'if you aren't raging, you haven't been paying attention', Carpineti deconstructed regressive but normalised homophobic and transphobic behaviours across the scientific community. He said:

"Hate slows down the progress of institutions, hate discourages individuals from becoming role models, hate aims to maintain the status quo, hate distracts us from our work. Identity politics has always been part of science, the (second) Fermi paradox reminds us of this. Science is politics as it is part of life."

In order to bring about change Carpineti issued an impassioned call for an "inclusive and intersectional revolution" and a complete overhaul of entrenched outdated patriarchal attitudes inhibiting scientific innovation.

Gamechangers for diversity in STEM – defining solutions

After two intensive days of high energy deliberation, knowledge exchange and creativity, participants developed nine ambitious projects to reverse the lack of diversity in STEM. In the final plenary session on Saturday afternoon each group pitched compellingly to investors in hopes of winning their support.

Key themes emerged as they presented their projects. Mentoring schemes aimed at school aged children in the most deprived or inaccessible communities were viewed as a powerful vehicle towards tacking the under-representation of girls and young people from specific minority groups and social backgrounds.

Tackling lack of diversity in STEM workplaces by shifting responsibility for diversity management to senior level colleagues was also given priority since currently much of this work is being done by junior level practitioners or early career researchers. Such approaches aimed to allow scientists who are women or minorities to reclaim their 'humanity' by mitigating the risk of burnout and enabling them to better balance work and family life.

The risks and challenges confronting LGBTQ scientists were given centre stage and a legal toolkit enabling their safe movement around the world was identified as key to attaining true equality and inclusion in scientific research.

Other themes arising concerned the knowledge gap among diversity practitioners across the sector. Creating digital platforms to share experiences and archive information featuring toolkits, advice and new initiatives was seen as key towards empowering individuals to develop solutions and forge a network or community.

The winning teams

In returning their decision the judges Victoria Thorpe (Accenture), Selina Pavan (Bank of America), Samantha Edgar (HSBC) and Elaine Safier (HSBC) made clear their huge admiration for the inspiring efforts mobilised by all participants to increase equality, diversity and inclusion in STEM. They followed by announcing two joint winning teams and two joint runner ups.

Roots to STEM - A project aiming to grow STEM aspirations and inclusivity among Keystage 2 children and their parents and carers picked up the winning £1000 prize. With its objective to expand across school districts and scale up activities over time it demonstrated long term sustainability goals by aiming to build communities and a more diverse and inclusive STEM workforce for the future.

Team participants were Sotira Georgiou, Athina Frantzana, Dr Katherine Inskip, and Dr Priyanka Dhopade.

Out and About in Higher Education STEM - The second winner to pick up the £1000 prize. The development of a legal framework to support the global mobility of LGBTQ+ community in higher education was seen as critical for forwarding scientific research often supported through overseas development funding. Recognising the hostility and risks confronting LGBTQ university staff and students in countries where homophobic attitudes are codified via arbitrary laws, the project proposes the collation and curation of information for students and staff on the new Pride in STEM website set up by Dr Alfredo Carpineti. This information would also be disseminated through professional societies via the Athena Swan Forum and through Stonewall membership.

Team participants were Dr Eugenie Hunsicker, Dr Emma Nichols, Henry Li, Sarah Cosgriff, Dr Clara Barker, Dr Antonio Portas, Dr Alfredo Carpineti and Shakeel Khan.

The two joint runner ups which each received £500 in prize money were:

Check yourself – An online tool providing ten easy steps to check the culture of diversity in the workplace - enabling organisations to make comparisons against other organisations regionally as well as providing a toolkit to drive improvements. Aiming primarily to target senior management, the tool aims to shift the labour of diversity and inclusion work from junior staff to senior management, since evidence shows that interventions which are initiated at this level are more likely to succeed.

Team participants were Esther Osarfo-Mensah, Dr Samantha Hood, Dr Jane O'Hara, Dr Jenny Andrew, Dr Tana Joseph.

Next Level – A long term sustainable mentoring scheme aiming to raise awareness of career routes and opportunities in STEM. Pre-GCSE children who receive free school meals will be paired with a mentor of their choice and engage in activities such as work experience, face-to-face and virtual meetups, or projects. The mentoring relationship would be self-directed by the young person and they would become both ambassadors for the careers they had been exposed to and the company of the mentor. As an accredited scheme a young person could include it on their CV or university application and following a pilot in London the scheme would be rolled out nationwide.

Team participants were Laura Gemmell, Dr Paul Coxon, Shadab Ahmed, Floriane Fidegnon-Edoh.

Other proposed projects

Evidence-based science communication action research – The development of a digital platform to enable knowledge exchange and learning of STEM engagement across diverse communities. Thematic reports showcasing successful projects and initiatives in specific areas would be disseminated to STEM practitioners periodically.

Team participants were Josh Doyle, Dr Kathryn Boast, Lewis Hou

Scientists are humans – An online toolkit featuring tips and real-life stories of the challenges faced by scientists across academia to help them to "be the best you can be". It will serve as a resource to help scientists to help themselves, help others and help others to support them. The project's website can be visited here: scientistsarehumans.com/manifesto

Team participants were Dr Hannah Dee, Alison Young, Karel Green, Alexia Alexander Wight, Dr Maire Gorman, Yolanda Ohene

Log Life Book – A pilot project to represent, capture and amplify the voices of over 1000 PhD students in STEM. Students would be asked to diarise their STEM lives online, logging setbacks and milestones. AI provided feedback would be incorporated and a real-time word cloud would be produced. The minable data collected would be used to analyse and report on diversity and inclusion in STEM.

Team participants were Dr Alexis Webb, Hope Bretscher, Dr Caroline Palmer, Dr Rebecca Kirk, Dr Clara Barker

Diversity engine – Using machine learning techniques to help organisations to quantify diversity.

Team participants were Dr Tania Allard, Snezhana Ilieva, Francesca Di Nuzzo, Dr Elena Lestini, Shakeel Khan, David Swann

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