

# Workshop on Applying a Gender Lens to Science, Technology and Innovation

## Summary

18 January 2019, Vienna, Austria

### Executive summary

- **Science, technology and innovation (STI) and gender equality are equally important components of the 2030 Agenda. Achieving the Sustainable Development Goals will be impossible without developing new scientific and technological knowledge and deploying innovative solutions to development challenges. Lack of gender equality in STI leads to lost talent and potential and undermines the contribution of STI to the 2030 Agenda.**
- **The lack of diversity in science and technology can lead to gender biases and unaddressed needs that are specific to women. New and emerging technologies may affect men and women differently and increase or bring about new gender divides. Due to problems in attracting and retaining girls and women in science, technology, engineering and mathematics (STEM) there are fewer women at every career step in this field. The lack of female role models and issues related to work-life balance are other factors that may hold back girls and women in choosing and staying in STEM.**
- **In order to better understand the underlying issues, we need more and better data to support a society-wide discussion. Policy makers, academia and private sector stakeholders need to incorporate gender from the inception phase of their policies, projects and products. They need to think in new frameworks to approach gender issues at the workplace. Some countries and regions struggle to attract more girls to STEM, while others have difficulty to retain or promote women to leadership levels. Therefore, a nuanced policy approach is needed. Finally, supporting gender equality in STI and STEM could be paired with other measures that aim for greater diversity in general and the inclusion of marginalized groups.**

### I. Background

STI and gender equality are both cross-cutting issues that are central to the SDGs. With the ambition-level of the 2030 Agenda and the principle that “no one should be left behind”, achieving the SDGs will be impossible without relying on science, technology and innovative ideas and addressing gender inequality. The efforts to address gender equality can further contribute to create a more diverse environment in STI and STEM, that includes women and marginalized groups as well.

In this context, the [Workshop on Applying a Gender Lens to Science, Technology and Innovation](#) was jointly organized by the Government of Austria, UNCTAD and UN Women, in support of the work of the UN Commission on Science and Technology for Development (CSTD) and the Commission on the Status of Women (CSW). It took place on 18 January 2019 in Vienna, back-to-back with the CSTD 2018-2019 Inter-sessional Panel. The workshop brought together science, technology and innovation (STI) policy makers, researchers and representatives of governments and international organizations who discussed the current state of gender perspectives in STI, highlighted best practices, and developed policy recommendations in support of the work of the CSTD and CSW. The workshop included a keynote address and two interactive panel discussions. The first focused on applying gender lens to the 2018-2019 priority themes of the CSTD and CSW (rapid technological change, building resilient communities, social protection systems, and access to public services and sustainable infrastructure), while the second discussed how to support women in STEM careers. This report gives a short summary of the major findings and suggestions.

## II. Gender-equality in STI and STEM remains a timely issue

Discussions of the workshop highlighted several issues that women in STI and STEM are still confronted with.

### ***Lack of women in STEM***

While machine learning and artificial intelligence (AI) are becoming part of everyday life, their developers are not representative of society. Even when women are inspired to choose a scientific career, retaining them is not so easy. Only 12 per cent of leading machine-learning researchers are women,<sup>1</sup> and only a third of entry-level positions in technology companies are being filled by women.<sup>2</sup> This low share of women entering these careers is problematic, especially as women are far less likely than men to stay in the field. This “leaky pipeline” particularly affects STEM fields. US data indicates that after 12 years working in this occupational field, about 50 per cent of women left STEM jobs, compared to less than 20 per cent leaving other professional fields.<sup>3</sup>

### ***Lack of diversity in research and development leads to problems and biases***

Globally, the share of female researchers is less than 29 per cent, with important geographical differences across countries and regions.<sup>4</sup> The dropping out of women from STEM and low share of female researchers can have real-life consequences beyond career choices. The lack of diversity in research and development (R&D) means that certain problems are not addressed at all, often because of oversight. For instance, women are more vulnerable in car accidents because safety features (e.g., seat belts and airbags) were designed with a focus on the male population who are, on average, taller and heavier than women.<sup>5</sup> Similarly, in medical research, differences between men and women are often neglected. For efficiency purposes men are used to test drugs.<sup>6</sup>

Technology developers might build their unconscious biases to technologies they develop. Amazon, for example, had to take its AI-based hiring tool offline after specialists uncovered biased outcomes. The tool was supposed to rate and filter job applicants to make the hiring process quicker. However, the decisions favored men. The model had been trained on the application data from the past decade and observed its patterns. Most of the CVs submitted were from men, and so were the successful candidates. Hence, the machine learning algorithm discerned that gender was an important criterion to discard applicants.<sup>7</sup>

### ***Gender digital divide***

One major factor keeping women from reaping the benefits of modern technology, apart from basic education, is access to the Internet. The digital gender gap has increased globally in recent years. Women worldwide are 12 percentage points less likely to use the Internet than men. In least

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<sup>1</sup> Simonite, T. AI Is the Future—But Where Are the Women? Wired, August 17, 2018. <https://www.wired.com/story/artificial-intelligence-researchers-gender-imbalance/>

<sup>2</sup> Krivkovich, A, Kutcher E, Yee L. Breaking down the Gender Challenge | McKinsey. Accessed January 25, 2019. <https://www.mckinsey.com/business-functions/organization/our-insights/breaking-down-the-gender-challenge>

<sup>3</sup> Ashcraft C, McLain B, Eger E. Women in tech: The facts. National Center for Women & Technology (NCWIT), 2016.; Glass, J L, et al. “What’s so special about STEM? A comparison of women’s retention in STEM and professional occupations.” Social forces 92.2 (2013): 723-756.

<sup>4</sup> UNESCO. 2018. Women in Science. Fact Sheet No. 51. June 2018. FS/2018/SCI/51.

<sup>5</sup> Bose D, Segui-Gomez M, Crandall JR. Vulnerability of female drivers involved in motor vehicle crashes: an analysis of US population at risk. Am J Public Health. 2011;101(12):2368-73.

<sup>6</sup> United States General Accounting Office. (2001). Drug Safety: Most Drugs withdrawn in Recent Years had Greater Health Risks for Women. Washington, DC: Government Publishing Office.

<sup>7</sup> Reuters. Amazon Scraps Secret AI Recruiting Tool That Showed Bias against Women. October 10, 2018. <https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G>

developed countries (LDCs) the estimates for gender disparities are as high as 33 percentage points in 2017, up from 30 in 2013.<sup>8</sup> This implies that for women, particularly in developing countries, the barriers to accessing the opportunities from digitalization are particularly high. These women are excluded from social networks, learning opportunities, financial tools and business support, in other words from an essential part of today's life.

### ***High level of automation expected in industries with high shares of female employees***

New technologies, such as artificial intelligence and robotics, hold great promise. However, these new inventions also have a downside. New industrial machinery and robots are becoming sufficiently low-cost to replace increasing numbers of workers. Particularly in sectors with high shares of female employees, such as textiles, the share of automation is expected to be high as routine tasks are easily automated.<sup>9</sup> Developing countries with large textile industries, such as Bangladesh, might be especially affected by this development.

### ***Invisibility of female role models***

Women and men are not on an equal footing in the public eye. A “content gender gap” exists. In 2016, only 17 per cent of the biographies on Wikipedia were about women.<sup>10</sup> Physicist Donna Strickland is a noteworthy woman, who won the 2018 Nobel Prize in Physics. But a Wikipedia page was only created for her after the committee's announcement of the prize. At that time, she was only an associate professor, who only applied for a full professor position after receiving the Nobel prize.<sup>11</sup>

Invisibility of successful women, in particular female scientists, can have long-term consequences. These women are female role models which girls can aspire to. Popular culture plays a role here as well. The 2016 movie “Hidden Figures”, which portrayed three female NASA scientists responsible for the computations that put the first American astronaut in space, had an important message about possibilities for women and girls; even more so because they were African-American, which inspired girls who are often excluded from academic opportunities.

## **III. Recommendations emerging from the workshop**

### ***Have society-wide discussions supported by evidence-based research***

To better understand and address the root causes of gender inequality in STI we need to examine the human and cultural factors and the unconscious gender biases. To do this, we need more, better and disaggregated data on women and girl's participation in STEM education and different STEM career stages as well as on participation in innovation and entrepreneurship. We also need to gather more information about the challenges women and girls face as well as their needs and aspirations. Evidence-based research can support better and more targeted policies. Several countries are taking assertive attitudes in quantifying and monitoring gender gaps, and affirmative actions in using gender quotas for research grants and recruitments or specific grants targeting women.

Shifting social norms, changing stereotypes (i.e. blue-pink syndrome) and mindsets, however, require society-wide discussions where both men and women are involved. Showing good examples and

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<sup>8</sup> ITU. ICT Facts and Figures 2017, 2017. <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf>

<sup>9</sup> Brussevich, M., Dabla-Norris, M. E., Kamunge, C., Karnane, P., Khalid, S., & Kochhar, M. K. Gender, Technology, and the Future of Work. International Monetary Fund, 2018.

<sup>10</sup> Wikimedia Foundation 2016 Annual Report, 2016. <https://annual.wikimedia.org/2016/fact-5.html>

<sup>11</sup> Washington Post. Perspective | Why Nobel Winner Donna Strickland Didn't Have a Wikipedia Page. Accessed January 25, 2019. [https://www.washingtonpost.com/outlook/2018/10/08/why-nobel-winner-donna-strickland-didnt-have-wikipedia-page/?noredirect=on&utm\\_term=.011a1bae2814](https://www.washingtonpost.com/outlook/2018/10/08/why-nobel-winner-donna-strickland-didnt-have-wikipedia-page/?noredirect=on&utm_term=.011a1bae2814); CBC News. Nobel Prize-Winning Scientist Donna Strickland Made Full Professor at University of Waterloo | CBC News. Posted October 26, 2018. <https://www.cbc.ca/news/canada/kitchener-waterloo/donna-strickland-full-professor-university-waterloo-1.4879656>

increasing the visibility of female role models in STEM are important to change mindsets and biased perceptions. Exposing young children from early age to female and male role models is a good starting point, while parents, the media and the film industry have a shared responsibility.

### ***Incorporate gender from inception phase***

STI policy makers, academia and the private sector need to consider gender from the design of every policy instrument, research project and product in order to increase women's participation in STI and STEM and to address the lack of gender perspectives in science content and technology development.

It is important to explicitly bring gender perspective and a gender-sensitive approach into any research subject and technology development process. If technologies - let it be related to food, energy, water or climate change solutions – are to support women and girls, they need to be involved in developing and implementing solutions, decision-making channels and financing. Technology is not gender neutral, therefore it is essential to involve women at the high level in decisions on technology adoption.

Gender needs to be a forethought and not an afterthought. In the area of machine learning and artificial intelligence, overcoming biases is much more difficult later than embedding the right values now and designing products that are void of biases at the first place. For this we need more diversity in the technology workforce, especially in the area of machine learning and artificial intelligence. Technology companies also need to sensitize software developers about gender biases and aim to better understand all users' needs.

### ***Develop new frameworks at the workplace***

Instead of trying to "fit" women and their biological roles related to childbearing into the existing frameworks at the workplace, we need to think about a paradigm shift. This should involve a holistic approach at the individual, organizational level, but also cultural and societal level.

Tools that can bring results in the short-term include networking, mentoring and coaching women and girls when they are students but also during their professional careers. It can also involve sensitizing and training mentors and mentees about unconscious biases. But these should not be standalone initiatives. Longer-term measures like recruitment and retention policies, including those aiming for better work-life balance (policies geared towards flexible working arrangements and parental leaves) are commendable, but we also need to consider women's scientific careers. Tenure-track duration might conflict with women's childbearing intentions, while flexible jobs may trap women in lower quality or lower paid jobs.

The prerequisites of successful measures include awareness of and support from management at every level; expertise in gender and organizational change; and communications and marketing skills to communicate about the benefits of gender equality.

### ***Use nuanced approaches***

Countries and regions across the globe face different challenges: some struggle to attract women and girls to choose STEM studies and careers, while others have almost achieved gender equality in terms of participation. As gender in STI and STEM is a complex issue, we need to use a nuanced approach, rely on local data and research and learn from solutions around the world.

## **IV. Next steps**

The cooperation between CSTD and CSW in looking at the intersection of STI and gender can help to achieve better results. Therefore, participants at the workshop encouraged CSTD and CSW to continue to work together. This report aims to support further discussions and the work of the two commissions.

## Annex on best practices

<p><b>Addressing unconscious bias:</b> Canada’s bias-busting strategies</p>	<p>Evidence-based approach to address implicit biases against women and fostering their inclusion and success in STEM by addressing these biases. <a href="http://successinstem.ca/resources/">http://successinstem.ca/resources/</a></p>
<p><b>Assisting women through mentorship:</b> IDEAL Society network &amp; Three Circles of Alemat</p>	<p>Improve opportunities and outcomes for women through mentorship and an improved diverse and interdisciplinary network. <a href="https://theidealsociety.org/">https://theidealsociety.org/</a> -- <a href="https://tca.jssr.io/">https://tca.jssr.io/</a></p>
<p><b>Fostering women’s success in academia:</b> Austria’s Herta Firnberg scholarship</p>	<p>A 3-year post-doc funding scheme by the Austrian Science Fund for highly qualified female scientists to start their academic careers or resume them after maternity leave. <a href="https://www.fwf.ac.at/en/research-funding/fwf-programmes/firnberg-programme/">https://www.fwf.ac.at/en/research-funding/fwf-programmes/firnberg-programme/</a></p>
<p><b>New frameworks:</b> “Stop the clock” for tenure</p>	<p>High female exit rates from early-career academics has led many US universities to adopt gender-neutral family policies which extend the time until a tenure decision is made by a year after having or adopting a child.</p>
<p><b>Data to assess the status quo:</b> UNESCO’s SAGA project</p>	<p>The project determines, measures and assesses sex-disaggregated data, as well as supports the design and implementation of science, technology and innovation policy instruments that affect gender equality in STEM. <a href="https://en.unesco.org/saga">https://en.unesco.org/saga</a></p>
<p><b>Accountability:</b> UK’s gender pay gap service</p>	<p>Since 2017, all employers with more than 250 employees are required to report their data on the gender pay gap. This data is fed into the gender pay gap service. <a href="https://gender-pay-gap.service.gov.uk/">https://gender-pay-gap.service.gov.uk/</a></p>
<p><b>Making women visible:</b> International Day for Women and Girls in Science</p>	<p>11<sup>th</sup> February is the International Day for Women and Girls in Science which was adopted by the United Nations General Assembly to promote full and equal access to and participation in science for women and girls. <a href="http://undocs.org/A/RES/70/212">http://undocs.org/A/RES/70/212</a></p>
<p><b>Putting women front and center:</b> Female role models in popular culture – Hidden Figures</p>	<p>Portrait of female scientists who helped with the launch of the first astronaut into space. <a href="https://www.imdb.com/title/tt4846340/">https://www.imdb.com/title/tt4846340/</a></p>
<p><b>Gender mainstreaming energy policy:</b> Project on 15 ECOWAS countries’ energy policies</p>	<p>Integration of gender perspectives in 15 ECOWAS countries’ energy policies: introduction of gender focal points in ministries, gender budgeting, mentoring women entrepreneurs in the energy sector. <a href="https://www.ctc-n.org/news/15-west-african-countries-build-gender-just-energy-system-entrepreneurs-global-investment-forum">https://www.ctc-n.org/news/15-west-african-countries-build-gender-just-energy-system-entrepreneurs-global-investment-forum</a></p>