Close the Gap briefing for Scottish Government debate
Artificial Intelligence and Data Driven Technologies: Opportunities for the Scottish Economy and Society

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Close the Gap is Scotland's expert policy advocacy organisation working on women's labour market participation. We have 18 years' experience of working with policymakers, employers and employees to influence and enable action to address the causes of women's inequality at work.

Introduction

Artificial intelligence (AI) and data driven technologies undoubtedly create opportunities for the Scottish labour market and society. However, these technologies also present a number of key challenges around women's labour market inequality, built-in discrimination and bias, and future skills challenges. The way in which the Scottish Government responds to these opportunities and challenges will be the determinant as to whether AI will sustain or challenge, women's inequality.

Potential discrimination within Artificial Intelligence

Women are under-represented in tech in Scotland, accounting for only 23% of the workforce.[1] There are also patterns of occupation segregation within tech sub-sectors with women further under-represented in AI and in its subsets of machine learning and deep learning.[2] The House of Lords Select Committee on Artificial Intelligence recommended that the UK Government encourage greater diversity in the training and recruitment of AI specialists.[3]

Technology is not fundamentally sexist, but its design rarely takes account of women's lives. The tech sector is heavily male-dominated, and characterised by a

[1] Skills Development Scotland (2018) *Record number of females join the tech sector* https://www.skillsdevelopmentscotland.co.uk/news-events/2018/october/record-number-of-females-join-the-tech-sector/

[2] Thomson, Clive (2019) *Coders: Who they are, what they think, and how they are changing the word*

[3] House of Lords, Select Committee on Artificial Intelligence (2018) *AI in the UK: Ready, willing and able? (Report of Session 2017-9)*

culture of sexual harassment, discrimination, inflexibility and pay inequality that makes many tech workplaces feel non-inclusive to women.[4] This culture starts at the top and permeates every level of tech companies, which has implications not only for women working in the sectors, but also for the design of systems and products. Where platforms and systems are designed by men, and with men's lives as the default context, they are often ignorant or indifferent to women's lives and experiences.

There is evidence that the design of robots is reinforcing traditional and harmful gender norms and stereotypes. For example, 'care-bots' have been developed to resemble women, or to have stereotypically female traits, and subservient female virtual assistants are the default interface for consumers' interactions with machines.

Algorithms are at the heart of AI and can be useful tools to automate decisions, however, many algorithms exhibit bias and discrimination against women and ethnic minorities. Two contributing factors for this are the under-representation on women working in AI, and therefore among engineers developing algorithms that determine how a decision is made, and also the use of biased training data on which an AI decision-making is based. The result is that bias and discrimination are often baked into the design of an AI, which in turn replicates existing discrimination and inequality. High profile examples of unintentionally racist image recognition algorithms include the Google search engine auto-tagging Black women as having "unprofessional hair" and auto-tagging Black people as "gorillas".[5] The UK Centre for Data Ethics Innovation's interim report into AI in decision-making noted that as the volume and variety of data used to inform decisions increases, and the algorithms used to interpret the data become more complex, concerns are growing that without proper oversight, algorithms risk entrenching and potentially worsening bias. This is particularly true in areas or sectors where there is evidence of historical bias in decision-making.[6]

The Women Leading in AI Network have recommended that organisations using algorithms should carry out regular quality assurance checks against discrimination and unfair treatment, carry out algorithmic auditing and ensure that contractual assurance is in place for third party algorithms.[7] This transparency is a necessary prerequisite to ensuring ethical use of new technologies.

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[4] Graham, Helen, Vanesa Fuertes, Valerie Egdell and Robert Raeside (2016) *Women in ICT and digital technologies: An investigation of the barriers to women entering, staying and progressing in the sector, and actions to ameliorate this – Executive Summary,* Employment Research Institute, Napier University; Chang, Emily (2018) *Brotopia: Breaking up the boys' club of Silicon Valley;* Be It (2017) *Sexism in the IT Industry: Survey results* available at https://www.scotlandis.com/news/2017/december/sexism-in-it-in-scotland-the-report/ accessed November 2019

[5] https://www.theguardian.com/technology/2018/jan/12/google-racism-ban-gorilla-black-people

[6] Centre for Data Ethics and Innovation (2019) *Interim Report: Review into bias in algorithmic decision-making*

[7] Women Leading in AI (2019) *10 Principles of Responsible AI*

Artificial Intelligence and recruitment decision-making

AIs can automate, or partially automate, recruitment decision-making. Proponents of this technology argue that an AI is more objective than humans. There is indeed widespread evidence of non-transparent and biased recruitment processes discriminating women. However, if the data used to develop these AIs is based upon existing discriminatory decision-making in recruitment, this gender bias will be replicated in the AI.

For example, Amazon abandoned an AI recruiting tool, developed in Edinburgh, when it was revealed to discriminate against women.[8] Amazon's computer models were trained to vet applicants by observing patterns in CVs submitted to the company over a 10-year period. Most came from men, a reflection of male dominance across the tech industry. In effect, Amazon's system taught itself that male candidates were preferable. It penalized CVs that included the word "women's," as in "women's chess club captain", and downgraded graduates of two all-women's colleges. Additionally, a study by Carnegie Mellon University in the US found that on job listing sites, men were being shown six times as many adverts as women were for high-paying jobs of $200,000 and up.[9]

Scotland's response to AI

It is vitally important that Scotland's response to AI is gendered, thus ensuring new technologies do not cement, or indeed, worsen existing gender inequalities. AI may accelerate digital disruption in the jobs market and pre-existing research and analysis has shown that this disruption is expected to have a gendered impact.[10] Women workers are concentrated at the extreme ends of the automation spectrum, with women over-represented in jobs that are at the highest risk of automation, such as retail or secretarial roles, and under-represented in the sectors where job growth is likely as a result of automation, such as STEM. Occupations most at risk of automation for men have the lowest earnings, whereas there is considerable risk to 'women's jobs' in better paid occupations, which has the potential to reverse gender equality gains. In the *Fairer Scotland for Women* action plan, the Scottish Government have committed to ensuring that addressing the causes of the gender pay gap are central to policies on automation and artificial intelligence.[11]

Despite this, strategies at the Scottish and UK-levels, such as the AI Sector Deal, have been characterised by a lack of gender analysis and limited use of gender-

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[8] Business Insider *Amazon built and AI tool to hire people but had to shut it down because it was discriminating against women* https://www.businessinsider.com/amazon-built-ai-to-hire-people-discriminated-against-women-2018-10?r=US&IR=T

[9] Thompson, Clive (2019) *Coders: Who They Are, What They Think, and How They Are Changing Our World*, London: Picador

[10] World Economic Forum (2018) *The Global Gender Gap Report 2018*

[11] Scottish Government (2019) *A Fairer Scotland for Women: gender pay gap action plan*

disaggregated data. Responding to the impacts of automation is also a key feature of Scottish Government policy frameworks such as the Enterprise and Skills Board's strategic plan and the recently-published Future Skills Action Plan. Again, these policy documents lack gender analysis and do not outline how these proposals will enable the development and utilisation of women's skills. This is important because evidence shows that unless action plans and strategies actively consider women throughout the policymaking process, and utilise gender disaggregated data in design, delivery and evaluation, these plans will not deliver for women.

Future strategies must mitigate the impact of potential job losses, and provide for opportunities for upskilling and reskilling for all employees. The design of reskilling interventions should be mindful of gendered patterns of training and development. Currently, women are less likely to receive employer training than men, and are more likely to receive generic training such as equality and diversity and health and safety, while men are more likely to be given supervisory and management training.[12] Part-time workers, the majority of whom are women, are significantly less likely than full-time workers to receive any workplace development and support opportunities, particularly in relation to opportunities to perform tasks outwith their job role.[13]

Furthermore, the attrition rate of women working on tech, and in STEM more broadly is high; 70% of women with STEM graduate qualifications are not working in the industry.[14] This represents a gross loss of female talent to Scotland's economy. Developing initiatives that support women to upskill, especially women returning from a career break, is one part of the solution. However, it is critical that upskilling and reskilling interventions challenge occupational segregation more broadly, which means targeting women in female-dominated occupations, particularly those which are at high risk of automation.

Conclusion

If the current trajectory continues, the development and adoption of AIs is likely to reinforce women's labour market and economic inequality as a result of the development of gender-blind technology, the replication of bias in recruitment decision-making and the potential job losses from automation. This has the potential to undermine the Scottish Government's ambitions around the gender pay gap, and women's equality more broadly.

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[12] Aldrige, Fiona and Corin Egglestone, (2015) *Learning, Skills and Progression at Work: Analysis from the 2015 adult participation in learning survey*, UK Commission for Employment and Skills

[13] House of Commons Women and Equalities Committee (2016) *Inquiry into the gender pay gap*

[14] Royal Society of Edinburgh (2018) *Tapping All Our Talents: A progress review of science, engineering, technology and mathematics in Scotland*

Strategies and analyses relating to automation have so far failed to recognise the importance of understanding women's experiences of skills acquisition, training and the labour market. The Future Skills Action Plan commits the Scottish Government to a number of actions relating to automation, including defining 'meta-skills' and the publication of an AI Strategy. It is vitally important that the Government, adopt a gendered approach to these actions, including the utilisation of gender-disaggregated data and engaging with gender equality organisations. In line with the commitment in *Fairer Scotland for Women,* the Scottish Government must place tackling the gender pay gap at the centre of all policymaking on automation and artificial intelligence in order to ensure these new technologies tackle pre-existing and emerging inequalities.