INNOVATION AND TECHNOLOGICAL CHANGE, AND EDUCATION IN THE DIGITAL AGE FOR ACHIEVING GENDER EQUALITY AND THE EMPOWERMENT OF ALL WOMEN AND GIRLS

Expert guidance and substantive inputs to preparations for the 67th Session of the Commission on the Status of Women

CSW67
COMMISSION ON THE STATUS OF WOMEN

UN WOMEN

The views expressed in this paper are based on the discussions of the Expert Group Meeting and do not necessarily represent those of the United Nations.

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Foreword

Digitalization is rapidly transforming our societies; we need to be alert to the ways in which those changes can prejudice gender equality instead of enhancing it. While digital technologies allow for unprecedented advances to improve socio-economic and political outcomes for women and girls, they also give rise to profound new challenges that can perpetuate and deepen existing patterns of gender inequalities.

Since 2020, the COVID-19 pandemic has magnified the unequal pace of digital transformation. The gender digital divide is becoming the new face of gender inequality, preventing millions of women from accessing education, jobs and other indispensable services. These gaps are rooted in longstanding and persistent stereotypes, which also diminish women's participation and leadership in innovation processes.

In his landmark report, *Our Common Agenda*, the UN Secretary-General stressed that we are at an inflection point in history and proposed the development of a Global Digital Compact. Now is the time to break the cycles of inequality and join forces to build an open, safe and equal digital future for the generations to come. The priority theme of the sixty-seventh session of the Commission on the Status of Women (CSW67) is timely: "Innovation and technological change, and education in the digital age for achieving gender equality and the empowerment of all women and girls". It provides the opportunity for a holistic examination of innovation and technology from a gender perspective and subsequent shaping of global normative frameworks, international initiatives, as well as policy and programming at all levels.

This publication is intended to inform the Commission's deliberations on the priority theme, providing a useful resource for all delegations and stakeholders:

1. It outlines the findings and recommendations of the Expert Group Meeting (EGM) on the priority theme, which was held from 10 to 13 October 2022. The Group comprised 45 experts representing a broad range of organizations, disciplines and geographic and societal realities. An accompanying

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glossary of terms support understanding of key concepts related to the priority theme.

2. It presents a summary of a series of background papers, expert papers and informational notes prepared especially for the EGM, exploring various facets of the theme. These address key trends and knowledge gaps and frame concrete recommendations for policies to be implemented at the international, national, regional and local levels.

3. It offers an analysis of the existing normative frameworks on gender perspectives in technology and innovation, to support the Commission in its deliberations and development of its Agreed Conclusions.

Its aim is to provide a wealth of expert information on this critical topic with a broad range of recommendations for all actors, so as to ensure that women and girls - irrespective of their gender, age, race, disability, geographic location, country of origin or economic background - have an equal opportunity to safely and meaningfully access, use, lead, and design technology. More than ever, we need to stand together to affirm that "Digital rights are women's rights". We must reinforce the accountability of online spaces and digital tools to be free of gender-based violence, discrimination and misleading content.

CSW67 and the Global Digital Compact together provide a global platform to shape a future where technology contributes to transforming social norms, strengthening the voices of women and girls in all their diversity and fairly distributing the benefits of digitalization to achieve the Sustainable Development Goals. To achieve the future we want, we must reassert human agency over technology and explore new avenues to adopt a human-centric approach to digitalization, with the feminist principles of inclusion, intersectionality and systemic change at its core.

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University students at Jordan's Fifth National Technology Parade showcase their grasp of modern technologies, Jordan.
Photo: UN Women/Hamza Mazra'awi

Acknowledgements

This report reflects the presentations and discussions during the CSW67 Expert Group Meeting organized on 10-13 October 2022 and relies on the findings and conclusions of the background papers, expert papers and informational notes prepared especially for the meeting. The able co-chairing of the sessions by Caitlin Kraft-Buchman, Jamila Venturini, Mei Lin Fung and Nighat Dad is gratefully acknowledged, as is the preparation and presentation of the background reports by Alison Gillwald and Londa Schiebinger. The contributions of all experts and observers to the meeting are also greatly appreciated.

1. Introduction

The 67th session of the Commission on the Status of Women (CSW67), to be held March 6-17 2023, will consider as its priority theme "Innovation and technological change, and education in the digital age for achieving gender equality and the empowerment of all women and girls." To support the substantive preparations, UN-Women convened an Expert Group Meeting (EGM) on the priority theme, held virtually from 10-13 October 2022.

The objectives of the EGM were to:

- Convene the leading experts and organisations carrying out research and analysis on aspects related to the priority theme to gather the best expertise and knowledge globally
- Provide an opportunity to take stock of the latest research globally on the priority theme, including key trends, data availability and needs, best practices, and gaps in policy responses
- Develop informed, practical and action-oriented recommendations to inform the drafting of the report of the Secretary-General on the priority theme and to influence and expand the global normative frameworks on gender equality and technology and innovation

The EGM was attended by 45 experts representing a broad range of organizations, including civil society organizations, academia and research consortia, think thanks, networks and associations, and practitioners leading research on issues of relevance to the priority theme on innovation and technological change and education in the digital age. Efforts were made to identify experts on a broad spectrum of issues of relevance to the theme, to ensure that the gender dimensions of innovation, technological change, and education in the digital age were examined in a holistic manner. In selecting the experts, the criteria of geographical balance and diversity of representation were also taken into account to ensure that a broad range of realities and perspectives were reflected. Organizations representing the United Nations System and other inter-governmental organizations with relevant mandates and expertise were also invited to participate in the EGM as observers.

2. Framing the priority theme

Innovation and technological change have the potential to help achieve the Sustainable Development Goals (SDGs), and can contribute greatly to improvements in the well-being, education, health and livelihoods of women and girls. Digital technologies in particular provide opportunities for greater access to information, education and skills and open possibilities for increased employment and business opportunities. They have the potential to allow for services that improve access to health, legal and financial services, and allow traders to access global markets for their products. Digital access can also help raise women's and girls' awareness of their rights, increase their civic engagement and expression of ideas and opinions, their participation in creative and cultural practices, leisure and in connecting with peers. However, while the digital revolution brings immense potential to improve social and economic outcomes for women, research highlights the risk of perpetuating and embedding existing patterns of gender inequality, creating new forms of gendered harms, and limiting the equitable realization of the benefits of digital transformation.

The CSW67 priority theme brings a unique opportunity to holistically examine the gendered impacts of innovation and technology and education in the digital age, drawing upon recent research, and to identify recommendations that will allow for a more inclusive and equitable digital evolution. While the concept of innovation and technological change is extremely broad, in order to enable more targeted and effective discussions, the EGM focused on technological innovation, in particular digital technologies and education in the digital age. This framing will allow the CSW's deliberations to be relevant and timely in a post-COVID-19 pandemic period, where digital technologies took up an increasingly important role in both communal and individual lives and heightened digital inequalities. It will also ensure that the outcomes of the EGM and its recommendations align with a number of ongoing processes within the United Nations related to digital technologies, such as preparations for the Summit of the Future and the elaboration of the Global Digital Compact[1] being developed under the auspices of the UN to outline shared principles for an open, free and secure digital future for all. A number of the issues examined align in this respect with the issues examined under the Global Digital Compact, including connecting all people to the Internet, protecting data, applying human rights online, accountability for discrimination and misleading content, and digital commons as a global public good.

In order to do so, four distinct yet related sub-themes were chosen to be explored by the Expert Group Meeting, covering different facets of the priority theme:

2a. The gender gap in digital access and skills:

- How to deepen our understanding of digital inequalities and how universal and meaningful connectivity is, and should be, defined and measured for women and girls.

- How to ensure meaningful connectivity for women and girls, beyond access, analyzing the range of barriers to the productive use of digital technologies and also access to science, technology, engineering and mathematics (STEM) education, and how to address these barriers, including affordability, and harmful social norms.

- How to promote quality education as the primary determinant of internet access and use for girls, and also for women, in the digital age, covering both formal and informal and adult education and re-skilling, as well as digital tools and learning environments.

1. See: https://www.un.org/techenvoy/global-digital-compact

2b. Inclusive Innovation ecosystems and digital transformation:

- How to create gender-transformative innovation ecosystems that attract, train, retain and promote women in STEM careers and support women's entrepreneurship.
- How to ensure that we leave no one behind from digital transformation, examining the future of work in the digital economy and the under-representation of women in key emerging technological sectors.
- How to promote women and girls as innovators and agents of change in the technological evolution.
- How to better mainstream gender in digital policies and investments – both public and private – and the role of governments and businesses in driving innovation that tackles gender equality and narrows the gender digital divide.

2c. Gender transformative technology and innovation:

- How to ensure that technology, innovation and digital services respond to the needs of women and girls, including the most marginalised.
- How to ensure that technologies are developed with a human rights perspective, and are inclusive, accessible, trustworthy and gender-responsive by design, including in sectors that are relevant to the SDGs.
- How to implement safeguards against the gendered risks of emerging technologies and ensure that emerging technologies protect the rights of the women and girls they aim to serve and support, using the example of data science and biases in Artificial Intelligence (AI).

2d. Addressing online and technology-facilitated gender-based violence and discrimination and protecting the rights of women and girls online:

- How to address rise in instances of online and technology-facilitated gender-based violence, and gaps and limitations in legal frameworks and law enforcement, the need to build capacities at judicial and enforcement institutions to offer a survivor-centric intersectional approach, and the need to develop responses beyond the criminalization of online behaviour to respond to the needs of victims.
- How to create global definitions, measures and indicators of technology-facilitated gender-based violence.
- How to protect human rights in the digital age, such as freedom of expression, freedom from discrimination, and the right to privacy, as well as data protection and democracy.
- How to increase protection of specific groups of women that are often targeted online, including women human rights defenders (WHRDs), women politicians, journalists and other women in the public eye.
- How to better respond to the broad range of impacts of online and technology-facilitated violence, including in terms of restricting or dissuading women's participation and agency in both digital and physical spaces as well as protecting children, and issues related to online culture and harmful social norms and their mental health and other impacts.

Within each sub-theme, the need for improved metrics and disaggregated data was also assessed. The theme of education in the digital age was also examined as a cross-cutting theme across all areas, examining not

only the need to promote digital skills for women and girls and address their under-representation in STEM education, but also opportunities for women and girls created by digital learning, and the need to promote cross-disciplinary learning within STEM education, in order to harness gender-responsive technologies.

In preparation for the EGM, a series of background papers, expert papers and informational notes were prepared exploring various facets of the theme. These addressed key trends and knowledge gaps and framed concrete recommendations for policies to be implemented at the international, national, regional and local level (see Annex II for the list of papers and authors and all papers are made available on the webpage of the Expert Group meeting for CSW67).

While innovation and technological change presents both challenges and opportunities in a large number of sectors with direct impacts on women and girls, including healthcare, finance, agriculture, energy, urbanisation, climate change and disaster risk reduction, among others, it was not possible to examine all of these in-depth with a sectoral lens. Instead, a cross-sectoral and systemic lens approach was chosen, exploring how innovation ecosystems, systems and processes function and could be capacitated to become enabling environments for gender-transformative solutions. Some concrete examples of digital technologies and their application were chosen for illustrative examples. Digital financial inclusion was one of these, exploring how its development could contribute to further marginalisation unless designed with the needs of women in mind, and opportunities for policymakers and regulators to drive digital financial transformation that is inclusive and are designed to meet women's needs. Another was AI, examining how to establish safeguards in data science and address inherent biases in datasets.

The principles and approaches highlighted in the recommendations to guide the inclusive development of these technologies and safeguard against gendered harms are designed to be cross-cutting in nature. They may be applied in many cases to social innovation as well as technological innovation, and are relevant to the design, development and deployment of technologies in a range of sectors, and in many cases applying to analogue technologies as well as digital.

This report presents the main issues highlighted and recommendations made from both the papers and from the presentations and discussions that took place during the Expert Group Meeting itself, to inform the substantive preparation of CSW67.

A woman at work at the CIAT Genetic Resources Unit, Colombia. Photo: Courtesy of CIAT/Neil Palmer

3. The gender gap in digital access and skills

3a. Addressing digital inequalities and ensuring meaningful connectivity

In 2022, it is estimated that 63% of women across the globe were using the Internet, compared to 69% of men[2], while this rate decreases to 30% in many developing countries and closer to 20% in Least Developed Countries (LDCs). Notable gender gaps in mobile Internet access persist in low- and middle-income countries (LMICs). Women were 16% less likely than men to use mobile Internet across LMICs in 2021[3]. Women are currently 18% less likely than men to own a smartphone, impacting women's access to and use of mobile money services among others.[4] Women and girls who are unable to take advantage of these benefits risk being doubly excluded; not only from digital services themselves, but from core services such as government services and e-commerce. Research suggests that women could even face bigger difficulties in managing their lives than in a pre-digital era.[5]

The gender gap in meaningful connectivity means that women are less likely to pursue education, book health appointments, or use online public services, among other barriers. It is also important to note the heterogeneity amongst women and the uneven ability of women and girls to access and more importantly to use and deploy digital tools. Women and girls who belong to marginalized groups, such as rural populations and lower socioeconomic segments, with lower education levels and incomes, experience greater barriers to connectivity. The 2018 African After Access survey found that in 20 countries of the Global South surveyed, there was an estimated 125% gap in internet access between women in urban and rural areas. The gap between women in urban and rural areas is particularly large in Africa with Uganda, Kenya, Mozambique, Tanzania and Rwanda, all having gaps in excess of 150%[6]. Many of these women face an 'access trap', in that telecommunications companies are unlikely to provide coverage to areas where they will not receive a viable return on investment. Large differences in internet access by age group were also captured, with 27% of women 15-29 years old having access to the Internet versus 16% of those 30-44 year old, 12% of those 45-60 year old and only 7% of those over 60 year[7].

The After Access survey also found that men-owned microbusinesses make far greater use of ICTs than those owned by women, correlating with considerably higher revenues. The probability of a business having Internet access reduced by an estimated 6 percentage points if it was women-owned.[8] As a result of the exclusion of women from the digital world, low and lower-middle income countries have lost, over the last decade, $1 trillion USD in GDP.[9]

The main barrier to Internet uptake is the price of smart devices, while the main constraint on use is the price of data.[10] Modelling of the data also shows that Internet uptake and use correlates with an individual's level of education and income, which itself may be determined by social, cultural, religious and biological

2 Broadband Commission (2002), "Accelerating Broadband for New Realities".
3 GSMA, "The Mobile Gender Gap Report 2022".
4 Ibid
5 Helani Galpaya and Ayesha Zainudeen, "Gender and digital access gaps and barriers in Asia: But what about after access?", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
6 Alison Gillwald and Andrew Partridge, "Gendered Nature of Digital Inequality: evidence for policy considerations", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
7 Ibid.
8 Ibid.
9 Alliance for Affordable Internet (2021). "The Costs of Exclusion: Economic Consequences of the Digital Gender Gap".
10 Op. cit. at 6.

factors,[11] and thus perpetuate gender disparities. Women with limited digital skills tend to constrain their mobile use to so-called 'application islands' due to the inability to adapt and apply skills to new applications. Often this is limited to social media.[12] Women are also found to rely on friends and family, who may have limited skills themselves, to teach them how to use mobile applications and services.[13]

Understanding the intrinsic role of gendered social norms in maintaining barriers to access requires context-specific understanding of the specific country or population to which it applies. For instance, in Pakistan, the gender disparity in access could be reflective of social norms which limit women's mobility, their role in household decisions, and their involvement in spending decisions.[14] This can even be reflective of women's own conscious decisions to limit their use to ensure safety and minimize 'additional disruption[s] in their daily lives'.[15] Research in three districts in Pakistan showed 44% of girls, compared to 93% of boys reported owning a mobile phone, while other girls reported relying on their fathers' devices.[16] Conversely, qualitative research showed that women in Myanmar in fact play a central role in financial decisions in the household according to social norms, including whether or not to purchase a mobile phone, but due to affordability constraints male household members are automatically prioritized for ownership of devices, since they are more likely to go out of the house for work or study. When it came to spending on airtime and data, the same research showed that, as the family's financial manager, women would feel the need to prioritize others' needs before theirs and ensure that household income is spent prudently. They would not see the 'need' for them to have their own mobile or spend on top-ups for themselves, even though they might want to. These two examples highlight the importance of context-specific knowledge in understanding the gender gap and its causes to design effective policy solutions to remedy it.

Access to the Internet depends not only on having meaningful connectivity, but also on having affordable access and a supportive social environment, which facilitates women's full agency and abilities in their use of the Internet. The minimum threshold for meaningful connectivity requires sufficient internet speed, the ability to connect with enough data, and ownership of an appropriate device. It also requires a safe space to access the internet, for example, refugee women reported being unable to access wifi access points in camps due to safety issues.

Access to a device and a connection (even of the best quality) alone are not sufficient conditions for meaningful transformation in the lives of women and girls. An analysis of COVID-19 impacts on access to the Internet in Nigeria and South Africa showed that women who were already online were less able than men to harness it for productive means such as online work, e-commerce or human capital development, revealing significant gender differences in the ability to digitally substitute business and educational activities during the COVID-19 Pandemic. This highlights the importance of getting more women online to be able to digitally substitute critical activities in times of need.[17]

There is a clear need to move beyond the focus on access and ensure that women are equipped with the knowledge, awareness and skills to leverage connectivity for their economic and social empowerment. For example, women must also have the necessary technical skills, such as the knowledge of how to set up and manage a social media business page or an online freelancing account, how to set up privacy features and to report abuse in social networks, or how to download, install and set up a ride-sharing app. Digital skills and digital awareness are not the only challenges. To run a small home-based business via a digital platform, an entrepreneur would need access to a bank account, financial literacy, and childcare

11 Deen-Swarray, M., Gillwald, A., Khan, S., & Morrell, A. (2012). "Lifting the veil on ICT gender indicators in Africa: Evidence for ICT Policy Action". Cape Town: Research ICT Africa.
12 LIRNEasia (2019). "AfterAccess: ICT access and use in Asia and the Global South (Version 3.0)". Colombo: LIRNEasia.
13 GSMA (2015). "Accelerating digital literacy: empowering women to use the mobile Internet".
14 Adeel, M., Yeh, A. G. O., & Zhang, F. (2017). "Gender Inequality in Mobility and Mode Choice in Pakistan". Transportation, 44, 1519-1534.
15 Media Matters for Democracy (2021), "Women disconnected: Feminist case studies on the gender digital divide amidst COVID-19".
16 UNESCO, "Education in the digital age for women and girls: Recommendations from the Transforming Education Summit", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
17 Op. cit. at 6.

facilities. Other barriers include women's time poverty, which conflicts with the need for constant upskilling and reskilling in an environment where services and demand are constantly evolving.

Policies and strategies that aim to bridge the gender digital divide have been put in place by some governments, but they do not seem to be generalized across the globe. Gender is referenced in only half of national overarching ICT policies or Master Plans (ITU). Furthermore, over 40% of countries studied in the Alliance for Affordable Internet (A4AI)'s Affordability Report 2020 had no meaningful policies or programs to expand women's access to the Internet. Digital strategies and policies should integrate a gender perspective and intersectional approach. For example, in Benin, a policy with gender targets and programmes focusing on universal access from a gender and intersectional perspective was also developed.[18] In Costa Rica, research on women's online access led to the development of a gender strategy within its ICT ministry, building on a multidimensional analysis of the constraints faced by women based on available data on age, income, education, location (acknowledging existing data gaps on indigenous or LGBT population) to support a more nuanced policy analysis and with targeted programmes focusing on the needs of women as users and developers.

Public funds such as the Universal Service and Access Funds (USAFs) are mechanisms that should be used to improve women's internet access, connectivity and use. Almost 38% of low- and middle-income countries do not have a USAF, and when they do, this opportunity remains largely untapped.[19]. Several countries have been proactive in subsidizing the development and implementation of initiatives and programs that support women's digital opportunity. The Dominican Republic has developed a project which encompasses, among other things, demand-side subsidies targeting vulnerable households, particularly women as heads of households.[20]. In Colombia, the country's USAF is being used to provide training related to technical skills and knowledge on the use of ICT for women.[21] Others should learn from these experiences and develop country-specific gender focused projects to be funded by these resources and other existing development funds (such as those supporting digital skills, community connectivity infrastructure, among others).

Conclusions and recommendations:

- **Conduct research on women's access to and meaningful use of the Internet** to understand their needs in different local contexts, as well as the factors limiting them, such as cultural and social norms, and what has failed in terms of initiatives to expand access and use to inform future policies and programmes.

- **Continually collect comparable sex-disaggregated data to deepen our understanding of and monitor progress towards meaningful connectivity,** including demand-side barriers (e.g., digital skills, administrative barriers, costs and language), the different ways in which women use the Internet, and the benefits they are able to draw, and the role of intermediaries in digital access to inform digital policies and strategies. This work must encompass qualitative research for more context-specific insights and take account of the special status of vulnerable groups of women to prevent further marginalization. Disaggregate data by factors such as income, age, intersectionality, as well as specific contexts or the situation of specific marginalized groups, to ensure more targeted policies and interventions.

- **Democratize access to data**, making data available to inform policy and inclusive innovation where action is needed, especially within the global south.

- **Build the capacity of national statistics offices and foster collaboration among stakeholders** to collect, analyze, and use sex-disaggregated data productively and safely.

18 Sonia Jorge and Nathalia Foditsch, "What policies do we need to make the internet affordable to all?", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
19 Ibid.
20 Ibid.
21 Ibid.

- **Conduct gender impact assessments of regulations to understand the necessary interventions required to overcome high prices for devices and data in the context of the country, while avoiding unintended consequences.** Services intended to benefit the public at large require targeted and positively discriminating interventions to avoid reinforcing and perpetuating existing inequities and only benefiting existing or large users.

- **Incentivize operators to establish differentiated pricing arrangements and reduced tariff data plans to facilitate women's connectivity.**

- **Create policies and programs that facilitate access and/or subsidize smartphones and laptop devices for women and girls.** Access to mobile devices on a daily basis, as well as sufficient connection, are foundational to meaningful connectivity, particularly in the case of women in rural communities. Initiatives should consider distributing free or subsidized mobile devices to women, given the barrier the cost presents to their acquiring a digital device.

- **Provide targeted support through subsidies and training programmes** to improve access and use of digital services for women-owned microbusinesses.

- **Develop holistic digital strategies with gender-specific targets**, which are time-bound and subject to continuous monitoring and evaluation.

- **Integrate goals and programs specifically focused on closing the gender digital divide into universal service and access funds and other permanent funds**.

- **Support and invest in efforts to increase network coverage, capacity and quality**, particularly in underserved areas, to ensure universal and affordable access, facilitate access to and sharing of radio spectrum for broadband connectivity, and provide safe and accessible public access facilities for women and girls, including by leveraging Universal Service Funds.

- **Develop transversal or integrated policy interventions to eliminate systemic marginalization**. Greater equality and gender parity in education systems is necessary for gender equality in the digital realm. Digital literacy is not sufficient in enabling those offline to maximize the opportunities offered by the Internet; broader human and economic development is necessary to tackle digital inequality.

- **Create enabling environments for the private delivery of digital public goods and the development of community networks** through low-risk policy experimentation, crowding-in of productive private and community resources and low regulatory transaction cost models for the deployment of digital infrastructures and goods, particularly in rural areas.

- **Incorporate the intersection of gender with other characteristics**, such as age, ethnicity, rurality, migrant origins, or disabilities, in the design and evaluation of STEM and digital policies and interventions. This includes not only affirmative action towards the inclusion of such groups, but the removal of barriers that prevent them from accessing meaningful connectivity or fragilize their safety (e.g. mandatory registration requirements for accessing the Internet or acquiring SIM cards, that affect undocumented women).

- **Support the development of online content and services, including government services, which are accessible to women with limited literacy and digital skills.** Ensure women are not only included in the pilot and user testing stages of these services, but also can have a voice in decision-making processes prior to the policy design and implementation. Additionally, ensure that the digitalization of public services – particularly essential ones – always include non-digital alternatives for people who can't or don't want to use online options. Avoid embedding unnecessary and disproportionate data collection within digital public systems or applications, particularly of sensitive data.

- **Actively include women and gender experts in processes of policy formulation, regulation and governance** to ensure more equitable and just digital and data outcomes, as the intensification of datafication and the extraction of vast amounts of user-generated data has severe implications for those invisible or underrepresented in the data sets. The inclusion of women-led organizations, including community networks and women-only focus groups, is essential to securing appropriate feedback on policy design and initiatives.

3b. Education in the digital age and attracting and promoting women and girls in STEM education and careers

Education is a fundamental human right and an unparalleled source of empowerment, as well as a driving force for the advancement of social, economic, political and cultural development. Despite national and international efforts, the global gender gap in digital skills is growing, particularly in developing contexts. Without dramatically upscaled efforts to close the gendered barriers to digital access, skills, and careers for girls and women, it will be impossible to harness the potential of the digital revolution to close access gaps to education and advance gender equality.

The global move toward online learning and other forms of educational technology[22] during the COVID-19 pandemic-related school closures is likely to have further widened educational inequalities. By 2021, 11 million girls were estimated to never return to schools, adding to the staggering 130 million girls who were already out of school before the pandemic hit, and the disproportionately high number of women illiterate adults. These alarming numbers not only threaten the right to education of millions of women and girls worldwide, with drastic negative effects for societies in the long-term, it also puts girls at even greater risk of adolescent pregnancy, early and forced marriage, and violence. Gender roles and expectations that determine how girls and boys must use their time during school closures also played a decisive role in whether girls were able to participate in, and benefit from, remote and largely digital learning strategies.[23] Household demands on girls increased, as reported in many low- and middle-income countries and contexts,[24] and persistent gender inequality and the inaccessibility of remote learning for many girls and women with disabilities may also have widened learning gaps, with the potential for "a setback for a whole generation."[25]

Technology is valuable for educational purposes to the extent that it opens doors to high-quality educational content and interactions that facilitate learning and development and can be used and scaled in low resource environments. There are three key elements to making digital learning effective. The first is ensuring connectivity and accessibility through age-appropriate, gender-responsive, transformative and high-quality digital learning programmes that are accessible for all and, ideally, under open licenses to encourage sharing and reuse. The second is to ensure the capacity of teachers to expand pedagogy, and of students to use relevant technologies in a manner which nurtures creativity and digital citizenship. The third is to ensure free, easy, aligned, contextual, open, human-centered content. High-quality digital learning content will incentivize students, teachers, caregivers, and educational institutions to establish and maintain portals to digital learning and help bridge formal and non-formal learning.

While women make up the majority of students in higher education, they are the minority in ICT and broader STEM fields. Only 28% of engineering and 40% of computer science graduates are women.[26] Women are not pursuing careers in ICT, despite the fact that girls are doing as well as or better than boys in mathematics and science in the majority of countries. Online learning, which is becoming an increasingly important tool for upskilling, indicates a similar gender gap in course uptake.[27] The underrepresentation of women in ICT and AI fields at the tertiary education level and working in the field of AI (22%)[28] contributes to pervasive and harmful gender bias and misogynistic stereotypes in AI applications

22 At one point in the pandemic, 134 of the 149 countries surveyed were using high-tech modalities, such as online platforms or portals that require digital access, to assure continuity of learning during school closures, see: UNESCO, UNICEF and the World Bank (2020), "Survey on National Education Responses to COVID-19 School Closures. First Round of Data Collection". UNESCO Institute for Statistics.
23 UNESCO (2021), "When Schools Shut: Gendered impacts of COVID-19 school closures". Paris: UNESCO.
24 Op. cit. at 16
25 UNFPA and Women Enabled International (2021), "The impact of COVID-19 on women and girls with disabilities".
26 UNESCO (2021) "UNESCO Science Report: The race against time for smarter development".
27 Elena Estavillo Flores, "What mechanisms can ensure digital technologies favor inclusion and close gender gaps?", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
28 Op. cit. at 26.

such as voice assistants,[29] but also in unintended proxies for gender in financial instruments and human resource recruiting algorithms.

Women are highly represented in STEM fields associated with health and the provision of care, (such as medicine, chemistry, or biology), and highly underrepresented in other fields (mathematics, engineering), which reinforces gender stereotypes around caregiving. Current research has identified a paradox between levels of gender equality and the participation of women in STEM fields.[30] The more egalitarian a country is, the fewer women participate in STEM fields. Conversely, countries that rank lower on gender equality indices present better levels of female participation in STEM fields. In the most developed countries, women tend to use self-expressive value systems of their occupational decisions in terms of motivation and interest. However, in countries with lower equality rates, women justify their choice of STEM studies in terms of economic autonomy, to allow them to produce sufficient resources for their own sustenance and that of their families.[31]

A study of women in STEM in Norway found that most began a career in the field through an alternative pathway to higher education. Some women entered by way of an interest or strength in a different discipline, such as language or writing, suggesting that women avoid 'competing' directly with men's interest in IT or programming. Other women initially studied a non-technological discipline, then, when digitalization made technology competence increasingly important, they had acquired STEM skills through work-based upskilling or a return to study. Other women found opportunities working in digitalization because their non-technical profession was needed. Though many of these women occupied central positions in their organizations and contributed to processes of digitalization of vital importance for society, many will remain invisible in statistics identifying women in STEM.[32] This pattern of underrepresentation in STEM has several implications, including the risk that technological products and services do not meet the needs and demands of women, as well as a tendency to make invisible the contributions of women in scientific and technological fields and to highlight the contributions of men in these areas resulting in a dearth of female role models in STEM. Since STEM subjects are often considered the most difficult subjects at school level, in many societies, male-dominated STEM fields are associated with prestige in educational and professional terms, whereas fields which are highly dominated by women tend to be associated with lesser prestige.

A number of factors shape women's underrepresentation in STEM fields. These include societal stereotypes about the type of person who is expected to succeed in STEM career pathways, namely middle-class white males. Such stereotypes discourage many young people who do not meet these attributes from entering STEM fields. The belief exists that women are more competent in reading and languages, whereas men are more competent in math, science, and technology; this belief seems to be endorsed or reinforced by parents and teachers. Adolescents themselves assume these social beliefs in such a way that they end up making these beliefs a reality. The widespread assumption that girls and women are not interested in technology must be overturned. This assumption creates a self-perpetuating cycle, in which girls lack knowledge about technology, therefore do not express interest in the field, therefore are not encouraged to enter tech-arenas and therefore continue to lack knowledge.

The most prevalent stereotypes attributed to people in STEM do not facilitate women's sense of belonging and the belief that they 'fit in' or are 'welcome' in those STEM fields. Gender bias in learning materials has been shown to sustain gender differences in attainment, as

29 See: UNESCO, EQUAL Skills Coalition (2019) "I'd blush if I could: closing gender divides in digital skills through education" for an in-depth examination of these stereotypes.

30 Stoet, G. & Geary, D. (2018). "The gender-equality paradox in science, technology, engineering, and mathematics education". *Psychological Science*, 29, 4, 581–93.

31 Sáinz, M., Martínez-Cantos, J. L. & Meneses, J. (2020). "Gendered patterns of coping responses with academic sexism in a group of Spanish secondary students" (Diferencias de género en las respuestas de afrontamiento del sexismo académico en un grupo de estudiantes españoles de secundaria). *International Journal of Social Psychology*, 35, 2, 246-281.

32 Corneliussen, H. G. (2020). "Dette har jeg aldri gjort før, så dette er jeg sikkert skikkelig flink på – Rapport om kvinner i IKT og IKT-sikkerhet" (I have never done this before, so I'm probably really good at it" - Report on women in ICT and ICT security), Sogndal, VF-rapport 8/2020.

well as the kind of classroom dynamics and teaching styles at play. Current programs which seek to address stereotypes limiting girls' access to STEM education focus only on girls. Instead, girls' broader environment must be considered, including the socioeconomic and sociocultural origins of families and schools. It is also necessary to engage with boys, as it is crucial that they too change their mindset and actively contribute to breaking down gender stereotypes.

Girls from low socioeconomic backgrounds have less contact with science activities[33] and are also less likely to receive encouragement from their parents to engage in STEM pathways[34]. Therefore, it is crucial that the intersection of gender with other factors of inequality, such as girls from impoverished areas, rural areas, with migrant origins, or disabilities, must be incorporated in the design and evaluation of STEM interventions.

Policies and initiatives, often designed without meaningful stakeholder input, continue to be rolled out in one form or another without discernible impact. For example, despite decades of well-intentioned work by organisations, activists, and advocates to tackle low participation of women in STEM – comprising everything from career days, computer clubs, role modelling, mentoring and coaching to general promotional events and more – increasing the number of women in IT remains elusive[35].

Women identify a variety of interests as motivational for studying technology, including its importance in solving societal challenges. This should be recognized in order to support the future of work in fields such as the green transition, e-health, and AI, which are all fields in need of cross-disciplinary knowledge.[36] A recent systematic review revealed a shortage of interventions that incorporate the arts, humanities and social sciences into the fields of science and technology, best known in many instances as STEAM (Science, Technology, Engineering, Arts, and Mathematics).[37]

Conclusions and recommendations:

- **Provide universal access to broadband connectivity for teachers, students, schools, and other educational environments.** Policies, actions, and investments for learners most in need of opportunities should be promoted to bridge inequalities, spark needed innovation, and make solutions easier to 'scale out' to less privileged groups.

- **Ensure universal digital literacy for education and other empowering purposes**, with particular attention to preparing and supporting teachers, in both high and low resource environments.

- **Promote new types of learning content and new pedagogies to promote computational thinking at primary and secondary levels and to optimise online and virtual learning environments.** This requires platforms and tools designed to support rather than replace teachers, and the integration of technology and technology-enabled pedagogies in pre- and in-service teacher training. Teachers need to participate in policy-making related to the educational use of technology.

- **Support free, open and accessible education in digital environments and prioritize the development of excellent quality public digital learning platforms**. For learning outcomes to improve at scale, including for the most marginalized, educational content must be freely available, easy to access and use, and, when feasible, aligned with formal curriculum. It should also be available in many languages, accessible to people with disabilities, adaptable, and contextually relevant. To this end, the promotion and use of open educational resources can be especially powerful. Overreliance on single technology solutions, which rely on one company, should be avoided.

33 Flecha-García, R. (Coord.). Dawson, E. Ortega-Alonso, D. Sáinz, M.; Sordé Martí, T.; Schiebinger, L. & Trujillo G. (2022). "Hacia una comunicación inclusiva de la ciencia: Reflexiones y acciones de éxito". [Towards an inclusion communication of science: Relections and success actions] Fundación Española para la Ciencia y la Tecnología (FECYT).
34 Sáinz, M. & Müller, J. (2018). "Gender and family influences on Spanish students' aspirations and values in STEM fields. International Journal of Science Education", 40(2), 188-203.
35 Quiros, C., Morales, E., Pastor, R., Carmona, A., Sainz Ibanea, M. & Herra, U. (2018). Women in the Digital Age. Publications Office of the European Union, Luxembourg.
36 BCS (2019). BCS Insights Report.
37 Milagros Sáinz, "How to address stereotypes and practices limiting access to STEM-related education for women and girls", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.

- **Leverage digital technology to advance national and international aspirations for education and lifelong learning**, across pedagogy, curriculum, assessment, social care and the organization of learning, both in and outside of formal educational institutions.

- **Integrate gender equality at the heart of education sector plans, budgets and policies.** Integrate a human rights-based approach in computer science and engineering secondary and tertiary curricula. Identify and address gender disparities and their underlying factors from the early years and beyond, and scale up budgets, strategies and commitments that eliminate harmful gender norms in pedagogy, build the institutional and human capacity of education sector staff, focus on the most marginalized, and support learning.

- **Invest in robust research on education technology, assessing impact, cost-effectiveness and equity implication**s before committing resources to scaling up interventions.

- **Tackle gender stereotypes that women and girls are not interested in technology, which underpin gender inequality throughout the STEM field.** Strategies and actions must focus not only on changing women's and girls' perceptions of technology, but also those of the wider "ecosystem", including family members, friends, fellow students, and co-workers.

- **Provide career orientation and recruitment initiatives** by providing insights into technology education and technology-driven occupations and inviting girls to visit and get to know IT departments at university campuses, as well as inter-disciplinary initiatives that combine technology with social science. Meetings and mentorships should also be facilitated for girls and young women with women STEM professionals with whom they can identify based on shared social and personal characteristics. The effectiveness of policies programs and initiatives aimed at increasing women's access to STEM fields should be evaluated so that they do not become performative.

- **Expand initiatives to combat gender stereotypes in STEM professions to also focus on topics that respond to current and future societal challenges**, such as the fight against climate change or social injustice. The promotion of interdisciplinarity could be effective in raising girls' interest in STEM and challenging current pre-conceptions about the lack of synergies between STEM and non-STEM disciplines.

- **Develop a clear policy in schools against sexism and promote targeted training, including mandatory unconscious bias training programs.** These should target different stakeholders of the broader school community, including teachers, counsellors, parents, and peer groups, including boys and young men, as well as human resources representatives. All training sessions should incorporate the voices of women in STEM professions. Teachers at all stages of the education system should be provided with resources and didactic materials which make visible the contributions of women to STEM to deconstruct stereotypes and redress gender gaps in digital literacy and participation in STEM.

- **Harness the potential for education to tackle and prevent online bullying, gender-based violence and harmful gender norms**, and to build students' and teachers' attitudes, behaviours and skills to support justice, inclusion, health and gender equality.

Students in a science class at a rural school, Vietnam.
Photo: UN Women Vietnam/Pham Quoc Hung

4. Inclusive innovation ecosystems and digital transformation

4a. The future of work in the digital age: leveraging technologies to create decent work for women, including in marginalized communities

The tech workforce continues to be dominated by men, with women making up only 22% of AI professionals globally and the majority of technical and leadership roles being held by men. There are still invisible barriers, including gender stereotypes, sticky floors and glass ceilings which discourage women from pursuing education in STEM fields and hinder equal participation between men and women in this industry. Women are promoted at a slower rate than men, only 52 women being promoted to manager for every 100 men. A shocking 22% of women in tech are considering leaving the workforce altogether given the prevailing masculine working culture reflected in impediments to advancing and other barriers including exposure to violence and harassment and lower wages[38].

Technology is also transforming the way we live and work. Platforms - digital interfaces that connect consumers to providers of various types of goods, services, and information - are creating new opportunities for work, and offering more flexible working arrangements. This emerging ecosystem of digitally-mediated work is upending traditional employment models and altering employment relationships[39].

Women face multiple barriers that keep them from leveraging the opportunities that the evolving platform economy offers, including (i) socio-cultural norms that limit women's economic participation online as they do offline; (ii) a digital divide in access, ownership and use of technology; (iii) which manifest in restricted access to relevant skills; and (iv) manifest in fewer women in STEM education and related professions. The challenges are greater in many countries in the Global South where social norms and resource constraints limit women's access to education, skills and/or jobs, and where they are frequently relegated into unfavourable and informal working conditions in highly segmented labour markets, with weaker institutional structures and enforcement of regulations[40].

Further, advancements in technology have not improved the overall labour market position of women[41], and evidence suggests that online labour markets are at risk of replicating many of the same gender biases found offline[42], including lower pay, instability, lack of labour protection and entitlements such as social security, child or long-term care services or care leave policies, or the ability to engage in collective action. On digital platforms, too many women are doing "survivalist work" while men have

38 ILO (2022), "Preparing future generations of women for new job demands: skilling, re-skilling, digitalization and automation" prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
39 Dewan, S. (2021). "Managing Technology's Implications for Work, Workers, and Employment Relationships in ASEAN". The ASEAN Secretariat. *Managing Technology's Implications for Work, Workers, and Employment Relationships in ASEAN*.
40 Dewan, S. (2022) "Women, Work, and Digital Platforms: Enabling Better Outcomes for Women in the Digital Age", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
41 OECD. (2017) "Going Digital: The Future of Work for Women".
42 Op. cit. at 40

the more lucrative opportunities. Moreover, women engaged in the platform economy are also exposed to the risk of sexism, discrimination, violence and harassment[43]. Digital platforms should not be seen as an alternative to providing women with opportunities for decent work or expanding their participation in the labour market.

Women may be at greater risk of job displacement as automation and digital technologies may take over routine tasks or occupations such as clerical support or service work in which women are overrepresented[44]. Automation is also likely to contribute to growing polarization in the global jobs market, with women in richer countries having a comparative advantage over women in poorer countries because of their higher levels of education and digital literacy[45].

Unless existing ingrained structural barriers are removed, women, especially those already most marginalized, will continue to lose out. It is not a matter of "fitting" women into the current and future world of work, but rather shaping the world of work in a manner that is gender-transformative, benefitting both women and men.

In a rapidly changing world of work, the digital, green and blue economies have the potential to create millions of decent jobs. The ILO indicates that the circular economy and renewable energy sector could create a net total of 18 million new jobs by 2030. Yet, as part of this transition, between 1 and 2 million workers will lose their jobs and require reskilling into other occupations.

New technologies and digitalization can boost productivity and promote more sustainable production practices. They can create jobs in new markets and increase women's employment. For the large number of women working in agriculture, for example, green technological advances, if made affordable and accessible, have the potential to increase yield and productivity, augment their earnings and reduce physical toll, whilst increasing environmental sustainability[46]. Women currently account for less than 30%of STEM professionals. The share of women in renewable energy is nevertheless significantly higher than in the overall energy sector (by 10 percentage points), suggesting that, if managed well through a Just Transition framework[47], the transition to renewable energy could also advance equality of opportunity in employment and more equitable labour market outcomes[48].

Conclusions and recommendations:

- **Equip women with digital and technical skills.** Educational and vocational curricula should be updated so that they consider labour market trends, and employers and workers organizations can play a key role in identifying foreseen skills gaps. National training systems should offer upskilling targeted at young women, particularly those at risk of being replaced by machines or automated processes. Combining training with on-the-job learning, including through quality apprenticeships, has proven to be successful in both developed and developing countries. Apprenticeships, however, need to be more flexible to accommodate different needs, such as those of women and those of persons with disabilities, and to eliminate gender biases and discrimination in access to opportunities.

- **Prioritize active labour market policies, including gender-responsive employment policies, skills anticipation and development**, to facilitate the transition to new occupations and jobs, or to change demands within existing jobs. Governments should forecast jobs for the future and set educational policies to meet those future needs. Policies should pay special attention to specific groups of women at risk of being left behind, such as women with disabilities, young women, women in minority groups and indigenous women. Policies will also need to address digital

43 Op. cit. at 38
44 Ibid
45 ILO and OECD (2018) "Global Skills Trends, Training Needs and Lifelong Learning Strategies for the Future of Work".
46 ILO (2022) "Third recurrent discussion on the strategic objective of employment".
47 See ILO Guidelines for a just transition towards environmentally sustainable economies and societies for all
48 IRENA (2019) "Renewable Energy, a Gender Perspective". and ILO and IRENA (2021) "Renewable Energy and Jobs".

divides between rural and urban areas and adopt appropriate sectoral approaches that will assist women to benefit from technological advances, rather than be displaced by them. Efforts to design and implement these policies require the active involvement and meaningful contribution of young women in order to reflect their needs.

- **Establish adequate social protection systems**, including care policies and services to allow the redistribution of unpaid care work between women and men and between the family and the State to reduce the current gender gap. Rights at work are also crucial to tackle discrimination in pay, safety and women's access to managerial and leadership positions.

- **Promote social dialogue between employers and workers organizations** to minimize the adverse impacts of digitalization and automation and maximize the potential benefits of technological progress, including for advancing gender equality, equity and non-discrimination.

- **Address socio-cultural barriers which inhibit women's labour force participation and employment outcomes**, including the discounting of women's economic potential by families or by employers, the pressure to marry early and bear children at a young age and the disproportionate burden of domestic responsibilities.

- **Establish labour regulations and protections for workers in the platform economy**, including a minimum wage and public provision of basic social security for all, with a special effort to ensure that women are registered to receive entitlements.

- **Create an enabling ecosystem to support women's economic participation and employment**, including safe transport options, lighting and toilets; investing in childcare and other time-saving measures; and developing human capital through equitable access to education, skills, and technology.

- **Gather gender-sensitive labour market data that is disaggregated** not only by sex and age, but includes other facets such as disability, race and ethnicity, in order to design appropriate labour market policies, assess their implications and impacts for women and inform changing labour market demands. More sex-disaggregated data must also be collected on the incidence, characteristics, and experience of women engaging in digitally-meditated work through platforms. Data protection, privacy protection, and data rights frameworks are also necessary.

- **Integrate reskilling as part of automation processes**, with part of the budgets devoted to automation including reskilling the workers it may displace.

Indigenous women taking part in a technology education programme, Guatemala.
Photo: UN Trust Fund/Phil Borges

4b. Building gender-transformative innovation ecosystems supporting women's entrepreneurship

Starting and running a business in the digital economy of the 21st century requires at least a minimal level of 'digital entrepreneurship'. Disadvantages experienced by women entrepreneurs are not just attributable to a lack of local or regional access to technology and infrastructure, but also to a lack of knowledge economy skills, such as comprehensive digital and strategic skills to be able to conduct business in the digital economy[49]. E-commerce carries a higher risk of dropping out for women, who tend to hold lower digital skills and have less free time to engage in online activities due to disproportionate household responsibilities[50]. This creates a clear gendered order in technology, whereby offline bias is carried online, and women become frequently positioned as end users and men as primary innovators and designers[51]. While women-led enterprises are not intrinsically less productive, an inherent gender bias obstructs women entrepreneurs from equal access to ecosystem resources such as finance and markets, preventing them from reaching their full potential[52]. Men are three times more likely than women to own a business with employees, whilst women-owned start-ups receive 23 percent less funding than those owned by men.[53] Despite good intentions to evolve public-private and inter-agency collaboration within innovation ecosystems, the gap between demand and supply of gendered support appears ever harder to bridge. This is further reinforced by budget restraints and the misconception that gender-neutral support can adequately serve all would-be entrepreneurs. As a result, women entrepreneurs, and especially younger generation women entrepreneurs, do not receive adequate support.

Conclusions and recommendations:

- **Adopt an inclusive, systems-thinking and action research lens to regularly evaluate, adapt as needed and measure women entrepreneurs' participation across all pillars of the innovation ecosystem**. This should encompass the collection of sex-disaggregated data and should address access to IT infrastructure, digital literacy skilling, resources, markets, financial support, and public procurement.

- **Construct a gender-transformative innovation ecosystem framework** that builds the entrepreneurial capacity and strengthens the digital talent-pipeline of women entrepreneurs.

- **Design place-based, contextual solutions and supports which acknowledge women entrepreneurs as a heterogeneous group**, located across widely differing geographic locations and innovation ecosystems, with widely varying resource, support, and educational needs.

- **Create accelerators for early-stage start-ups founded by women** (such as temporary special measures and public procurement policies) and foster **multi-stakeholder partnerships to provide loan guarantees for women entrepreneurs**.

49 Braun, P. (2010). "A skilling framework for women entrepreneurs in the knowledge economy". in C Henry & S Marlow (eds), *Innovating Women: Contributions to Technological Advancement. Contemporary Issues in Entrepreneurship Research*, Volume 1, Emerald Group Publishing Limited, London, pp. 35-53; Van Deursen, A., Helsper, E & Eynon, R. (2016). "Development and validation of the Internet Skills Scale (ISS)". *Information Communication Society*, Vol. 19(6), pp. 804–823.

50 OECD (2020), OECD-Webinar-Women-Entrepreneurship-Policy-and-COVID-19, Summary-Report, viewed 1 September 2021: https://sites.telfer.uottawa.ca/were/files/2020/06/OECD-Webinar-Women-Entrepreneurship-Policy-and-COVID-19_Summary-Report.pdf

51 Marlow, S & McAdam, M. (2015). "Incubation or induction? Gendered identity work in the context of technology business incubation", *Entrepreneurship Theory and Practice,* vol. 39(4), pp. 791–816.

52 Ahl, H. (2006). "Why research on women entrepreneurs needs new direction". *Entrepreneurship Theory and Practice*. Vol. 30(5), pp. 595-621.; Bosse, D & Porcher L. (2012). "The Second Glass Ceiling Impedes Women Entrepreneurs". *The Journal of Applied Management and Entrepreneurship*, Vol. 17(1), pp. 152-68.

53 OECD (2018), "Bridging the Digital Gender Divide".

4c. Gender-responsive digital policies and investments

The benefits of technological innovation do not necessarily contribute to gender-transformative social outcomes. Technology design reflects existing socio-economic conditions, while the specific modalities of its development, appropriation, assimilation and reconfiguration in turn impact social structures[54]. This mutual shaping between the socio-political context and technological innovation comprises a complex ecosystem of norms and rules, discourses and practices. Innovation ecosystems therefore represent a dynamic socio-political structure. Digital technologies radically alter production systems and social organization[55].

Public innovation should be promoted in order to catalyze the respective roles of the public, private and community sectors, creating a system of checks and balances rooted in a systemic vision, operationalized through norms and principles in the law and actionized by appropriate mechanisms enforcing rights, duties, obligations and liabilities[56]. For example, public consultations and independent assessments should be mandated prior to rollout of technological systems in the public sector. Further, affected communities should be involved in the conception and design of systems in order to augment efficacy, impact and benefit to all.

Governments, NGOs, and researchers should employ co-creative and participatory methods when implementing new technologies, in which technologists work together with users to understand the physical requirements for a new technology alongside relevant cultural and social norms. Public digital innovation for gender equality may be seen as a techno-institutional ecosystem that enables public agencies, private sector organisations, and community groups/ people's organisations to co-shape innovation trajectories towards an egalitarian, economically just, and participatory digital paradigm.

The technological components of this ecosystem comprise the foundational digital infrastructure that needs to be provisioned through public financing models, in order to make them universally accessible and affordable. The state should invest in technical protocols that, as the building blocks for innovation, protect and preserve the public trust necessary for the participation of small/less powerful actors in the economy and society. Vibrant stakeholder communities can be orchestrated around these infrastructures, involving public agencies, private sector, and civil society actors keeping their differentiated roles and responsibilities in mind.

In order to design and implement successful mechanisms to ensure digital technologies favor inclusion and close gender gaps, it is paramount to apply two cross-cutting methodologies: a gender perspective, and a systemic approach. A gender perspective allows us to understand the implications for women and men of any policy aimed at closing the digital gender divide, so that women's concerns and experiences are an integral dimension of the design, implementation, monitoring and evaluation of policies and programs. This means that it is not enough to include women in the process of policy making, technology design, etc., but that every person involved in these responsibilities need to be acknowledgeable in gender perspective methodologies. The second fundamental element to bridge the digital gender divide is to apply a systemic approach, that is, to identify the different factors that affect and feed the state of things that we want to change, understanding the direct and indirect relationships between them. General barriers to digital inclusion must be addressed in a systemic way: affordability, discrimination, privacy, safety and security, knowledge and skills, relevant content, services and products; cultural norms and female participation in leadership, creation and decision-making[57]

54 Gurumurthy, A. and Chami, N., (2022) "Innovation to tackle gender inequality – a back-to-basics roadmap", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
55 Ibid
56 Ibid
57 Op. cit. at 27

Conclusions and recommendations:

- **Commit to public digital innovation for gender equality at the multilateral level.** The Global Digital Compact (GDC) should unequivocally embrace a human rights, gender equality, and development justice-oriented approach. It must recognize the need for digital sovereignty of peoples and nations as an essential ingredient to democratize the opportunity to create and benefit from digital innovation. The GDC must envision clear commitments through the Official Development Assistance route for the financing of digital innovation ecosystems and institution development in the Global South, particularly LDCs, to strengthen gender equality outcomes, including in public services, local livelihoods, and women's public participation. The GDC should be envisaged as a first step in developing an international body of law on digital governance. The UN Technology Facilitation Mechanism (TFM)[58] should be channelled effectively to enable synergistic resource support and agile institutional coordination between UN agencies and national governments for a gender strategy development on digital public goods. The creation of a new global work programme similar to 'STI for the SDGs' would be productive in this regard.

- **Protocols for gender aspirational design should guide the development of all digital public goods and infrastructure** such as high-speed connectivity, public data pools and machine-readable data sets, public cloud infrastructure and public platform marketplaces.

- **Harmonize digital and sectoral policies, including in relation to gender equality.** Digitalization and datafication of public systems and public service infrastructure in sectors such as education and health need be developed through public consultation and have a human rights-based and gender equality approaches at their core.

- **Work towards the establishment of public digital innovation ecosystems rooted in feminist visions and mainstream gender in all digital policies by[59]:**

  – **Gathering sex-disaggregated data and conducting research**, including via surveys, to identify areas where women are at disadvantage vis-à-vis men as well as their needs and how products and services need to be tailored to be more accessible and valuable to women.

  – **Defining a gender mainstreaming practice**: Structure practice by defining objectives, activities and governance, including across more than one policy area. Identify similar gender mainstreaming practices from concerned regions or elsewhere and take on board lessons learned from those practices.

  – **Aligning the practice with national strategic documents**: Ensure the practice is aligned with the objectives of the overarching national ICT policy or Master Plan. Ensure the practice is aligned with national strategic documents that guide work on other policy areas such as the National Strategy on Financial Inclusion or National Education Strategy. If a national strategic document does not exist, promote the adoption of one that includes a dedicated chapter or section stating concrete actions to support women and girls, and mainstreaming those concepts throughout.

  – **Allocating resources**: Define a specific budget for the implementation of the gender mainstreaming practice and develop tools to help partners align with a gender mainstreaming strategy or policy.

  – **Collaborating and partnering with other government institutions**: Identify relevant Ministries and institutions and consult with their gender focal points and identify or established institutionalized coordination mechanisms relating to addressing gender in digital policies;

58 Established to facilitate multi-stakeholder collaboration and partnerships through the sharing of information, experiences, best practices and policy advice among Member States, civil society, the private sector, the scientific community, United Nations entities and other stakeholders. See: **https://sdgs.un.org/tfm**

59 Based on ITU (2022) "Universal and meaningful connectivity: Are the SDGs fit for purpose to report on progress for women and girls in technology? An approach for gender mainstreaming of the digital ecosystem", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.

– **Consult with stakeholders** that will be affected by the practice and with other stakeholders such as business representatives, civil society organisations, local women's groups, gender experts, regional regulatory associations, and international organisations at the conception and design phase as well as development, deployment, audit and iteration phases of public service products. Establish partnerships with key stakeholders for the practice implementation.

– **Measuring impact**: Establish a framework to measure effectiveness of practices, identify areas where there is room for improvement and identify lessons learned for replication and scalability.

- **Establish Human Rights Due Diligence for the private sector.** Corporate policies for technology design and deployment need to be based on an explicit commitment to gender equality principles and must respect data governance laws and data rights of citizens in all jurisdictions, committing to the highest ethical human rights-based standards to eliminate harm and maximize social benefits of technological innovation.

- **Integrate diverse perspectives into internet governance**, content moderation, algorithmic design and programing, research and innovation, policy-making and evaluation, and data processes. Establish Algorithmic Auditing to foster evolution of risk and remedy.

Mata Koné, a women farmer, testing the Buy from Women app, Mali
Photo: UN Women/Alou Mbaye.

5. Fostering Gender-transformative innovation and technology

5a. Embedding gender considerations in technology development

Technological innovations have the capacity to accelerate the advancement of women, making it easier to exercise their rights and linking them with opportunities to improve their income, have better jobs, continue their education, access health services and justice, participate politically and insert themselves socially. For example, digital services could be useful for rural women, who are currently last in line in terms of ICT access and less likely to engage with ICT solutions designed with them in mind. For instance, ICTs have the potential to rectify the information asymmetry that is currently experienced by female farmers by facilitating access to crucial technical information, while mobile technologies can connect rural women to supply chains, service provision, and directly to markets and consumers, maximizing profitability by avoiding intermediaries.

We are beginning to see the benefits of the "FemTech" revolution - software, diagnostics, products, and services that use technology to focus on women's health[60]. For example, using digital tools for providing access to mobile health or e-health services, such as information on sexual and reproductive health (SRH), are effective and suitable to reaching youth as they reduce stigma and enhance confidentiality, and can be cost-effective. Evidence demonstrates that providing SRH information through mobile phones can positively influence health outcomes, including improving knowledge, and increasing use of health services[61]. Digital technologies can improve women's and children's health in rural and underprivileged regions in particular. For example, free mobile apps providing women with preventive care information to support them through pregnancy and early infant care benefitted 2.9 million women in slum communities in India and reported an increase in women's knowledge of family planning methods, an increase in the number of pregnant women who take prenatal vitamins, and an increase in proportion of infants under six months who were exclusively breastfed[62].

However, despite the general progress of digital uptake for persons, organizations and governments, gender gaps persist and each new technology is accompanied by new dimensions of the gender digital divide[63]. Technologies do not exist in a vacuum, and while they have the potential for positive change, they can also reinforce fault lines. In this regard, gender norms shape technologies, and technologies, in turn, shape gender and other social norms, often reinforcing vicious cycles where past inequalities are amplified and perpetuated. Gender distortions are built, sometimes invisibly, into basic technologies[64]. Examples in the field of mechanical engineering include automotive safety technologies that perpetuate a cycle of discrimination and injury to people who do not fit the profile of the model mid-sized white male. AI, machine learning and robotics are powerful digital tools increasingly used in healthcare, education, transportation, and

60 Schiebinger L. "Harnessing Technology and Innovation to Achieve Gender Equity and Empower all Women and Girls", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
61 Ippoliti and L'Engle, 2017. "Meet us on the phone: mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries". https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978- 016-0276-z
62 Op. cit. at 60
63 Op. cit. at 27
64 Op. cit. at 60

e-commerce. However, historic and real-time bias built into these technologies have been shown to augment and embed cycles of discrimination[65]. While digital innovations can support better access to health and SRH, there are risks related to the governance of data and the ability to track patients and their health issues/concerns. For example, the use of period tracking apps and google searches to find women who are seeking information on abortions. In this regard, it would be important to consider these kinds of risks and put in place measures for their mitigation, such as classifying period-tracking applications as 'health' applications rather than 'wellness' applications, which would require the application of health data rules and greater level of privacy and protection.

Designers have the opportunity to turn vicious cycles into virtuous cycles of cultural change and to challenge gender norms with their designs by moving from techno-centric to human-centric approaches. Technologies can then embody social norms that promote equality and inclusion by challenging and reformulating user expectation. This, in turn, prompts users to rethink social norms. These novel designs ultimately influence culture and help develop more equitable societies. The goal is to create technology that is designed, from the outset, with gender and other social factors in mind. However, in order to do so, we must create more space for co-creation between the public and private sectors while also incentivising the private sector to systemize the adoption of gender-responsive innovation processes.

The participation of women as creators, designers, promoters and decision-makers in the fields of digital technologies can also help foster technologies that respond to their needs, aspirations, circumstances, preferences and priorities. Women's direct participation is needed to shape technologies, lead investments, research, public policy, and business efforts. Although the participation of women in patenting activities in the ICT sector has increased in recent times, progress is relatively slow. At the current pace, it will be 2080 before women are involved in half of all patented inventions within the five largest IP offices.[66] Increasing women's representation, retention and leadership in technological innovation and change should be an urgent priority for all countries.

From the very beginning, technologists need to consider the many axes of discrimination and delineate those most relevant to their research. Intersectionality describes overlapping or intersecting forms of discrimination related to gender, sex, ethnicity, age, socioeconomic status, caste, sexuality, geographic location, migration status, religion, and race, among other factors. Across scientific disciplines, a U.S. study revealed that authors from minority groups tend to publish on research topics that reflect their social identities. Similarly, inventions designed by mixed-gender teams are shown to be more economically valuable and have a higher impact than those designed solely by men.[67] In short, including women and minority groups in the creation of science and technology enhances the sector and better serves society.

Policy is a driver of technology that can catalyze structural solutions that foster social equity and environmental sustainability. In order to be effective, the pillars of technology infrastructure—funding agencies, peer-reviewed journals and conferences, institutions of higher education, and industry, must coordinate policies[68].

Conclusions and recommendations:

- **Reconfigure granting processes for research to support interdisciplinary work between technologists and humanists and social and behavioural scientists**. Funding should support and incentivize research that benefits everyone across the whole of society. Proposal evaluations need to consider both the technical excellence

65 For examples, see above at 60.
66 Op. cit. at 58
67 Ibid
68 Tannenbaum, C., Ellis, R. P., Eyssel, F., Zou, J., & Schiebinger, L. (2019). "Sex and gender analysis improves science and engineering". *Nature*, 575(7783), 137–147. https://doi.org/10.1038/s41586-019-1657-6

and the social benefits of a proposal, with special attention to gender, race, and intersectional social analysis.[69] This could be achieved, for example, by establishing review panels composed of both technologists and humanists and social scientists and by training proposal evaluators in these approaches. Financial and mentoring resources must also be directed to women-led ventures, inventions, research and projects.

- **Include criteria on gender and STEM within professional standards bodies, certifications, quality charters and accreditation schemes in higher education, including at departmental level**.

- **Require sophisticated sex, gender, race, intersectional, and broader social analysis when selecting papers for publication within the editorial boards of peer-reviewed journals and conferences**. The NeurIPS (Neural Information Processing Systems) conference, for example, conducts ethical reviews before accepting papers. Journals, such as Nature and The Lancet, require sex and gender analysis, where relevant.

- **Integrate knowledge of sex, gender, race, intersectional, and broader social analysis into core engineering, design, and computer science curricula within institutions of primary, secondary, and higher education, colleges and universities, and research institutions.** It is imperative that critical intersectional sociocultural analysis be embedded as a compulsory requirement in core courses across the natural sciences, medicine, and engineering curricula. Universities that prepare students to understand the cultural impacts of their research can influence industry by preparing their technologists to consider social benefits and harms as they design products, services, and infrastructures. In this respect, universities have been developing "Embedded EthiCS," courses that embed ethical reasoning in core computer science courses, as well as Responsible Computing courses which teach critical approaches to computing[70].

- **Implement ethics reviews of ongoing research as well as new technologies, including gender analysis**, in the private sector, universities, industries, peer-reviewed journals, and peer-reviewed conferences.

- **Expand international gender indices and monitoring and evaluation to consider gender equality in technology and innovation production**.

- **Develop an index for social equity and environmental sustainability for industry.** Many industries have developed inclusive workforces but this must be expanded to evaluate their products, services, and infrastructures for social equity and environmental sustainability.

- **Employ gender-responsive methodologies** in policy-making and tech design processes[71].

- **Encourage equity within ICT organizations and emerging technology**, including the elimination of discrimination and gender pay gaps, and the promotion of diversity and inclusion to create workplaces which are enabling and safe for women. Foster and support the participation of women, especially women affected by other forms of marginalization, in relevant internet governance bodies.

- **Apply gender lens criteria for investment in technological solutions, programmes and innovation policies**, including efforts to capture women and girls' voices and solutions in the design and testing phases.

69 The European Commission is a leader in this area and has had policies for integrating sex and gender into research since 2003. Their new funding framework launched in 2020, Horizon Europe, strengthened this requirement with applicants required to integrate sex, gender, and intersectional analysis into the design of research, or to justify that it is not relevant to the work. See Schiebinger, L. & Klinge, I. (2020), "Gendered Innovations 2: How Inclusive Analysis Contributes to Research and Innovation". Luxembourg: Publications Office of the European Union.

70 National Academies of Sciences, Engineering, and Medicine. (2022). "Fostering responsible computing research: Foundations and practices". Washington, DC: The National Academies Press. https://doi.org/10.17226/26507

71 Schiebinger, L., Klinge, I., Sánchez de Madariaga, I., Paik, H. Y., Schraudner, M., and Stefanick, M. (Eds.) (2022). "Gendered Innovations in Science, Health & Medicine, Engineering and Environment". http://genderedinnovations.stanford.edu/methods-sex-and-gender-analysis.html

- **Promote women as creators in digital innovation ecosystems.** Incentivizing local innovation hubs can give the much-needed stimulus to women's participation in the technology sector. Temporary Special Measures such as quotas and hiring targets in the private sector should also be set and enforced by state agencies as part of the governance of market innovation systems.

- **Apply Gender-responsive standards** with its human rights-based inclusion by design approach in the design, development and deployment of new technologies.

- **Foster systemic approaches and accelerate innovative solutions with a gender lens within the United Nations System** by (i) identifying promising solutions; (ii) designing gender lens criteria for investment that capture the high potential of women to reach their targeted impact and by (iii) adding on to their credibility while they face the competition of follow-on funding.

5b. Leveraging data science to advance gender equity

Corporations, governments, and other well-resourced institutions possess the ability to design and deploy data systems, while those whose lives and livelihoods are most dependent on the output of these systems remain largely absent from conversations. This unequal balance of data power can result in interrelated and intersectional harms. Frameworks intended to rebalance and restructure these unequal power relationships which structure the data science field can be applied to the entire lifecycle of data science research. This includes the communities involved in the initial phases of research ideation, categories of data collection and the context which surrounds datasets, matters of transparency and accountability and the outputs of data-driven research.

The intensification of datafication and the extraction of vast amounts of user-generated data has severe implications for those invisible or underrepresented in the data sets. Active inclusion of all those affected by decisions in processes of policy formulation, regulation and governance is essential to ensure more equitable and just digital and data outcomes.

A broad formulation of data science ethics is not a strong enough concept in which to anchor ideas about gender equity. A justice-oriented approach must instead be taken. The inclusion of impacted communities as full research partners in any data science project can help to ensure that appropriate data is collected in relevant categories. Further, in the rapidly-evolving digitalization context, outcome-based regulations are seen as a useful tool that allows flexibility for stakeholders to take adequate measures to respect the objectives and results formulated in a regulation, in comparison with compliance-based regulations that that may be too prescriptive or easily outdated in requiring to follow a specific process or action.

Equity must be prioritized over equality, and human rights and justice over ethics, in data governance and regulation. Quality is measured from a starting point in the present, with resources or punishments measured out according to what is happening now. This approach of equal resource allocation means that those who are ahead in the present will go even further. An equity approach entails working toward a world in which everyone is treated equally, taking present power differentials into account and redistributing resources accordingly. Similarly, a broad formulation of ethics is not a strong enough concept in which to anchor ideas about gender equity. A justice-oriented approach must instead be taken, which looks to understand and design systems that disrupt unequal power structures, which remain the root cause of gender inequality. The ways in which structural power impacts the creation of datasets and data systems must be acknowledged and accounted for.

Further, the social, political and historical context surrounding any dataset must be taken into account through documentation and other qualitative forms of information gathering. Attending to the context of any particular dataset leads not only to more accurate and more truthful data analysis, but also helps to ensure the efficacy and appropriateness of any intervention developed in response to that analysis.

Ultimately, the goal should be to create Global Data Commons to ensure that everyone can benefit from the datafication of society and access data for beneficial research. This could include standardized disaggregated data (including demand-side) as a public good essential to the governance of global digital public goods. However, risks should be mitigated, for example, data that may put women in vulnerable positions could be categorized as sensitive and be subject to specific regulations and protection policies for its use (including the need to anonymize and de-identify) and data brokering practices must be regulated. A balance between data collection and access on the one hand, and safety on the other must be found. Data collection efforts and policy interventions must be firmly grounded in a human rights-based approach to tech policy, data gathering and protection, with the application of the UN Guiding Principles of Business and Human Rights and the Gender dimensions of the Guiding Principles to the technological sector in this respect. They should systematically conduct human rights due diligence throughout the lifecycle of the AI systems they design, obtain or operate and incorporate a gendered lens and systems to monitor compliance should be transparent and independent.

Conclusions and recommendations:

- **Mitigate impacts on the enjoyment of the right to privacy and other human rights by adapting or adopting adequate regulation or other appropriate mechanisms, in accordance with applicable obligations under international human rights law**, for the conception, design, development and deployment of new and emerging technologies, including AI, by taking measures to ensure a safe, transparent, accountable, secure and high quality data infrastructure and by developing human rights-based auditing mechanisms and redress mechanisms and establishing human oversight[72].

- **Foster collaboration between the private sector, academia, public sector, and development actors, including the United Nations agencies**, to collect, analyze, and use data productively and safely and to develop responsible and human rights-based standards for data collection and sharing that prevent abusive exploitation and overcome data concentration among few global actors.

- **Include impacted community members as co-designers in any data science project.** Participatory design processes such as these can help to ensure data-scientific research is directed towards the issues and opportunities desired by communities themselves.

- **Establish meaningful and inclusive categories of data collection**, including the aggregation and disaggregation of categories to protect vulnerable populations as warranted.

- **Consider the social, political and historical context surrounding any dataset through documentation and other qualitative forms of information gathering.** Developers should certify that the datasets they use to develop a particular system or project comply with criteria/standards; governments should develop documentation on their own datasets and assure that derivative use of data collected for other purposes comply with local data protections standards and legality, necessity and proportionality criteria.

- **Codify transparency through meaningful audits, impact assessments, and an escrow system for algorithmic transparency and individual and collective reflexivity.** The goal of transparency is to reveal the outcomes and impacts of the data, code, algorithms and systems. Increasing numbers of data and tech professionals are questioning the nature of their work and calling for more strategies to prevent digital harms and audit current platforms.

- **Hold institutions accountable for the failures and harms of data systems through forceful legal, financial and technical consequences**.

72 See General Assembly Resolution 75/176 on "The right to privacy in the digital age" (/RES/75/176), and HRC Resolution 48/4 on "Right to privacy in the digital age" (HRC/RES/48/4).

- **Credit and compensate the different forms of labour involved in data work.** Many forms of data work, on which gender equity increasingly depends, take a psychological toll on researchers.

- **Create Global Data Commons to ensure that everyone can benefit from the datafication of society and access data for beneficial research**, which could include standardized disaggregated data (including demand side) as a public good essential to the governance of global digital public goods. Data collection efforts and policy interventions must be firmly grounded in a human rights-based approach to tech policy, data gathering and protection, with the application of the UN Guiding Principles of Business and Human Rights and the Gender dimensions of the Guiding Principles to the technological sector in this respect. They should systematically conduct human rights due diligence throughout the lifecycle of the AI systems they design, obtain or operate and incorporate a gendered lens.

- **Regulate/mitigate risks associated with data brokers** and their use by law enforcement agencies.

5c. The gendered impacts of AI: policies and safeguards to regulate new technologies, mitigate risks and protect rights

The velocity and scale of digitalisation are transforming every part of society in every part of the globe. It is uncertain whether emerging and data-driven AI technologies will move us to the positive, or the negative side of socio-economic equality, gender and climate justice, stability and peace. Systemic gender, racial and intersectional bias sit at the core of current AI & Algorithmic Decision-Making (ADM) processes wiring historic bias, inequity and discrimination into our newly digitised economic, governance, and social systems. Algorithms based on incomplete or biased data and the models built from them incorporate assumptions of gender, race and class. This process will evolve into ever more difficult to dismantle inequalities - if we do not act now.

While several global initiatives that work to promote responsible computing have emerged, they should incorporate gender issues and include gender experts. For example, the Global Partnership on Artificial Intelligence (GPAI), which was launched in 2020 to guide the responsible development, use, and adoption of AI that is human-centric and grounded in human rights, inclusion, diversity, and innovation, while encouraging sustainable economic growth.[73] Several international agencies also support responsible AI and Robotics, however, gender audits are important to see whether gender issues are adequately treated.

Conclusions and recommendations:

- **Implement the UNESCO Recommendation on the Ethics of Artificial Intelligence**[74], which establishes a comprehensive framework, based on human-centred principles and values. The Recommendation encourages Member States to establish dedicated funds from their public budgets to finance gender-responsive schemes and establish a Gender Action Plan as part of their national digital policies, with targeted programmes and gender-specific language to increase women and girls' participation in STEM. The Recommendation mandates the collection of sex-disaggregated data and greater women's leadership in AI decision-making, backed by capacity development. It calls on Member States to ensure that gender stereotyping and discriminatory biases are not translated into AI systems, particularly within the research community.

- **Undertake audits of global initiatives that work to promote responsible computing to ensure that they incorporate gender issues and include gender experts.**

- **Regulate AI and robotics to ensure that these technologies are developed in accordance with human rights principles and democratic values.** To

73 GPAI Paris Summit (2021), "Responsible AI working group report". Global Partnership on Artificial Intelligence. https://www.gpai.ai/projects/responsible-ai/gpai-responsible-ai-wg-report-november-2021.pdf

74 Adopted on 24 November 2021 by standing ovation by the General Conference at its 41st session

do so, governments can observe legality, necessity and proportionality while developing and deploying AI systems within the public sector; establish mandatory human rights impact assessments as a prerequisite to the implementation of automated systems, with participation from women and gender experts; or establish an Office of Technology Assessment that includes gender experts and social scientists.

- **Conduct data reviews and pay attention to global diversity in training data for AI.** Several instruments have been developed, including "data nutrition labels," where researchers systematically label the content of training datasets.[75] Another approach, "datasheets for datasets," recommends developing metadata for machine learning datasets considering gender and other intersectional populations.[76] Old and "harmful" or un-representative datasets should be retired with a view to allowing more inclusive and representative, including synthetic, data to be used.

- **Carry out algorithmic reviews.** Solutions to bias in AI also require attention to leveraging machine learning algorithms to audit and override data bias throughout the data and machine learning life cycle. In many instances, such as in the case of word embeddings, where the dataset is the set of English language on the World Wide Web, bias will need to be corrected through impact assessments and AI audits that debias the algorithm.[77]

- **Address gender stereotypes and bias in AI through more coordinated policy action.** Present efforts to address the effects of bias in AI remain largely focused on computational factors such as the statistical representativeness of datasets. Policies and programmes focused on making all concerned more gender-aware and helping women and girls develop confidence in gender-responsive learning environments must be upscaled and replicated.

- **Survey and audit AI principles being applied by companies for inclusion of gender, race, and intersectional analysis**. Numerous companies have promoted AI Principles similar to those articulated at the Asilomar Conference in 2017.[78] Industry can facilitate achieving their AI Principles by hiring employees trained to work in interdisciplinary teams that include technologists, humanists, and social scientists, and who have cultivated skills to evaluate the potential social benefits and potential social harms of their products, services, and infrastructures.

- **Leverage the power of AI technologies and automation to address gender segregation and improve women's access to finance, higher education and flexible work opportunities**.

An information and communication technology training at the 'Oasis Center for Resilience and Empowerment of Women and Girls' operated by UN Women in the Azraq refugee camp in Jordan. Photo: UN Women/Christopher Herwig

75 Chmielinski, K. S., Newman, S., Taylor, M., Joseph, J., Thomas, K., Yurkofsky, J., & Qiu, Y. C. (2022), "The dataset nutrition label (2nd Gen): Leveraging context to mitigate harms in artificial intelligence". arXiv preprint arXiv:2201.03954.
76 Gebru, T., Morgenstern, J., Vecchione, B., Vaughan, J. W., Wallach, H., Daumeé III, H., & Crawford, K. (2018), «Datasheets for Datasets". arXiv:1803.09010.
77 Zou, J., & Schiebinger, L. (2018), "AI can be sexist and racist—It's time to make it fair", *Nature, 559*(7714), 324–326.
78 Future of Life Institute, Asilomar AI principles, https://futureoflife.org/2017/08/11/ai-principles/

5d. Digital Financial Inclusion for gender equality

Target 5.a of the Sustainable Development Goals calls upon Member States to undertake reforms to give women equal rights to economic resources, including access to financial services. However, 750,000 million women remain excluded from formal financial services. Digital financial services offer a number of opportunities for women, allowing them to leverage digital payments to harness income-generating activities, access new markets, join commerce platforms, receive government benefits, gain access to loans or savings, send or receive remittances, or simply benefit from important information for their farming or business activities[79]. The gender gap in digital financial inclusion is maintained by several factors, including gender disparity in mobile phone ownership, digital skills and financial literacy, lack of official documentation, and gendered social norms. Some of these factors can also make women more vulnerable to cyber fraud, SMS and voice phishing, identity theft and online harassment. Gendered legislation can also serve as a barrier to women's financial inclusion, whereby women's ability to own, manage and control property, enter contracts and open accounts is restricted by law.

Gendered social norms also influence the type of products supplied by financial service providers, resulting in marketing and distribution channels which do not meet women's needs. In Papua New Guinea, the introduction of kiosk-type outlets, called Mama Bank Access Points, which are located close to women's businesses centres and are biometrically enabled to allow users who are illiterate to transact using their thumbprint, have helped women to engage in banking.[80] Digital financial services which are designed to meet women's needs and incentivized through policies which make them safe and affordable, lead to women's active participation in the formal economy, increased GDP growth, higher labour force participation, and improved household bargaining power[81].

Conclusions and recommendations:

- **Support the expansion of digital payment infrastructure to increase women's usage of digital financial services.** The most significant progress towards gender equality in financial access has been in countries where the government has made digital payments a top priority[82]. There is also strong evidence that digital payments drive usage of other financial services, promoting the active use of an account, building a digital footprint on which to access credit, and acquire insurance alongside of these products[83].

- **Digitalize government payments, such as social benefits, replacing payments in cash, to drive digital financial inclusion.** A digitized social protection program should be reliable, accessible, flexible, secure and accountable and provide women with agency at every step. Policies in this regard should be built with women and local gender experts' participation so that they don't create further exclusion or vulnerabilities; and financial institutions and other intermediaries involved in payment processes should incorporate high data protection standards and refrain from collecting data that is not necessary or proportionate.

- **Establish policy frameworks which encourage businesses to digitize wage payments** and **merchant payments in a manner that is responsible, inclusive and tailored to women** so that micro and small merchants may adopt digital payments as a preferred mode of transaction. **Make digital remittances more affordable** to allow more women to benefit from receiving remittances upon which they depend digitally.

- **Create an enabling regulatory environment that addresses legal barriers to obtaining identification and encourages women's registration**, such as the provision of women-only registration counters, mobile registration services which bring enrolment closer to

79 www.cgap.org/blog/global-findex-digitalization-covid-19-boosted-financial-inclusion
80 FinDev Gateway: https://www.findevgateway.org/finequity/blog/2020/07/bram-peters-pacific-financial-inclusion-programme
81 Yasmin Bin-Humam and Diana Dezso, "Driving digital financial transformation in support of SDG 5: recent gains and remaining challenges", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
82 www.betterthancash.org/news/three-key-findings-that-show-that-financial-equality-is-within-reach-in-our-lifetime.
83 www.womensworldbanking.org/insights-and-impact/global-findex-2021-womens-world-banking-response/

women's homes and marketing campaigns which are tailored to women. Gender-inclusive innovations should be implemented in Know Your Customer[84] processes and requirements. They can also regulate and supervise the responsible and inclusive expansion of digital financial service agent networks, responsible for educating customers about financial concepts and product service terms. Women have an important role to play in agent network expansion, both as agents, and as clients who can support its growth.

- **Integrate financial capability into government cash transfer programs to reach women with timely and relevant training**. National strategies should address key aspects of consumer protection, risks and redress mechanisms.

- **Incentivize the collection, analysis and use of sex-disaggregated data.** Financial service providers should generate and publish sex-disaggregated statistical data to contribute to the development, evaluation and review of gender-transformative policies. National-level, sex-disaggregated demand surveys should be funded to complement it. Data reporting templates, definitions and basic taxonomy should be designed and disseminated.

Women taking part in a solar engineering training course, India.
Photo: UN Women/Gaganjit Singh

84 A set of processes that allow banks and other financial institutions to confirm the identity of the organisations and individuals they do business with, and ensures those entities are acting legally (definition from SWIFT).

6. Addressing online and tech-facilitated gender-based violence and discrimination and protecting the rights of women and girls online

Online gender-based violence (OGBV) can be understood as "any act of gender-based violence against women that is committed, assisted or aggravated in part or fully by the use of ICT, such as mobile phones, the Internet, social media platforms or email, against a woman because she is a woman, or which affects women disproportionately."[85] OGBV can take a range of forms, among them verbal abuse, threats of violence, the dissemination of non-consensual images or videos, stalking, theft of private data, digital financial abuse, doxing (the non-consensual distribution of personal data online) and the creation or distribution of falsified images or videos without consent. Many of these acts are manifestations of existing forms of gender-based violence replicated in an online context, such as stalking or verbal abuse, while others are uniquely tech-facilitated, such as the creation of nonconsensual sexual deepfake videos. Since the beginning of the COVID-19 pandemic, there has been a global increase in various forms of OGBV, referred to as the 'shadow pandemic'. A study of women and non-binary people in the UK found that 46% of respondents had experienced online abuse since the beginning of COVID-19, with 29% reporting that online abuse was worse during the pandemic.[86]

Perpetrators of OGBV may be current or former intimate partners, family members, state officials, friends, colleagues, or a person unknown to the victim, all of whom act with the objective of controlling or discrediting women. A growth has also been observed in incidents of OGBV perpetrated by coordinated groups, among them men's rights activists, incels (involuntary celibates), and other groups engaging in the 'manosphere', with growing evidence of association with extremist groups.[87] Women who experience multiple and intersecting forms of discrimination, including women of color, women with disabilities, LGBTQI persons and women's rights defenders remain at the greatest risk of harassment and abuse. A study of Twitter in 2018 found that women of colour were 34% more likely to be mentioned in an abusive tweet when compared to white women, with Black women in particular more vulnerable to abuse.[88] OGBV prevents women and girls from fully enjoying their human rights and fundamental freedoms and impedes their participation in economic, social, cultural and political affairs, creating an intractable barrier to the achievement of gender equality.

85 A/HRC/38/47, para 23
86 Glitch UK and End Violence Against Women Coalition (2020) "The Ripple Effect: COVID-19 and the Epidemic of Online Abuse".
87 UN Women (2022), Stepping up action to prevent and respond to online and ICT-facilitated violence against women and girls, prepared for the Expert Group Meeting for CSW67.
88 Amnesty International. (2018). T"roll Patrol Findings". Troll Patrol Report. https://decoders.amnesty.org/projects/troll-patrol/findings

6a. Impacts of online gender-based violence on women in the public eye

Women whose professions or activism require them to be more visible online experience higher levels of online gender-based violence, among them women politicians, journalists, women human rights defenders and women's rights activists.[89] OGBV targeted at women politicians is predominantly directed against them because they are women, rather than because of their political views or policies, and female politicians and journalists are targeted to a much greater extent than their male counterparts. A study exploring the impact of online harassment on women journalists in Pakistan found that 77% of those surveyed self-censor on the internet as a means of countering online violence.[90] As in the case of offline gender-based violence, the goal of OGBV directed at women politicians is to undermine the political efficacy of women in public spaces and control how they are perceived by the public.

A closely related issue is that of gendered disinformation campaigns, which seek to weaken women political leaders by spreading false information about their qualifications, experience, and capabilities, often using sexualized imagery as part of their tactics. These campaigns are predicated on existing gender-based discrimination and may characterize women candidates as lacking the requisite knowledge or experience for a role, or as persons who are too emotional for the task. Victims of these campaigns can face significant long-term effects that go way beyond their online experience, including physical and psychological health issues. Gendered disinformation campaigns also make politically engaged women more likely to reconsider their ambitions, or to self-censor out of fear of online or offline reprisal. A study commissioned by Plan International involving over 26,000 girls in 33 countries found that gendered disinformation undermines girls' ability to see themselves as leaders with ideas worth listening to and with the ability to change the world[91] In situations where there is a dearth of women's political voices or gendered reporting in news media, these attacks have particularly pernicious effects on women's representation and freedom of expression.

Conclusions and recommendations:

- **Recognize sex and gender as protected characteristics. Apply human rights law, including freedom of expression and the rights to privacy, equality and non-discrimination, to the regulation of online spaces and develop universal guidelines on gendered hate speech and disinformation.** Private companies are urged to work proactively to apply these guidelines to existing platforms and technology, including in new developments and ongoing upgrades.

- **Tackle the discriminatory patterns which underpin gender-based discrimination and violence.** Finance awareness and education campaigns to promote a culture of respect and inclusivity both online and offline. Engage men and boys in an effort to change harmful attitudes, perceptions and behaviors, in a manner that is tailored to local contexts to achieve greater impact. Programmes should be evaluated over time to develop an evidence base and identify learnings.

- **Design platforms which embed privacy-by-design and safety-by-design.** Build tools to better detect and report patterns of OGBV, encompassing content moderation and localization software to enable swift and accurate detection. Consider content moderation federations of women's rights groups which can negotiate and influence content platforms. Private companies are encouraged to be transparent about how they respond to cases.

89 Op. cit. at 87.
90 Kamran, H. (2019) "Media Matters for Democracy. Hostile Bytes – a study of online violence against women journalists". https://digitalrightsmonitor.pk/wp-content/uploads/2019/11/Hostile-Bytes.pdf
91 Plan International (2021) "The Truth Gap: How Misinformation and Disinformation Online affect the lives, learning and leadership of girls and young women".

6b. Protecting women's voice and agency online

A report from Article19, released in June 2022, found that 80% of the global population now lives with less freedom of expression than they possessed a decade ago.[92] This trend is reflected in digital spaces, in which state and non-state actors with racist, homophobic, xenophobic or conservative motives leverage technology to attack members of marginalized communities, or those who express viewpoints that are nonconformist, or which transgress patriarchal societal norms. Online attacks on women's freedom of expression are gendered in nature, in that women are not attacked in the same manner and experience far more vicious and frequent attacks. Common themes of these assaults include character assassination, gendered slurs, sexualised speech, rape and death threats.[93] New technologies, among them spyware and surveillance, have facilitated mass and targeted surveillance by governments and private actors, with disproportionate impacts on freedom of expression for women's movements, women human rights activists and victims of violence and abuse, among others.

Individuals and communities who experience intersecting inequalities often rely on digital spaces to support their organising activities and civic action, to connect in solidarity across geographical boundaries and to raise awareness of their difficulties in public fora. The surveillance and suppression of these communities' digital spaces is a profound threat to their public participation.

In some cases, censorship of content produced by women or minority groups may be inadvertent. Online content moderation undertaken by social media platforms utilizes a mix of human review and algorithms. Where algorithms are not debiased at the stage of design, they risk morphing into a weapon against those they intend to protect. Multiple reports have documented the removal of content and imagery produced by women, particularly those from minority groups, in the process of content moderation.[94]

The freedom of expression, the space for exposing injustice and human rights violations and the enjoyment of the right to privacy when communicating, online and offline, are preconditions for empowering women and girls to challenge stereotypes and patterns of discrimination and for effecting change[95]. Human rights law provides the most solid ground for regulating online spaces as it is a widely recognized set of rules on freedom of expression, right to privacy, and equality and non-discrimination. Compliance with human rights standards including in the use of digital technologies, advancing gender equality and equal rights of women and girls, and the protection of civic space are key areas of focus of the Secretary-General's Call to Action for Human Rights[96] as well as Our Common Agenda which highlights, as key areas of intervention, abiding by international law, including application of human rights online and to new technologies, placing women and girls at the centre, and improving digital cooperation[97]. Furthermore, the UN Guiding Principles on business and human rights provide a framework for States and business enterprises to systematically conduct human rights due diligence throughout the lifecycle of the technologies and systems that they design, develop, deploy, sell, obtain or operate, with particular attention paid to disproportionate impacts on, inter alia, women and girls[98].

92 Article 19. (2022), "The Global Expression Report 2022".
93 Jan Moolman, Hija Kamran and Erika Smith, "Women and girls' freedom of expression, voice, agency and participation in digital spaces and specific groups of women targeted online (WHRDs and activists, politicians and women in the public eye, journalists, etc.)", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
94 Office of the United Nations High Commissioner for Human Rights (OHCHR), "Interlinkages between women's rights and digital technologies, civic space, data and privacy, and freedom of expression", prepared for the Expert Group Meeting of the sixty-seventh session of the Commission on the Status of Women, 2022.
95 Ibid
96 The Call to Action for Human Rights highlights "Gender equality and equal rights for women", "Public participation and civic space" as key areas of intervention and include "the application of the human rights framework to the digital space" as an action to address new frontiers of human rights.
97 The Secretary General's "Our Common Agenda": www.un.org/en/common-agenda
98 See A/HRC/48/31; A/HRC/41/43

Conclusions and recommendations:

- **Apply Human rights law in regulating online spaces and ensure compliance with human rights standards** to protect and promote the rights of women and girls in the use of digital technologies, including freedom of expression, the right to privacy, and equality and non-discrimination, and the protection of civic space.

- **Systematically conduct human rights due diligence throughout the lifecycle of technologies and systems**, with particular attention paid to disproportionate impacts on, inter alia, women and girls.

- **Empower women and girls as agents of change in the design of safe spaces.** It is critical to encourage more women and girls to participate in the creation and governance of technology and online spaces, as well as to enter STEM fields. Private companies are urged to develop gender-responsive platform design in partnership with women's rights groups, women in the technology sector, and civil society organizations.

- **Educate women and girls, and men and boys, on online safety and online etiquette.** Education programmes should make use of innovative teaching methods, such as gamification for learning and online safety, and be made available to girls and boys from an early age. Private companies must ensure safety protocols are clear and easy to understand and enforce a zero-tolerance policy on incidents of OGBV including current digital spaces and emerging spaces such as the metaverse. Vulnerability surveys should be undertaken for new users, especially youths or people without much knowledge of social media.

- **Finance an operational framework which supports victims of OGBV** through helplines, front-line support workers, public education initiatives, and civil society organizations and develop specific support mechanisms to protect workers and activists leading such initiatives, including mental health care and strong security infrastructures so they don't become themselves targets of violence.

Women taking part in a technology and education programme supported by UN Women, Mexico.
Photo: UN Women/Dzilam Méndez

6c. Applying legal frameworks to address online gender-based violence

Much of the existing work to address OBGV has been fragmented, with an absence of normative standards and common vocabulary which explicitly captures the unique nature of gender-based violence in online spaces. Addressing OGBV can be particularly challenging since cases typically involve multiple victims, perpetrators and platforms across different jurisdictions.[99] The rapid evolution of emerging forms of OGBV further proliferates knowledge gaps and means governments struggle to keep pace with the latest technological developments.

There is a clear need for governments to implement appropriate criminal and civil legislation to address OGBV. In some jurisdictions, existing legislation can be effectively applied to incidents of OGBV, such as laws which prohibit harassment or impersonation. In other cases, legal frameworks need to be expanded and amended to ensure they account for the distinct specificities of online violence. For example, existing privacy laws may not be comprehensive enough to capture certain forms of online abuse, such as the practice of maliciously doxing personal information. Other regulation may be overly comprehensive or vague and inadvertently lead to content removal, undermining critical discussions including those around sexuality, gender and reproductive health. In other cases, the unprecedented scale, speed, and ease of online communication requires the administration of novel legal powers. In cases where personal information or intimate images have been distributed without consent, the swift removal of content is critical to limiting the associated harms. The introduction of fast-track legal processes, which circumvent lengthy court proceedings, would enable incidents such as these to be addressed without delay.[100]

The formulation of legislation in itself is not sufficient to guarantee true justice for victims of online and technology facilitated gender-based violence. To ensure online violations are properly handled, actors in the legal system require technological and gender sensitisation training to be able to comprehend and investigate reports. Many victims of offline gender-based violence report being discredited when reporting incidents to police and experiencing inappropriate discriminatory treatment during legal proceedings.[101] Addressing this systemic bias in the legal system is critical to ensuring just legal outcomes for victims of OGBV. Further, legal action should not always be the first resort, given that these processes are heavy, lengthy and expensive. Further, some victims from marginalized communities may have legitimate distrust in the effectiveness of the criminal justice system, due to a range of factors including pervasive discrimination against their communities by legal authorities, historic and ongoing police brutality, or the financial inaccessibility of legal remedies. Victims of OGBV should therefore benefit from access to alternative legal avenues, which do not require interaction with judicial authorities, such as administrative bodies or civil torts. For example, in Australia, the eSafety Commissioner provides an avenue for people to report incidents of non-consensual distribution of intimate images and other forms of online abuse to the eSafety Commissioner's office, which then helps the victim/survivor in a variety of ways, including getting the harmful content removed from the internet[102].

99 Op. cit. at 88.
100 Emily Laidlaw & Hilary Young, "Creating a Revenge Porn Tort for Canada", *Supreme Court Law Review* (2020)
101 Elaine Craig (2018), "Putting Trials on Trial: Sexual Assault and the Failure of the Legal Profession", Montreal: McGillQueen's University Press; Vrinda Bhandari & Anja Kovacs (2021) "What's Sex Got To Do with It?", Internet Democracy Project; United Nations, "India: Attacks against Woman Journalist Rana Ayyub Must Stop: UN Experts" (21 February 2022); Yvette Brend, "BC Revenge Website Sets of Torrent of Anger, Legal Concerns" CBC (20 February 2016).
102 See the eSafety Commissioner of Australia: https://www.esafety.gov.au/.

Conclusions and recommendations:

- **Develop a comprehensive definition of online and technology-facilitated gender-based violence** which reflects both the continuum of violence and the common root causes and which is victim and survivor-centred.

- **Strengthen the development and implementation of comprehensive legislation on OGBV** which is gender-responsive at its core, addresses the intersectional nature of OGBV and which focuses on redress over criminalisation. Train legal system actors in technological and gender-responsive frameworks to ensure they are equipped to treat incidents of OGBV.

- **Legislative reforms must foreground rights to bodily autonomy, self-determination and freedom of expression** and must not cite morality or obscenity as their basis. Governments are urged to respect and protect women's freedom of expression online and refrain from censoring online expression and content produced by women or minority groups.

- **Develop international methodological guidance for the collection of qualitative and quantitative data on OGBV, with minimum disaggregation categories.** Develop legislation for data human rights-based/ethics in business to impose accountability on private companies and re-democratize data so that individuals may gain access to their own data. Regulations on data should be formulated according to the sensitivity of the data, its origin and projected uses.

A woman taking part in a solar engineering training course, India.
Photo: UN Women/Gaganjit Singh

ANNEX I: List of Participants

CSW67 Expert Group Meeting
List of Participants

Group A: The Americas (10-11 October):

Co-Chairs:
1. **Caitlin Kraft-Buchman**, Co-Founder/Leader <A+> Alliance for Inclusive Algorithms, CEO/Founder Women At The Table
2. **Jamila Venturini**, Executive Director, Derechos Digitales
Background Paper Authors:
3. **Alison Gillwald,** Executive Director, Research ICT Africa
4. **Londa Schiebinger**, John L. Hinds Professor of History of Science; Director, Gendered Innovations in Science, Health & Medicine, Engineering, and Environment, Stanford University
Expert Paper Authors and Discussants:
Bridging the gender digital divide and ensuring gender responsive digital transformation
5. **Sonia Jorge**, Founder and Executive Director, Global Digital Inclusion Partnership (GDIP)
6. **Ursula Wynhoven**, ITU Representative to the UN, NY / Broadband Commission (observer)
7. **Discussant: Kathryn Townsend**, Director of Policy, World Wide Web Foundation
Addressing online and tech-facilitated gender-based violence and discrimination and protecting the rights of women and girls online
8. **Dhanaraj Thakur**, Research Director, Center for Democracy & Technology
9. **Suzie Dunn**, Assistant Professor at Dalhousie's Schulich School of Law
10. **Kathryn Travers**, Policy Specialist, Ending Violence Against Women and Girls, UN Women (observer)
11. **Discussant: Quinn McKew**, Executive Director, ARTICLE 19
Fostering gender transformative technology and innovation
12. **Lauren Klein**, Winship Distinguished Research Professor and Associate Professor, Emory University
13. **Brandeis Marshall**, Founder and CEO of DataedX Group
14. **Yasmin Bin-Humam**, Financial Sector Specialist, Consultative Group to Assist the Poor (CGAP)
15. **Diana Dezso**, Consultant, Consultative Group to Assist the Poor (CGAP)
16. **Elena Estavillo Flores,** CEO, Centro-i para la Sociedad del Futuro
17. **Discussant: Judith Mariscal**, Executive Director, Centro Latam Digital
Expert participants:
18. **Shirley Malcom**, Senior Advisor and Director, SEA Change, American Association for the Advancement of Science
19. **Valentina Munoz Rabanal**, UN advocate for the Sustainable Development Goals (SDGs), youth feminist activist and digital rights advocate.
20. **Luiza Drummond Veado**, Senior Program Officer - UN Program, OutRight Action International
21. **Vanessa Rhinesmith**, Executive Director, Centre for Race and Digital Justice, The University of California, Los Angeles (UCLA)
22. **Akina Younge**, Policy Director, Centre for Race and Digital Justice, The University of California, Los Angeles (UCLA)

Group B: Asia-Pacific, Middle East, Africa, Europe (12-13 October)

Co-Chairs:
1. **Mei Lin Fung**, Chair and Co-founder, People Centred Internet
2. **Nighat Dad**, Founder and Executive Director, Digital Rights Foundation
Background Paper Authors:
3. **Alison Gillwald** Executive Director, Research ICT Africa/ Prof University of Cape Town
Expert Paper Authors and Discussants:
Bridging the gender gap in digital access and skills
4. **Helani Galpaya,** Chief Executive Officer, LIRNEasia
5. **Milagros Sainz Ibañez**, Director of the Gender & ICT Research Programme, Universitat Oberta de Catalunya (UOC)
6. **Sobhi Tawil**, Director of Future of Learning and Innovation, UNESCO (observer)
7. **Sylvia Poll**, Head, Digital Society Division, ITU (observer)
8. **Discussant: Alice Abreu**, Professor Emerita of the Federal University of Rio de Janeiro (UFRJ)
Addressing online and tech-facilitated gender-based violence and discrimination and protecting the rights of women and girls online
9. **Elettra Ronchi**, Adjunct Lecturer to Science Po, School of Public Affairs, Paris
10. **Nyama Gusona Celestina Marvel**, Youth Envoy, ITU Generation Connect Africa
11. **Ian Makamara**, Youth Envoy, ITU Generation Connect Africa
12. **Jan Moolman**, Co-Manager, Women's Rights Programme, Association for Progressive Communications
13. **Hannah Wu**, Chief, Women's Rights and Gender Section, Office of the United Nations High Commissioner for Human Rights (OHCHR)(observer)
14. **Asha Allen**, Advocacy Director for Europe, Online Expression & Civic Space, Center for Democracy & Technology
15. **Discussant: Marwa Fatafta**, MENA Policy and Advocacy Manager, Access Now
Fostering inclusive innovation ecosystems
16. **Hilde Corneliussen** Research Professor, Leader for Gender, Diversity and Technology and Research leader for Technology and Society, Western Norway Research Institute (Vestlandsforsking)
17. **Anita Gurumurthy,** Executive Director, IT for Change
18. **Oumayma Raimi Rode**, Innovation Manager - Gender Equality Portfolio, UNICEF Global Office of Innovation (observer)
19. **Discussant: Jill Tang**, Co-founder, Ladies Who Tech
Ensuring gender responsive digital transformation
20. **Patrice Braun**, Adjunct Professor, Research and Innovation, Federation University Australia
21. **Sabina Dewan**, President and Executive Director, JustJobs Network
22. **Chidi King**, Chief, Gender, Equality, Diversity and Inclusion Branch (GEDI), ILO (observer)
23. **Discussant: Ayanna T. Samuels**, Aerospace Engineer, Technology Policy and Gender Equity Specialist

ANNEX II: List of papers prepared for the Expert Group Meeting

CSW67: Innovation and technological change, and education in the digital age for achieving gender equality and the empowerment of all women and girls

Background papers:

- **Background paper: Gendered nature of digital inequality: Evidence for policy considerations**
  – Alison Gillwald, Executive Director, Research ICT Africa network

- **Background paper: Harnessing technology and innovation to achieve gender equity and empower all women and girls**
  – Londa Schiebinger, John L. Hinds Professor of History of Science; Director, Gendered Innovations in Science, Health & Medicine, Engineering, and Environment, Stanford University

Expert and Observer Papers:

Sub-theme 1: The gender gap in digital access and skills

- **Expert paper: What policies do we need to make the internet affordable to all?**
  – Sonia Jorge, Founder and Executive Director, Global Digital Inclusion Partnership, and Nathalia Foditsch, Independent Policy Consultant

- **Expert paper: Gender and digital access gaps and barriers in Asia: But what about after access?**
  – Helani Galpaya, Chief Executive Officer, and Ayesha Zainudeen, Senior Research Manager, LIRNEasia

- **Expert paper: How to address stereotypes and practices limiting access to STEM-related education for women and girls**
  – Milagros Sáinz Ibáñez, Director of the Gender & ICT Research Programme, Universitat Oberta de Catalunya (UOC)

- **Observer paper: Education in the digital age for women and girls: Recommendations from the Transforming Education Summit**
  – The United Nations Educational, Scientific and Cultural Organization (UNESCO)

- **Observer paper: Universal and meaningful connectivity: Are the SDGs fit for purpose to report on progress for women and girls in technology? An approach for gender mainstreaming of the digital ecosystem**
  – The International Telecommunication Union (ITU / Broadband Commission)

Sub-theme 2: Inclusive innovation ecosystems and digital transformation

- **Expert pape: Building gender-transformative innovation ecosystems supporting women's entrepreneurship**
  – Patrice Braun, Adjunct Professor, Research and Innovation, Federation University Australia

- **Expert paper: Women, work, and digital platforms: Enabling better outcomes for women in the digital age**
  – Sabina Dewan, President and Executive Director, JustJobs Network

- **Expert paper: Innovation to tackle gender inequality: A back-to-basics roadmap**
  – Anita Gurumurthy, Executive Director, and Nandini Chami, IT for Change

- **Expert paper: Actions and solutions to facilitate women's careers in technology-driven work environments**
  – Hilde G. Corneliussen, Research Professor, Leader for the Gender, Diversity and Technology research group, Head of Research for Technology and Society, Western Norway Research Institute (Vestlandsforsking)

- **Observer paper: Preparing future generations of women for new jobs demands: skilling, re-skilling, digitalization and automation**
  – The International Labour Organization (ILO)

Sub-theme 3: Fostering Gender Transformative innovation and technology

- **Expert paper: A social justice framework for leveraging data science to advance gender equity**
  – Lauren Klein, Winship Distinguished Research Professor, Emory University, and Brandeis Marshall, Founder and CEO, DataedX Group

- **Expert paper: The gendered impacts of AI and frontier tech: Policies and safeguards to regulate new technologies, mitigate risks and protect rights**
  – Elettra Ronchi, Adjunct Lecturer to Science Po, School of Public Affairs, Paris; Eleonora Lamm, Advisor, Bioethics and Ethics of Science for Latin America, UNESCO Social and Human Sciences Sector; Gabriela Ramos, Assistant Director General, UNESCO Social and Human Sciences Sector; and Mariagrazia Squicciarini, Chief of Executive Office and Director a.i., UNESCO Social and Human Sciences Sector.

- **Expert paper: Driving digital financial transformation in support of SDG 5: Recent gains and remaining challenges**
  – Yasmin Bin-Humam, Financial Sector Specialist, and Diana Dezso, Consultant, Consultative Group to Assist the Poor (CGAP)

- **Expert paper: What mechanisms can ensure digital technologies favor inclusion and close gender gaps?**
  – Elena Estavillo Flores, Chief Executive Officer, Centro-i para la Sociedad del Futuro

- **Observer paper: Embedding gender in technology development to ensure that innovation meet the needs of women and girls**
  – The United Nations Children's Fund (UNICEF)

Sub-theme 4: Addressing online and tech-facilitated gender-based violence and discrimination and protecting the rights of women and girls online

- **Expert paper: Strengthening democracy and accountability and protecting women's rights in the digital era: The impacts of online gender-based violence and disinformation on women politicians in representative democracies**
  - Dhanaraj Thakur, Research Director, and Asha Allen, Advocacy Director for Europe, Online Expression & Civic Space, Center for Democracy & Technology

- **Expert paper: The effects of social media on girls: Keeping children safe, preventing abuse and cyber-bullying, and mental health issues**
  - Nyama Gusona Celestina Marvel, Youth Envoy, ITU Generation Connect Africa Youth Group, and Ian Makamara, Youth Envoy, ITU Generation Connect Africa Youth Group

- **Expert paper: Freedom of expression and participation in digital spaces**
  - Jan Moolman, Co-Manager, Women's Rights Programme, and Hija Kamran, WRP and Gender IT Coordinator, and Erika Smith, Take Back the Tech Campaign Coordinator, Association for Progressive Communications

- **Expert paper: Addressing Gaps and Limitations in Legal Frameworks and Law Enforcement on Technology-facilitated Gender-based Violence**
  - Suzie Dunn, Assistant Professor, Dalhousie's Schulich School of Law

- **Observer paper: Interlinkages between women's rights and digital technologies, civic space, data and privacy, and freedom of expression**
  - Office of the United Nations High Commissioner for Human Rights (OHCHR)

- **Observer paper: Recommendations on Online and ICT-facilitated Violence Against Women and Girls**
  - UN Women

Women taking part in a technology and education programme supported by UN Women, Mexico.
Photo: UN Women/Dzilam Méndez

ANNEX III: Programme of Work of the EGM

United Nations Commission on the Status of Women Sixty-seventh session (CSW67)

Innovation and technological change, and education in the digital age for achieving gender equality and the empowerment of all women and girls

Expert Group Meeting 10-13 October 2022 (virtual meeting)

Group A: Monday 10 October and Tuesday 11 October, 13:00-17:00 EST
Group B: Wednesday 12 October and Thursday 13 October, 10:00-14:00 CET

Programme of work

Group A **Monday 10 October and Tuesday 11 October, 13:00-17:00 EST**	
DAY 1: Monday, 10 October	
13:00 – 13:30	**Welcome and opening of the meeting:** • **Welcoming Remarks from UN Women:** Åsa Regnér, Deputy Executive Director for Policy, Programme, Civil Society and Intergovernmental Support • **Introduction to the objectives and programme of the Expert Group Meeting by the Co-Chairs:** – Caitlin Kraft-Buchman, Co-Founder/Leader <A+> Alliance for Inclusive Algorithms, CEO/Founder Women At The Table – Jamila Venturini, Executive Director, Derechos Digitales • **Tour de table: participants to briefly introduce themselves**
13:30 – 14:30	**Session 1: An overview of the key issues and areas for policy action – Presentation of the Background Papers** • **Assessing the gender dimensions of digital inequality for policy action** – Alison Gillwald, Executive Director, Research ICT Africa network • **Harnessing technology and innovation in the digital age to achieve gender equality and empower all women and girls** – Londa Schiebinger, John L. Hinds Professor of History of Science; Director, Gendered Innovations in Science, Health & Medicine, Engineering, and Environment, Stanford University *Q&A and discussion led by the Co-Chairs*

14:30 – 14:35	5-minute break
14:35 – 15:35	**Session 2: Bridging the gender digital divide and ensuring a gender responsive digital transformation** • **What policies do we need to make the internet affordable to all?** – Sonia Jorge, Founder and Executive Director, Global Digital Inclusion Partnership • **How to mainstream gender in digital policies and investments?** – Ursula Wynhoven, ITU Representative to the UN, NY/ Broadband Commission *Remarks from the discussant and plenary discussion on the key issues and recommendations to the CSW* – Discussant: Kathryn Townsend, Director of Policy, World Wide Web Foundation
15:35 – 15:40	5-minute break
15:40-17:00	**Session 3: Addressing online and tech-facilitated gender-based violence and discrimination and protecting the rights of women and girls online** • **Strengthening democracy and accountability and protecting women's rights in the digital era: The impacts of online GBV and disinformation on women politicians in representative democracies.** – Dhanaraj Thakur, Research Director, Center for Democracy & Technology • **Addressing gaps and limitations in legal frameworks on online VAWG, and in law enforcement, including on such issues as non-consensual distribution of intimate images, deepfakes, etc.** – Suzie Dunn, Assistant Professor, Dalhousie's Schulich School of Law • **Recommendations on Online and ICT-facilitated Violence Against Women and Girls** – Kathryn Travers, Policy Specialist, Ending Violence Against Women and Girls, UN Women *Remarks from the discussant and plenary discussion on the key issues and recommendations to the CSW* – Discussant: Quinn McKew, Executive Director, ARTICLE 19

Group A **DAY 2: Tuesday, 11 October**	
13:00 – 13:30	**Summary of key issues and policy recommendations from Day 1 from the Co-Chairs** – Feedback from participants
13:30 – 15:00	**Session 4: Fostering gender transformative technology and innovation** • **A Social Justice Framework for Leveraging Data Science to Advance Gender Equity** – Lauren Klein, Winship Distinguished Research Professor, Emory University, and Brandeis Marshall, Founder and CEO of DataedX Group • **Driving digital financial transformation in support of SDG 5: recent gains and remaining challenges.** – Yasmin Bin-Humam, Financial Sector Specialist, and Diana Dezso, Consultant, Consultative Group to Assist the Poor (CGAP) • **What mechanisms can ensure digital technologies favour inclusion and close gender gaps?** – Elena Estavillo Flores, Chief Executive Officer, Centro-i para la Sociedad del Futuro *Remarks from the discussant and plenary discussion on the key issues and recommendations to the CSW* – Discussant: Judith Mariscal, Executive Director, Centro Latam Digital

15:00-15:10	10-minute break
15:10 – 16:45	**Session 5: Articulating key messages and policy recommendations for the 67th Session of the Commission on the Status of Women – critical areas of concern, policy gaps, and key recommendations.** – Facilitated by the Co-Chairs
16:45 – 17:00	**Wrap up and closing** *by the Co-Chairs*

Group B **Wednesday 12 October and Thursday 13 October, 10:00-14:00 CET**	
DAY 1: Wednesday, 12 October	
10:00 – 10:30	**Welcome and opening of the meeting:** • **Welcoming Remarks from UN Women:** Åsa Regnér, Deputy Executive Director for Policy, Programme, Civil Society and Intergovernmental Support • **Introduction to the objectives and programme of the Expert Group Meeting by the Co-Chairs**: – Mei Lin Fung, Chair and Co-founder, People Centred Internet – Nighat Dad, Founder and Executive Director, Digital Rights Foundation • **Tour de table: participants to introduce themselves**
10:30 – 11:30	**Session 1: An overview of the key issues and areas for policy action** • **Assessing the gender dimensions of digital inequality for policy action -** Presentation of Background Paper 1 – Alison Gillwald, Executive Director, Research ICT Africa network • **Harnessing technology and innovation in the digital age to achieve gender equality and empower all women and girls** - Presentation of Background Paper 2 – Londa Schiebinger, John L. Hinds Professor of History of Science; Director, Gendered Innovations in Science, Health & Medicine, Engineering, and Environment, Stanford University (*video recording*) *Q&A and discussion led by the Co-Chairs*
11:30 – 11:35	5-minute break
11:35 – 12:45	**Session 2: Bridging the gender gap in digital access and skills** • **After Access: Gender and digital access gaps and barriers in Asia: But what about after access?** – Helani Galpaya, Chief Executive Officer, LIRNEasia • **Addressing stereotypes and practices limiting access to STEM-related education for women and girls.** – Milagros Sáinz Ibáñez, Director of the Gender & ICT Research Programme, Universitat Oberta de Catalunya (UOC) • **Education in the digital age for women and girls: recommendations from the Transforming Education Summit** – Sobhi Tawil, Director of Future of Learning and Innovation, UNESCO • **Defining and measuring universal and meaningful connectivity: are the SDGs fit for purpose to report on women and girls progress on gender and technology?** – Sylvia Poll, Head, Digital Society Division, International Telecommunications Union (ITU) *Remarks from the discussant and plenary discussion on the key issues and recommendations to the CSW* – Discussant: Alice Abreu, Professor Emerita of the Federal University of Rio de Janeiro (UFRJ)

12:45 – 12:50	5-minute break
12:50 – 14:00	**Session 3: Addressing online and tech-facilitated gender-based violence and discrimination and protecting the rights of women and girls online** • **The effects of social media on girls: keeping children safe, preventing abuse and cyber-bullying, and mental health issues.** – Nyama Gusona Celestina Marvel and Ian Makamara, Youth Envoys, ITU Generation Connect Africa Youth Group • **Women and girls' freedom of expression, voice, agency and participation in digital spaces and specific groups of women targeted online** – Jan Moolman, Co-Manager, Women's Rights Programme, Association for Progressive Communications • **The gendered impacts of AI and frontier tech: policies and safeguards to regulate new technologies, mitigate risks and protect rights** – Elettra Ronchi, Adjunct Lecturer to Science Po, School of Public Affairs, Paris. • **Interlinkages between women's rights and digital technologies, civic space, data and privacy, and freedom of expression** – Hannah Wu, Chief, Women's Rights and Gender Section, Office of the United Nations High Commissioner for Human Rights (OHCHR) *Remarks from the discussant and plenary discussion on the key issues and recommendations to the CSW* – Marwa Fatafta, MENA Policy and Advocacy Manager, Access Now

Group B **DAY 2: Thursday, 13 October**	
10:00 – 10:30	**Summary of key issues and policy recommendations from Day 1 from the Co-Chairs** – Feedback from participants
10:30 – 11:20	**Session 4: Fostering inclusive innovation ecosystems** • **Actions and solutions to facilitate women's careers in technology-driven work environments.** – Hilde G. Corneliussen, Research Professor, Leader for the Gender, Diversity and Technology research group, Head of Research for Technology and Society, Western Norway Research Institute (Vestlandsforsking) • **The role of governments and businesses in driving innovation that tackles gender inequality and narrows the gender digital divide.** – Anita Gurumurthy, Executive Director, IT for Change • **Embedding gender in technology development to ensure that innovation meets the needs of women and girls** – Oumayma Raimi Rode, Innovation Manager - Gender Equality Portfolio, UNICEF Global Office of Innovation (observer) *Remarks from the discussant and plenary discussion on the key issues and recommendations to the CSW* – Discussant: Jill Tang, Co-founder, Ladies Who Tech

11:20-11:25	5-minute break
11.25-12:15	**Session 5: Ensuring gender responsive digital transformation** • **Building gender-transformative innovation ecosystems supporting women's entrepreneurship.** – Patrice Braun, Adjunct Professor, Research and Innovation, Federation University Australia • **The future of work in the digital age: how to leverage digital technology to create higher-quality and gender-inclusive work for women in marginalized communities** – Sabina Dewan, President and Executive Director, JustJobs Network • **Preparing future generations of women for new jobs demands: skilling, re-skilling, digitalization and automation** – Chidi King, Chief, Gender, Equality, Diversity and Inclusion Branch (GEDI), ILO *Remarks from the discussant and plenary discussion on the key issues and recommendations to the CSW* • Discussant: Ayanna T. Samuels, Aerospace Engineer, Technology Policy and Gender Equity Specialist
12:15-12:30	15-minute break
12:30 – 13:50	**Session 6: Articulating key messages and policy recommendations for the 67th Session of the Commission on the Status of Women – critical areas of concern, policy gaps, and key recommendations.** – Facilitated by the Co-Chairs
13:50 – 14:00	**Wrap up and closing** *by the Co-Chairs*

Statisticians entering data into the database for further processing and analysis, Turkmenistan.
Photo: World Bank

Glossary of terms

The definitions provided in this paper are intended to support understanding of key concepts in the Report of the Expert Group Meeting in preparation for CSW67. The views expressed do not necessarily represent the views of the United Nations.

Affordability
In the context of the digital divide, affordability concerns the price of Internet and telecommunication devices and data, in relation to an individual's income and competing spending choices.[1] Internet access is deemed affordable when broadband access is available at a price that is less than two per cent of monthly GNI per capita.[2] It must be noted that women typically encounter more barriers to affordability than men, and in households where there are competing spending demands, men's access needs are likely to be prioritized.

AgriTech or AgTech
The application of digital technologies to increase agricultural production and productivity, such as the use of mobile technologies, remote-sensing services and distributed computing to improve smallholders' access to information, inputs and markets, streamline supply chains and reduce operational costs.[3]

Algorithm
A procedure or formula used to solve a problem, or a series of instructions which tell a computer how to transform a data set into useful information. Algorithms are used widely throughout all areas of information technology.[4]

Analog technology
Technologies which are non-digital or not computerized, such as landline telephones, photocopiers, and cassette tapes.[5]

Artificial intelligence (AI)
The ability of machines and systems to acquire and apply knowledge, and to carry out intelligent behavior.[6]

AI audit
An assessment process intended to uncover any risks to the rights and freedoms of individuals which may arise from AI adoptions, and to implement appropriate technical and organizational measures to mitigate these risks.[7]

Automation
The substitution of human input by machines, especially those which are digitally enabled.[8]

Biotechnologies
A set of enabling techniques to facilitate specific human-made changes in DNA or genetic material in plants, animals and microbial systems, with the purpose of building products and solutions.[9]

1 Adapted from ITU Definition of Affordability
2 Broadband Commission, 2025 Broadband Advocacy Targets, Target 2: https://www.broadbandcommission.org/advocacy-targets/2-affordability/
3 FAO Definition of Digital Agriculture: https://www.fao.org/digital-agriculture/en/
4 The Conversation (2020), What is an algorithm? How computers know what to do with data
5 Adapted from Merriam-Webster Dictionary and Howard, Shannon K., *Unplugging Popular Culture: Reconsidering Materiality, Analog Technology, and the Digital Native, 2018*
6 UNCTAD, Information Economy Report 2017, https://unctad.org/system/files/official-document/ier2017_en.pdf
7 Adapted from UK Information Commissioner's Office, *Guidance on the AI Auditing Framework*: https://ico.org.uk/media/2617219/guidance-on-the-ai-auditing-framework-draft-for-consultation.pdf
8 Adapted from Eurofound Definition of Automation
9 Adapted from UNDESA, Division for Sustainable Development, https://sustainabledevelopment.un.org/topics/biotechnology

Blended education

Blended learning involves a shift in traditional schooling methods and organization by taking advantage of the new technologies.[10]

Blockchain

Software composed of records of digital transactions which are grouped together into blocks of information and shared securely across computers on a shared network. Blocks are encrypted, ensuring information cannot be changed without it being detected.[11]

Blue economy

A concept which seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas.[12]

Care economy

The sum of all forms of care work, comprising both unpaid caregivers and care workers. Care work encompasses activities involved in meeting the physical, psychological and emotional needs of adults and children, old and young, frail and able-bodied. Care activities, whether paid or unpaid, are comprised of two broad types: direct, face-to-face, personal care activities, such as feeding a baby or helping an older person to take a bath; and indirect care activities, which do not entail face-to-face personal care, such as cleaning, cooking, and other household maintenance tasks which provide the preconditions for personal caregiving. These two types of care activities cannot be separated from each other, and they frequently overlap in practice, both in households and in institutions.[13]

Circular economy

Markets that incentivize reusing products, rather than scrapping them and then extracting new resources. In such an economy, all forms of waste, such as clothes, scrap metal, electronic waste and obsolete electronics, are returned to the economy or used more efficiently. This offers a way not only to protect the environment, but to use natural resources more wisely, develop new sectors, create jobs and develop new capabilities.[14]

Computational thinking skills

A set of competences which develop an individual's ability to leverage the concepts of computer science to formulate and solve everyday problems.[15] Computational thinking involves taking a complex problem and breaking it down into a series of small, more manageable problems (**decomposition**). Each of these smaller problems can then be looked at individually, considering how similar problems have been solved previously (**pattern recognition**) and focusing only on the important details, while ignoring irrelevant information (**abstraction**). Next, simple steps or rules to solve each of the smaller problems can be designed (**algorithms**). This helps present solutions in a way that a computer, a human, or both, can understand.[16]

Content moderation

The process by which Internet companies determine whether user-generated content meets the standards articulated in their terms of service and other regulations.[17]

Data governance

A system of rights and accountabilities for information-related processes, which govern the use, accessibility and transparency of data information.[18]

10 UNESCO International Bureau of Education Definition of Blended Learning: http://www.ibe.unesco.org/en/glossary-curriculum-terminology/b/blended-learning
11 Adapted from the UN Office of Information and Communications Technology (2018), Blockchain – What Does it Mean for the UN?
12 UNESCO Intergovernmental Oceanographic Commission Definition of the Blue Economy: https://ioc.unesco.org/topics/blue-economy
13 ILO (2018), Care Work and Care Jobs for the Future of Decent Work, https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_633135.pdf Definition of the Care Economy: https://www.ilo.org/global/topics/care-economy/lang--en/index.htm
14 Adapted from UNCTAD Definition of the Circular Economy: https://unctad.org/topic/trade-and-environment/circular-economy#:~:text=A%20circular%20economy%20entails%20markets,economy%20or%20used%20more%20efficiently
15 Adapted from the European Commission, The Computational Thinking Study, https://joint-research-centre.ec.europa.eu/computational-thinking-study_en
16 Adapted from https://www.bbc.co.uk/bitesize/guides/zp92mp3/revision/1
17 Adapted from the Human Rights Council, Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression, A/HRC/38/35
18 Adapted from The Data Governance Institute Definition of Data Governance

De-platform
The action or practice by a social media company to permanently delete or ban a user from the associated platform.[19]

Digital
An entity which is connected to the Internet, runs with the help of software, or is accessed by an electronic device such as a computer, a tablet or a mobile phone.[20]

Digital age
The present time, in which many processes are performed by computers and large amounts of information can be accessed instantaneously by virtue of computer technology.[21]

Digital citizenship
Competences which allow individuals to access, understand, analyze, produce and use the digital environment in a critical, ethical and creative way.[22]

Digital content
Data which is produced and supplied in digital form, for example video files, audio files, applications, digital games and any other software.[23]

Digital economy
The changing patterns of production and consumption brought about by digital technologies. The different economic facets of the digital economy can be broken down into three broad components: foundational aspects of the digital economy, such as fundamental innovations, core technologies and enabling infrastructures; digital and information technology sectors, such as digital platforms, mobile applications and payment services, which are making a growing contribution to economies; and a wider set of digitalizing and digitally enabled sectors, in which new activities or business models have emerged and are being transformed as a result of digital technologies, such as e-commerce.[24]

Digital extension services
The application of digital tools to facilitate the dissemination of knowledge and information for the purpose of improving agricultural supply chain management.[25]

Digital financial services
Money and asset services which are accessed and delivered through digital channels, including payments, credit, savings, remittances and insurance.[26]

Digital government or e-government
The use of novel information and communication technologies by governments with the objective of optimizing their functions, operations and services.[27]

Digital infrastructure
The physical resources which enable shared software-based services, for people, businesses, and public authorities, to be delivered electronically or over the Internet.[28]

Digitalization
The ongoing integration of digital technologies and digitized data across economies and society.[29]

Digital learning/E-learning
All forms of electronically supported teaching and learning, especially the web-based and computer-based acquisition of, and engagement with, knowledge and skills. Digital learning or e-learning may take place in or out of the classroom, may involve virtual learning

19 Adapted from a US Supreme Court Case, 2022, Definition of De-platform, p.10 line 4 https://www.supremecourt.gov/DocketPDF/21/21A720/226023/20220523140514745_Notice%20of%20Supplemental%20Authority.pdf
20 Adapted from Sax, David, *The Revenge of Analog*, 2018
21 Adapted from Redshaw, T., *What is digital society? Reflections on the aims and purpose of digital sociology, 2020*
22 UNESCO (2020), Digital citizenship as a public policy in education in Latin America, https://unesdoc.unesco.org/ark:/48223/pf0000376935_eng
23 Adapted from the *Proposal for a Directive of the European Parliament and of the Council on certain aspects concerning contracts for the supply of digital content*, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52015PC0634
24 UNCTAD (2020), Manual for the Production of Statistics on the Digital Economy , https://unctad.org/system/files/information-document/210319_UNCTAD_StatisticsManual_WEB.pdf
25 Naika, Mahantesha BN, et al., *Digital extension service: Quick way to deliver agricultural information to the farmers.*, 2021
26 ITU, Digital Financial Servies: A Case of Malawi, https://www.itu.int/en/ITU-D/Capacity-Building/Documents/IG_workshop_August2018/Presentations/Session8_LindaKambale.pdf
27 Adapted from OECD Glossary of Statistical Terms Definition of Digital Government
28 Adapted from European Commission Definition of Digital Infrastructure
29 Adapted from Eurofound Definition of Digitalisation

environments, and is often an essential component of distant education.[30]

Digital literacy
The ability to leverage technological concepts, methods and skills to be able to use and exploit information and communication technologies.[31]

Digital platforms
Software-based facilities which enable multisided interactions between providers and users of content, goods and services.[32]

Digital revolution
The transformative changes brought about by a fusion of technologies, such as artificial intelligence, gene editing and advanced robotics, which are blurring the lines between the physical, digital and biological worlds. The Fourth Industrial Revolution is of a scale, speed and complexity which is unprecedented, disrupting nearly every industry and creating new opportunities and challenges for people, places and businesses.[33]

Digital services
Any service provided on the Internet or another electronic network.[34]

Digital skills
The ability to use information and communication technologies to achieve beneficial, high-quality outcomes in one's everyday life.[35]

Digital technologies
Electronic tools, systems, devices and resources which generate, store or process data, including the infrastructure, devices, media, online services and platforms used for communication, information, documentation, networking and identity needs.[36]

Digital transformation
The use of new digital technologies, such as mobile technology, analytics, or embedded devices, to enable major business or organizational improvements, including streamlined operations, enhanced customer experiences, or new business models.[37]

Disinformation
False information which is intentionally designed to be deceptive and which often has a political or social goal, including undermining public trust in democratic institutions.[38]

Doxing
The non-consensual, public release of an individual's private, personal, or sensitive information, such as home and email addresses, phone numbers, or employer and family member's contact information, with the purpose of causing physical harm.[39]

E-commerce
The sale or purchase of goods or services which is conducted over an electronic or computer network.[40]

Edtech
The study and practice of facilitating learning and improving performance through the use of technological resources and processes.[41]

E-health
The application of digital technologies and health innovation to accelerate global attainment of health and well-being, such as electronic medical records, consumer health informatics, and telemedicine (the

30 UNESCO International Bureau of Education Definition of E-learning: http://www.ibe.unesco.org/en/glossary-curriculum-terminology/e/e-learning
31 ITU, Global World Telecommunication Development Report 2010: Monitoring the WSIS Targets, https://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-WTDR-2010-SUM-PDF-E.pdf
32 European Commission Definition of Digital Platforms
33 Adapted from UK Department for Business, Energy and Industrial Strategy, *Regulation for the Fourth Industrial Revolution, 2019*
34 Adapted from UN Model Tax Convention, Article 12B, paragraph 5, https://www.un.org/development/desa/financing/document/article-12b-un-model-tax-convention-agreed-committee-its-22nd-session
35 ITU (2018), Measuring the Information Society, https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2018/MISR-2018-Vol-1-E.pdf
36 Adapted from Victoria State Government Definition of Digital Technologies
37 Fitzgerald, Michael, et al., *Embracing digital technology: A new strategic imperative,2013*
38 See, Jack, C. *Lexicon of lies: Terms for problematic information, 2017*
39 Eckert, S. and Metzger-Riftkin, J., *Doxxing. The International Encyclopedia of Gender, Media, and Communication, 2020*
40 OECD Glossary of Statistical Terms Definition of E-Commerce
41 Association for Educational Communications and Technology, Educational technology: a definition with commentary, 2009

delivery of healthcare remotely using information and telecommunication technologies).[42]

E-trade

The digitally enabled transaction of trade in goods and services involving consumers, companies, and governments.[43]

FemTech

Software, diagnostics, products, and services which use technology to support women's health, including menstrual health, reproductive health, sexual health, maternal health and menopause.[44]

Gender digital divide

The disparity between women and men and girls and boys in relation to digital adoption and their relative opportunities to access, use and benefit from digital technology.[45]

Gender impact assessment

The evaluation, analysis or assessment of a law, policy or programme, prior to its implementation, that makes it possible to identify, in a preventative way, the likelihood of a given decision having negative consequences for the state of equality between women and men.[46]

Gender mainstreaming

The process of assessing the implications for women and men of any planned action, including legislation, policies or programs, in all areas and at all levels. It is a way to make women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programs in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated.[47]

Gender transformative

An approach or process which shifts unequal gender relations to promote shared power, control of resources, decision-making, and support for women's empowerment.[48]

Generation Equality Forum

The 2021 Generation Equality Forum marked the 25th anniversary of the Beijing Declaration and Platform for Action, a visionary agenda for the empowerment of women which was adopted at the 1995 Fourth United Nations World Conference on Women in Beijing. The Generation Equality Forum initiated a 5-year programme of work to accelerate progress on global gender equality, driven by six innovative, multi-stakeholder Action Coalitions, which have secured multiple financial, policy and programme commitments to drive progress across the most critical areas of women's empowerment.[49]

Generation Equality Action Coalition on Innovation and Technology for Gender Equality

The Action Coalition on Technology and Innovation is one of the six Action Coalitions as part of the Generation Equality Forum. The Action Coalition convenes leaders from civil society, governments, private sector, philanthropy and inter-governmental agencies to deliver catalytic, scalable and measurable action in pursuit of a gender-equal digital future.[50]

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42 Adapted from WHO Definition of Digital Health
43 Adapted from OECD Definition of Digital Trade
44 Adapted from Faubion, S., *Femtech and midlife women's health: good, bad, or ugly?,2021*
45 Adapted from UN Women (2021), Addressing the digital gender divide in Africa through the African Girls Can Code Initiative: https://www.unwomen.org/en/news/stories/2021/10/feature-addressing-the-digital-gender-divide-in-africa
46 Adapted from the European Institute for Gender Equality Definition of Gender Impact Assessment: https://eige.europa.eu/gender-mainstreaming/toolkits/gender-impact-assessment/what-gender-impact-assessment#:~:text=Gender%20impact%20assessment%20has%20been,equality%20between%20women%20and%20men
47 Adapted from UN Women Gender Equality Glossary, https://trainingcentre.unwomen.org/mod/glossary/view.php?id=36&mode=letter&hook=G&sortkey&sortorder&fullsearch=0&page=1
48 Adapted from UN Women Gender Equality Glossary, https://trainingcentre.unwomen.org/mod/glossary/view.php?id=36&mode=letter&hook=G&sortkey&sortorder&fullsearch=0&page=2
49 https://forum.generationequality.org/home
50 https://techforgenerationequality.org/about/#:~:text=We%20are%20a%20group%20of,join%20us%20in%20this%20commitment

Gig economy
A labor market in which individuals use digital platforms to negotiate discrete short-term or freelance work directly with customers and clients, as opposed to a permanent contract.[51]

Global Digital Compact
The Secretary General's 2021 Report "Our Common Agenda" proposed a Global Digital Compact to be agreed at the Summit of the Future in 2024. Through a multi-stakeholder technology track, the Global Digital Compact is intended to outline shared principles for an open, free and secure digital future for all and is expected to cover issues relating to digital connectivity, the application of human rights online, and the introduction of accountability criteria for discrimination and misleading content, among others. [52]

Green economy
An economic model which results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.[53]

Hate speech
Any kind of communication in speech, writing or behavior, that attacks or uses pejorative or discriminatory language with reference to a person or a group on the basis of who they are, in other words, based on their religion, ethnicity, nationality, race, color, descent, gender or other identity factor.[54] **Sexist hate speech** relates to expressions which spread, incite, promote or justify hatred based on sex.[55]

Human rights-based approach
An approach which aims to support better and more sustainable development outcomes by analyzing and addressing the inequalities, discriminatory practices and unjust power relations which are often at the heart of development problems. Under a human rights-based approach, development efforts are anchored in a system of rights and corresponding State obligations established by international law. Civil, cultural, economic, political and social rights provide a guiding framework for development plans, policies and processes.[56] In the context of information and communication technologies, a human rights-based approach is one which also embeds safety-by-design and privacy-by-design.

Hybrid learning
The educational model in which some students attend class in-person while others join the class virtually, or where each student undertakes a mix of in-person and online learning. Educators tend to view hybrid learning in terms of three different dimensions: learning environment, learning experiences and learning management.[57]

Innovation
From a development perspective, an innovation is a new solution with the transformative ability to accelerate impact. Innovation may be fueled by science and technology, entail improved ways of working with new and diverse partners, or involve new social and business models, behavioral insights, or path-breaking improvements in delivering essential services and products.[58]

Innovation ecosystems
An interconnected networks of actors, including governments, companies, universities, start-up incubators and accelerators, financial institutions, foundations, media, entrepreneurs and civil society, who work cooperatively and competitively to develop new products and services. In innovation ecosystems, each actor plays a role in creating value and generating an active flow of information sharing, knowledge transfer and investments.[59]

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51 Adapted from Brinkley, Ian, *In Search of the Gig Economy, 2016*
52 https://www.un.org/techenvoy/global-digital-compact
53 UNEP Definition of Green Economy
54 United Nations, Understanding Hate Speech, https://www.un.org/en/hate-speech/understanding-hate-speech/what-is-hate-speech
55 Council of Europe, Combatting Sexist Hate Speech, https://www.coe.int/en/web/genderequality/sexist-hate-speech
56 OHCHR, A Human Rights Based Approach to Health, https://www.ohchr.org/sites/default/files/Documents/Issues/ESCR/Health/HRBA_HealthInformationSheet.pdf
57 UNESCO (2021), Developing a Hybrid Learning Curriculum Framework for Schools: https://unesdoc.unesco.org/ark:/48223/pf0000377482
58 Adapted from the International Development Innovation Alliance (2018),Toward Bridging Gender Equality & Innovation, https://www.idiainnovation.org/resources/toward-bridging-gender-equality-innovation
59 Braun, Patrice, Expert paper prepared for the Expert Group Meeting in preparation for the 67th session of the Commission on the Status of Women (CSW67)

Internet of Things

An open and comprehensive network of intelligent objects, connected over the Internet or other communication networks, which have the capacity to auto-organize, share information, data and resources, and react in the face of environmental changes. [60][61]Examples include self-driving cars, wearable fitness trackers, and biometric security systems.

Machine learning

A branch of artificial intelligence, founded on the ability of machines to learn by themselves and to imitate human behavior. Examples include facial recognition and speech recognition technologies.[62]

Marginalized community

A group of individuals excluded from full participation in social, economic and political life and subject to acute and persistent disadvantage which is rooted in underlying social inequalities. [63]

Meaningful access

One's ability to have meaningful connectivity (see definition below), together with affordable access and a supportive social environment which facilitates women's and men's full ability and agency in their use of the Internet.[64]

Meaningful connectivity

One's ability to have daily access to the Internet with an appropriate device, enough data and a fast connection.[65]

Misinformation

Misinformation is incorrect or misleading information. In contrast to disinformation, misinformation is not necessarily created or shared to create harm and the individual who shares it may not even be aware it is false.[66]

Online and Offline

Offline means not connected to or served by a computer or telecommunications system, such as the Internet. Online refers to the contrary, and something available or done while connected to such a system (such as online shopping, online games).[67]

Online and technology-facilitated gender-based violence

Any act of gender-based violence against women that is committed, assisted or aggravated in part or fully by the use of information and communication technologies, such as mobile phones and smartphones, the Internet, social media platforms or email, against a woman because she is a woman, or which affects women disproportionately. [68]

Our Common Agenda

On the occasion of the United Nations' 75th anniversary in September 2020, the Secretary-General released his 'Our Common Agenda' report, which looks ahead to the next 25 years and represents his vision on the future of global cooperation, calling for inclusive, networked, and effective multilateralism to better respond to humanity's most pressing challenges. The Common Agenda proposes a Global Digital Compact to be agreed at the Summit of the Future in September 2024.[69]

Platform economy

A digital ecosystem within which dispersed networks of actors (workers, customers and related supporting service providers) interact, collaborate and co-create value for each other. In the platform economy, platforms connect consumers with demand to workers who are able to provide supply.[70] An important component of the platform economy are digital labour platforms, which include both web-based platforms, where work is outsourced through an open call to a

60 Madakam, S., Ramaswamy, R. and Tripathi, S., *Internet of Things (IoT): A Literature Review, 2015*
61 Madakam, S., Ramaswamy, R. and Tripathi, S., *Internet of Things (IoT): A Literature Review, 2015*
62 Adapted from the European Centre for the Promotion of Imports Definition of Machine Learning
63 Tenth Meeting of the Working Group on Education for All (2009), Concept paper on Marginalization.
64 Jorge, Sonia and Foditsch, Nathalia, Expert paper prepared for the Expert Group Meeting in preparation for the 67th session of the Commission on the Status of Women (CSW67)
65 Jorge, Sonia and Foditsch, Nathalia, Expert paper prepared for the Expert Group Meeting in preparation for the 67th session of the Commission on the Status of Women (CSW67)
66 Thakur, Dhanaraj and Allen, Asha, Expert paper prepared for the Expert Group Meeting in preparation for the 67th session of the Commission on the Status of Women (CSW67)
67 Adapted from Merriam Webster
68 Human Rights Council, (2018) Report of the Special Rapporteur on violence against women, its causes and consequences on online violence against women and girls from a human rights perspective* A/HRC/38/47
69 https://www.un.org/techenvoy/global-digital-compact
70 Adapted from Dufva, Mikko, Koivisto, Raija,Ilmola-Sheppard, Leena and Junno, Seija, *Anticipating Alternative Futures for the Platform Economy, 2017*

geographically dispersed crowd, known as "crowdwork", and location-based applications, which allocate work to individuals in a specific geographical area, typically to perform local, service-oriented tasks such as driving, running errands or cleaning houses.[71] Workers affiliated with platforms are considered to be in informal employment, which means they are beyond the purview of welfare benefits, labor protections and entitlements.[72]

Public digital innovation
The use of digital technologies and applications to optimize processes and procedures of public services.[73]

Secretary-General's Roadmap for Digital Cooperation
Based on recommendations from the Secretary-General's High-Level Panel for Digital Cooperation, the Secretary-General's Roadmap for Digital Cooperation outlines recommendations for a safer, more equitable digital world, encompassing universal connectivity, the promotion of digital public goods, and the protection of human rights in the digital era.[74]

Sex-disaggregated data
Data which is cross classified by sex, and which presents information separately for men and women, boys and girls. Sex-disaggregated data is necessary for effective gender analysis, as it is more difficult to identify real and potential inequalities in its absence.[75]

Social media
A collective term for websites and applications which focus on Internet-based communication, community-based input, interaction, content-sharing and collaboration. Forums, microblogging, social networking, social bookmarking, social curation and wikis (websites which allow users to edit or revise their content) are among the different types of social media which allow quick electronic communication of content to users.[76]

Socio-technical infrastructure
An approach to organizational work design which applies an understanding of social structures and community aspects to inform the design of workplaces, systems and spaces where people and technology interact.[77]

Technology
The application of scientific knowledge to the practical aims of human life, including the conversion of resources into outputs.[78]

Technology company
Technology companies encompass hardware manufacturing services, telecommunications services and information technology services, such as software applications, data centers, cloud computing and platform services.[79]

Universal Service and Access Funds
A public funding mechanism used in many countries which is designed to ensure telecommunications services are accessible, at affordable prices, to all individuals and communities. Universal Service and Access Funds are typically financed through contributions from telecom operators, in the form of a percentage of gross revenues. They usually operate by creating an entity which collects mandatory contributions and then reallocates them by making targeted investments and subsidies for projects in rural and remote locations, as well as underserved parts of the population. [80]

71 ILO Definition of Digital Labour Platforms: https://www.ilo.org/global/topics/non-standard-employment/crowd-work/lang--en/index.htm
72 Dewan, S. (2022). Digitalisation and the Indian Labour Market Trends, Challenges, and Opportunities. Forthcoming. Deutsche Gesellschaft für Internationale Zusammenarbeit.
73 Hong, Sounman, *Determinants of Digital Innovation in the Public Sector, 2022*
74 https://www.un.org/en/content/digital-cooperation-roadmap/
75 UNICEF, UNFPA, UNDP, UN Women. "Gender Equality, UN Coherence and You", ECOSOC agreed conclusions 1997/2; UNESCO Gender Mainstreaming Implementation Framework for 2002-2007, https://unesdoc.unesco.org/ark:/48223/pf0000131854
76 Adapted from GBV AoR Helpdesk (2022), Learning Series on Technology-Facilitated Gender-Based Violence. Learning Brief 3: Implications of technology-facilitated GBV and actions for humanitarian agencies, donors and online industries.
77 Adapted from Interaction Design Foundation Definition of Socio-Technical Systems
78 Adapted from OECD Glossary of Statistical terms Definition of Technology
79 Adapted from World Benchmarking Alliance, Digital Inclusion Benchmark 2021, https://www.worldbenchmarkingalliance.org/digital-inclusion-benchmark/
80 Adapted from Alliance for Affordable Internet (2022), Universal Service and Access Funds in Latin America and the Caribbean, https://a4ai.org/wp-content/uploads/2022/01/USAF-Report-English.pdf

Summaries of background papers, expert papers, and information papers

Background papers

Gendered nature of digital inequality: Evidence for policy considerations

Alison Gillwald, Executive Director, and Andrew Partridge, Research ICT Africa network

Summary of text:
Despite gender and digitalization being priority issues on the global agenda, there is a significant lack of gender-disaggregated data for evidence-based digital policy formulation, without which there is little way of tracking progress on the Sustainable Development Goals and their ICT sub-targets. Much of the data which does exist is poor in terms of accuracy and granularity, resulting in inaccurate data which may be even more harmful than an absence of data.

Despite a reduction in access-related gender inequalities as more people come online, women still access the Internet at a lower rate than men, and women users remain more likely to harness the Internet for social and communicative purposes and less so for 'productive' purposes, such as working from home, online business activities, platform work and human capital development. The Research ICT Africa After Access survey in 2018 found that when a small business is owned by a woman, it reduces the probability of the enterprise using the Internet by six percent. The limited data available indicates a similar pattern in the case of girls, who are less likely than boys to own a mobile phone, use the Internet or access information .

A lack of application of the standard definitions for ICT indicators and methodologies for ICT data collection developed by the UN agency responsible for the collection of ICT indicators, the International Telecommunications Uni on (ITU) and the need to conduct resource intensive demand side survey in order to be able to collect data in the predominantly pre-paid mobile markets in global South, has contributed to the dearth of sex-disaggregated data globally. This is compounded by the fact that country data provided to the ITU by developing countries is often limited and outdated. The collection of both qualitative and quantitative research data is critical to effective policy formulation. Similarly, the heterogeneity of women across different country settings and demographics must be understood and accounted for to identify the precise and multiple points of policy intervention required.

Key recommendations:

- To increase Internet usage among poor women, States should create enabling environments for the private and public delivery of digital public goods through low-risk policy experimentation, the crowding-in of productive private and community resources, and low regulatory transaction cost models which utilize unused spectrum, particularly in rural areas, and in resource allocation to the creation of digital commons .

- Impacted people and communities must be actively included in all processes of policy formulation, regulation and governance to ensure more equitable digital and data outcomes.

- Policies intended at reducing digital inequality must be transversal to account for the cross-cutting nature of digitalization. New policy proposals must undergo gender impact assessments to ensure they do not reinforce and perpetuate existing inequalities.

- Policy interventions should positively discriminate in favour of those who are at the intersections of multiple inequalities and most marginalized from the digital economy and society.. For example, subsidies and digital skills training programmes could be targeted towards women-owned microbusinesses.
- Global digital solidarity funding framework should be established to ensure the collection of digital statistics as public goods to inform evidence-based policy and global governance of digital public goods such as the Internet, data and cybersecurity.

Harnessing technology and innovation to achieve gender equity and empower all women and girls

Londa Schiebinger, John L. Hinds Professor of History of Science; Director, Gendered Innovations in Science, Health & Medicine, Engineering, and Environment, Stanford University

Summary of text:
Gender norms shape technologies, and technologies, in turn, shape gender and other social norms. Technology often reinforces vicious cycles where existing inequalities are amplified and perpetuated into the future. It is possible to break these cycles of inequality by integrating sex, gender, and intersectional analysis into technology research and design from its inception.

Gender distortions are built, sometime invisibly, into basic technologies. In mechanical engineering, design standards which are based on non-inclusive samples can have damaging material consequences. For example, current automotive technologies perpetuate a cycle of discrimination and injury to people who do not fit the profile of a mid-sized white male, with women 47% more likely to sustain serious injuries in automobile accidents than men. Historic and real-time bias built into AI, machine learning and robotics can similarly augment cycles of discrimination. For example, in Google Search, men are five times more likely than women to be offered ads for high-paying executive jobs, since the Google search algorithm returns advertisements for jobs based on the historic gender pay gap.

Sex, gender, and intersectional factors influence all stages of research. When the many axes of discrimination are considered and delineated from the outset, many harms can be avoided. In scientific disciplines, authors from minority groups tend to publish on research topics which reflect their social identities. This shows that the inclusion of women and minority groups in technology research and design is critical to ensuring the sector equitably serves society.

Technology can be leveraged to promote women's voice, agency, and participation. FemTech encompasses software, diagnostics, products, and services which use technology to support women's health. The myriad benefits of FemTech are gradually emerging, among them, improved treatments for women and greater gender equity in the healthcare system.

Key recommendations:

- Universities, industries, and peer-reviewed journals and conferences should implement ethics reviews of ongoing research and new technologies which encompass gender. Similarly, granting agencies should require applicants to explain how sex, gender, and intersectional analysis is relevant to their proposed research.

- Universities and research institutions should integrate knowledge of sex, gender, and intersectional analysis into core engineering and computer science curricula.

- An index for social equity and environmental sustainability should be developed for industry. While many industries have cultivated inclusive workforces, this must be expanded so that their products, services, and infrastructures are evaluated for social equity and environmental sustainability.

- Governmental and non-governmental organizations should address 'period poverty', including the exemption of these products from taxation and promoting the production and use of sustainable products.

Sub-theme 1: The gender gap in digital access and skills

What policies do we need to make the internet affordable to all?

Sonia Jorge, Executive Director, Global Digital Inclusion Partnership (GDIP), and Nathalia Foditsch, International Policy Consultant

Summary of text:
Binary definitions of online and offline are still used frequently at international and national levels. Such definitions of basic Internet are misleading. Access to the Internet depends not only on having meaningful connectivity, but also on having affordable access and a supportive social environment which facilitates women and men's full agency and abilities in their use of the Internet. The minimum threshold for meaningful connectivity alone requires sufficient Internet speed, the ability to connect with enough data at any time, and ownership of an appropriate device.

The gender gap in meaningful connectivity means that women are less likely to pursue education, schedule health appointments, or use online public services, among other barriers. Gaps in literacy and skills also sideline women from fully enjoying the range of opportunities provided by the Internet and digital services. The digital opportunity of rural women is particularly constrained, since they face both gender-based barriers as well as rural limitations.

As noted by the A4AI Cost of Exclusion Report: "Women already achieve incredible things in the digital economy. However, their experiences as content creators and entrepreneurs are more an exception than part of everyday life. Those who have been early leaders in their fields have been left vulnerable to scams and abuse. Millions have been left behind without sufficient support to access the internet, know how it works, or realize their full potential in using it. If governments want to see a digital economy as a core engine to a post-Covid recovery, they must invest in gender-equitable foundations to include everyone."

Key recommendations:

- Governments should develop a Digital Strategy with gender-specific targets, which is time-bound, subject to continuous monitoring and evaluation and which engages women and gender experts in the processes of policy design.

- Governments should be intentional in creating policies and programs which facilitate access for women, including subsidizing smartphones and laptop devices, and incentivizing operators to establish differentiated pricing arrangements and reduced tariff data plans.

- Universal Access and Service Funds (USAF) and other permanent funds should be directed to projects aligned with closing the gender digital divide, such as digital skills training programs or community connectivity infrastructure projects. Almost 38 percent of low- and middle-income countries do not have a USAF, and when they do, they are largely under-utilized.

Gender and digital access gaps and barriers in Asia: But what about after access?

Helani Galpaya, Chief Executive Officer, and Ayesha Zainudeen, Senior Research Manager, LIRNEasia

Summary of text:
There is a consistent gender gap in technology adoption and use, across mobile phone ownership, Internet use, social media use, and digital skills, among other indicators. In several Asian countries, the key reason cited for women's digital exclusion is simply a lack of awareness of what the Internet is. Low levels of education and income, as well as gendered social norms, are also key to maintaining gender disparities.

Understanding the intrinsic role of gendered social norms in maintaining barriers to access requires context-specific understanding of the respective country or population to which it applies. In Pakistan, the gender disparity in access could be reflective of social norms which limit women's mobility, their role in household decisions, and their involvement in spending decisions. This can even be reflective of women's own conscious decisions to limit their use, in order to ensure safety and minimize additional disruptions in their daily lives. Conversely, qualitative research has shown that, according to social norms, women in Myanmar in fact play a central role in financial decisions in the household; however, due to affordability constraints in a newly liberalized economy, male household members are automatically prioritized since they are more likely to leave the house for work or study.

Access to a device and a connection alone are not sufficient to meaningfully transform the lives of women and girls. Ensuring women are aware of the range of possibilities for working, earning, and learning through technology is crucial to progress. A further prerequisite for women's economic and social empowerment is the necessary digital knowledge, such as an understanding of how to set up and manage a social media business page or an online freelancing account. In an environment where services and demand are constantly evolving, the need for continuous upskilling and reskilling is particularly challenging for women, who experience greater time poverty. These constraints are compounded by illiteracy and confidence gaps, which place women at greater risk of digital threats.

Women without digital skills tend to lack the confidence required to use the Internet, with some restricting their mobile use to so-called 'application islands' due to the inability to adapt and apply skills to new applications. Often this is limited to social media. Women are also likely to rely on friends and family, who may have limited skills themselves, to teach them how to use mobile applications and services.

Key recommendations:

- There is a clear need to move beyond the focus on access and ensure that women are equipped with the knowledge, awareness and skills to leverage connectivity for their economic and social empowerment.

- Comparable gender-disaggregated data must be continually collected to monitor progress on primary indicators such as access and ownership, as well as on secondary level indicators such as digital skills. This work must encompass qualitative research for greater context-specific insight and take account of the special status of vulnerable groups of women to prevent further marginalization.

How to address stereotypes and practices limiting access to STEM-related education for women and girls

Milagros Sáinz Ibáñez, Director of the Gender & ICT Research Programme, Universitat Oberta de Catalunya (UOC)

Summary of text:
Paradoxically, contemporary research has identified that in more egalitarian countries, such as Norway or Finland, fewer women participate in STEM fields. Conversely, in countries where gender equality policies are less advanced, such as India, better levels of female participation in STEM fields can be observed. In the world's most developed countries, individuals tend to use self-expressive value systems of their occupational decisions in terms of motivation and interest. On the contrary, in countries with lower rates of equality, women justify their choice of STEM studies based on its ability to grant them economic autonomy.

The afore-mentioned pattern of underrepresentation in STEM has several implications, including the risk that technological products and services do not meet the needs and demands of women. There is also a tendency to make the contributions of women in scientific and technological fields invisible, while the contributions of men in these areas are highlighted. This impacts the way in which these contributions are taught in school and university contexts and the way women's contributions to an idea, or specific project, are valued in the workplace.

A complex array of factors (at different levels, i.e. environmental, social, school, and personal) shape women's underrepresentation in STEM fields. Societal stereotypes about the type of person who is expected to succeed in STEM career pathways, namely middle-class white males, discourage many young people who do not meet these attributes from studying STEM subjects. The belief that women are more competent in reading and languages, whereas men are more competent in science and technology seems to be endorsed by parents and teachers, who then shape children's perceptions of their own ability. Adolescents themselves assume these social beliefs in such a manner that they end up making these beliefs a reality. Gender bias in learning materials is also thought to sustain gender differences in attainment, as well as the kind of classroom dynamics and teaching styles at play.

Key recommendations:

- Present interventions which seek to address stereotypes limiting girls' access to STEM education focus only on girls. Instead, girls' broader environment must be considered, including parents and teachers. It is also crucial to include boys and attempt to change their mindset.

- Schools must make unconscious bias training mandatory and train teachers to be able to actively work with students so that they can deploy positive and active coping strategies against sexist beliefs. Textbooks and didactic materials must be designed to help teachers make more visible women's contributions to STEM.

- Meetings should be facilitated between school-age girls and women in STEM with whom they can identify based on shared social and personal characteristics, such as a similar cultural background or ethnic group. Female teachers of STEM subjects should be made visible, especially for those students who are not in direct contact with female role models in STEM.

- Pre-conceptions about the lack of synergies between STEM and non-STEM disciplines should be challenged, and the social utility of STEM subjects should be emphasized, including its value in the fight against climate change, social injustice, and other current and future societal challenges. Innovative pedagogies in the teaching of STEM subjects must be promoted.

- Long-term, sustainable programs and initiatives should be promoted to raise girls' interest and participation in STEM.

Education in the digital age for women and girls: Recommendations from the Transforming Education Summit

The United Nations Educational, Scientific and Cultural Organization (UNESCO)

Summary of text:

Over the past 20 years, great advancements have been made in girls' and women's education. In middle- and high-income countries, girls outperform boys in reading at primary school, and in science at secondary school. Nevertheless, identity, background and ability continue to dictate educational opportunities. Regional inequalities are significant; in some countries the extreme exclusion of women and girls from educational contexts persists, while significant pockets of exclusion remain in others. The most marginalized learners face several layers of discrimination. In at least 20 countries, largely in sub-Saharan Africa, very few young girls in poor rural areas complete secondary school, while only 11 percent of the poorest girls in crisis-affected countries do so. The global shift to online learning and other forms of educational technology as a response to school closures during the COVID-19 pandemic has likely widened educational inequalities further. Multi-country research has suggested that boys are significantly more likely than girls to possess the hardware and digital skills needed to access learning opportunities through connected technologies.

With better planning and sensitization, the education sector's embrace of ed-tech during the pandemic could have helped 'un-gender' technology as 'male'. The uncompromising, rather than voluntary, move to online learning presented an opportune moment to help women and girls understand that they have the same right to use technology as boys. Unfortunately, evidence suggests that problematic gender stereotypes surrounding technology appear to have intensified. In the rushed attempt to keep learning opportunities intact following abrupt school closures, women and girls did not seem to receive special attention. While girls and women likely gained new levels of access to technology and improved their digital skills as a result of the shift to ed-tech, it is unlikely that this progress was sufficient to close gender gaps in skills and confidence. Gender-responsive, rather than gender-blind or gender-neutral, approaches to digital learning are required to reconcile the deficits in technology access, skills, confidence and comfort for girls and women.

Key recommendations:

- Quality education must be provided as a public good and a human right. Universal access to broadband connectivity must be in place for teachers, students, schools, and other educational environments, and special efforts are needed to target women and girls with campaigns to expand access to and use of connected technology. Universal digital literacy for educational purposes must also be ensured, alongside digital content which is freely available, easy to access and use, and, where feasible, aligned with the formal curriculum. Formal education and other spaces of socialization and learning, such as community centres, libraries and museums, should be used as vehicles to 'de-gender' technology as 'male'.

- Gender equality should be at the heart of education sector plans, budgets, and policies. Gender disparities and their underlying factors must be identified at each stage of children's education, and budgets, strategies and commitments that eliminate harmful gender norms in pedagogy must be scaled up. Research on education technology must be financed and its impact, cost-effectiveness and equity implications assessed before it is applied to policies and programs.

- Platforms and tools must be designed to support rather than replace teachers. The capacity of teachers, counsellors and entire school communities should be scaled up to enable them to provide transformative education and career orientation, which deconstructs stereotypes and redresses gender gaps in digital literacy and STEM participation.

Universal and meaningful connectivity: Are the SDGs fit for purpose to report on progress for women and girls in technology? An approach for gender mainstreaming of the digital ecosystem

The International Telecommunication Union (ITU) / Broadband Commission

Summary of text:
At present, women are 25% less likely than men to have the basic knowledge required to access digital technology, four times less likely to know how to program, and 13 times less likely to file for a technology patent. Although girls and young women often outperform boys and young men in STEM education in developed countries, this has not corresponded to a narrowing of the gender gap in STEM leadership. Factors which inhibit women from progressing in technical fields include gendered social norms, and a lack of necessary infrastructure and funding, female mentors and role models, capacity building, and training.

Although policies and strategies aimed at bridging this gender disparity have been instituted by some governments, they are not ubiquitous. Gender is referenced in only half of national overarching ICT policies or Master Plans and over 40% of countries have no meaningful policies or programs to expand women's access to the Internet. In regions where there are fewer women involved in the policymaking process, the development of equitable gender policies is precarious.

Key recommendations:

- Efforts to increase network coverage, capacity and quality should be supported, particularly in underserved areas where a significant proportion of the population are women.
- Awareness campaigns, digital literacy programmes and formal education programmes should be leveraged to raise awareness of the threats that prevent women from accessing and using the Internet, and how they can be addressed or reduced. Awareness should also be raised of the potential benefits of women's access to and use of Internet-enabled content, applications, and services.
- The development of online content and services, including government services, which are accessible to women with limited literacy and digital skills should be supported. Women from these demographics should be included in the pilot and user testing stages of these services.
- To create a policy environment with a meaningful gender lens, policymakers in target regions should identify existing gender mainstreaming practices and any institutionalized coordination mechanisms in place. Projects should be aligned with the objectives of the respective region's national ICT policies, Master Plans or national strategic documents. Policymakers should consider leveraging the resources of institutions such as the national post office, which is likely to have offices throughout the country, to assist with logistical matters.

Sub-theme 2: Inclusive innovation ecosystems and digital transformation

Building gender-transformative innovation ecosystems supporting women's entrepreneurship

Patrice Braun, Adjunct Professor, Research & Innovation, Federation University Australia

Summary of text:
The information and knowledge transformation of the past two decades means that starting and operating a business in today's digital economy requires a level of digital entrepreneurship. During the Covid-19 pandemic, many enterprises were forced to shift their operations online to manage the demand for goods and services. Business model adaptation was particularly challenging for women entrepreneurs with enterprises in sectors traditionally associated with women, such as agriculture, tourism, food, and accommodation services, which were most severely affected by the economic downturn. E-commerce also proved challenging for women, who tend to hold lower levels of digital skills and have less free time to engage in online activities due to disproportionate household responsibilities. In the case of women-led informal, micro or small and medium-sized enterprises (MSME) in developing countries, pivoting to an e-commerce model was near impossible due to lack of digital literacy, stable Internet access, e-business skills, and e-payment capabilities, within both their own enterprises and their entrepreneurial ecosystems.

Research has shown that entrepreneurial ecosystems do not support female entrepreneurs to the extent they support male entrepreneurs. An inherent gender bias obstructs female entrepreneurs from equal access to ecosystem resources such as finance and markets, while weak governmental and private actor collaboration within ecosystems deters women entrepreneurs from accessing ecosystem pillars. As a result, many women entrepreneurs tend to 'go it alone'. Policies that take a holistic framework approach are pivotal to unlocking the potential of female entrepreneurs, whereby ecosystem actors working closely together – with each actor making a unique contribution to the digital, entrepreneurial, regulatory, e-trade and training landscape – can achieve transformative innovation ecosystems.

Key recommendations:

- An inclusive systems-thinking and action research lens should be adopted to regularly evaluate women entrepreneurs' participation across all pillars of the gender-transformative innovation ecosystem. This should encompass the collection of sex-disaggregated data which addresses access to IT infrastructure, digital literacy skilling, resources, markets, financial support, and public procurement.

- A gender-transformative innovation ecosystem framework must be constructed to unlock the potential of women. This should embody holistic, gender-responsive supports to build women's entrepreneurial capacity and strengthen the digital talent-pipeline of women entrepreneurs. Solutions should be contextual and acknowledge women entrepreneurs as a heterogeneous group, located across widely differing geographic locations and innovation ecosystems, with widely varying resource, support, and educational needs.

- STEM programmes must be evaluated for impact and respect women's individual career choices. National education curricula, which are still saturated in print skills, must be transformed into 'digital' curricula. This could include the introduction of coding at kindergarten level to engage both female and male students in STEM at an early stage to prepare them for a digital career, workplace, and society.

Women, work, and digital platforms: Enabling better outcomes for women in the digital age

Sabina Dewan, President and Executive Director, JustJobs Network

Summary of text:
Over the last two decades the world has witnessed a proliferation of digital platforms and the emergence of an ecosystem of digital work. Against a backdrop of declining global female labour force participation rates, many policymakers wonder if this emerging world of online work will create more and potentially better labour market opportunities for women toward improving their participation rates.

The population of working age women is perhaps more heterogenous today than ever before. Women possess varying levels of education and skills; they come from a range of socio-economic and cultural backgrounds; they have different threshold conditions for labour force participation; and they engage with digital labour platforms in different ways. This heterogenous population of working age women is matched by an equally diverse universe of labour platforms. This paper examines women's experience with digital labour platforms along five dimensions of flexibility, autonomy, income, entitlements and labour protections, and representation. It looks at how women are faring in this emerging world of platform-mediated work, and what must happen to enable them to avail opportunities and see better outcomes.

Evidence suggests that online labour markets are at risk of replicating many of the same biases found offline. Women are drawn to the flexibility that platforms seemingly provide in when and where to work. Yet, this flexibility is frequently unrealized because women face a disproportionate burden of domestic and care work that fuels time poverty. When it comes to autonomy, despite being self-employed contract workers, platforms establish standards and norms; rating systems, and in many instances, set prices; all of these restrain autonomy. A lack of regulation means that, in many parts of the world, gig work is not aligned to minimum wages. Since workers affiliated with platforms are considered to be self-employed, platforms are not obligated to provide welfare benefits. In the absence of government provision of entitlements, women engaging in work through digital platforms can be left without social security coverage, including maternity and health benefits. Finally, when workers are self-employed, and especially when they are home-based, the ability to associate and engage in collective action is diminished weakening women's collective voice.

Key recommendations:

- Harnessing the potential of digital platforms to improve labour market outcomes for women is contingent on addressing the same socio-cultural norms that have constrained women in the offline world for so long. Policymakers must be willing to highlight the need to address socio-cultural biases.

- There is a need to create an enabling ecosystem to support women's economic participation and employment, including the integration of safe transport options, lighting and toilets; investment in childcare and other time-saving measures; and developing women's human capital through equitable access to education, skills, and technology.

- Labor regulations and protections must be instituted for workers in the platform economy, including a minimum wage. Governments must move iteratively toward public provision of basic social security for all, with targeted efforts to ensure that women are registered to receive entitlements.

- More gender-disaggregated data must be collected on the incidence, characteristics, and experience of women engaging in digitally meditated work through platforms.

Innovation to tackle gender inequality: A back-to-basics roadmap

Anita Gurumurthy, Executive Director, and Nandini Chami, IT for Change

Summary of text:
Digital innovation ecosystems are situated in a corporate-led institutional framework and thereby reinforce socio-structural hierarchies, cement patriarchal gender power and perpetuate global injustice. To change the social gender order, it is necessary to approach digital technologies through a 'public innovation ecosystem' framework.

To support a public innovation ecosystem, the State should invest in connectivity infrastructure, as well as the platform, data and AI public goods necessary for social equity and inclusion. Technical protocols which enable the participation of less powerful actors in the economy should also receive investment, including public digital payments interface and public data exchange protocols.

To prevent capture of value propositions in digital innovation ecosystems, access-and-use conditions for innovation pools must be in place, as well as public oversight and scrutiny. Similarly, digital rights must be the basis for meaningful participation in digital society and its innovations. These rights needs to be contextualized in gendered terms, in full consideration of the unique socio-political factors which render women less powerful in the digital society.

Key recommendations:

- The Global Digital Compact should unequivocally embrace a human rights-, gender equality- and development justice-oriented approach. It must envision clear commitments through the Official Development Assistance route for the financing of digital innovation ecosystems and institution development in the Global South to strengthen gender equality outcomes.

- The UN Technology Facilitation Mechanism should be channeled effectively to enable synergistic resource support and agile institutional coordination between UN agencies and national governments for a gender strategy development on digital public goods. The creation of a new global work programme similar to 'STI for the SDGs' will be productive in this regard.

- Protocols for gender aspirational design must guide the development of all digital public goods and infrastructure such as high-speed connectivity, public data pools and machine-readable data sets, public cloud infrastructure and public platform marketplaces.

- The digitalization and datafication of public systems and public services infrastructure in sectors such as education and health must be developed through public consultation and rule-of-law based systems.

- Local innovation hubs should be incentivized to stimulate women's participation in the technology sector.

- Quotas and hiring targets in the private sector should be set and enforced by state agencies as part of the governance of market innovation systems.

Actions and solutions to facilitate women's careers in technology-driven work environments

Hilde G. Corneliussen, Research Professor, Leader for the Gender, Diversity and Technology research group, Head of Research for Technology and Society, Western Norway Research Institute (Vestlandsforsking)

Summary of text:
Research analysing why the gender gap in technology persists indicates a male-dominated culture of technology, which makes it more difficult for young women to envisage themselves in technology contexts. The 'ecosystem' which surrounds girls and women, including parents, school and employers, are also affected by these gender stereotypes. A Danish study found that while 70% of parents assumed that boys were more interested in information and technology (IT) than girls, only 1% of the parents imagined girls to be more interested in technology than boys. These attitudes affect the degree to which parents, and recruiters, actively encourage girls to participate in technology training and education.

A survey of young women which explored what had motivated them to study technology showed that exciting job opportunities were important, closely followed by a good salary and the importance of technology knowledge in solving societal challenges. Many of the positive drivers are similar between men and women; however, women place a greater emphasis on societal factors. A qualitative study found that few women receive adequate information about technology-related careers at school and that a minority of women who decide to study technology had been motivated through the school system.

A recruitment initiative in Norway was found to be effective in recruiting girls who had an existing interest in technology, since it provided the opportunity for girls to interact and be encouraged by women professionals in technology-related fields. This supported the girls' ability to envisage themselves in technology work. The recruitment initiative was similarly found to encourage girls who had not experienced support for developing an interest in technology, since it compensated for a lack of such support at home or school. However, the study showed a tendency for schools to send only girls they already considered to be interested in technology, thus limiting the effect of such recruitment initiatives.

Key recommendations:

- The widespread assumption that girls and women are not interested in technology must be overturned. This assumption creates a self-perpetuating cycle, in which girls lack knowledge about technology, therefore do not express interest in the field, therefore are not encouraged to enter tech-arenas and continue to lack knowledge.

- In some countries, a strong public discourse exists which suggests that gender equality has already been realized, which implies that the continuous gender imbalance in STEM fields is a result of women's free choice. This post-feminist assumption is based on misunderstanding and ignorance of the continuous gender stereotypes which underpin gender inequality throughout the STEM field and must be overturned.

- Many women identify non-technological fields of interest as motivational for studying technology. The diversity of these interests should be recognized in educational institutions but also to support the future of work in fields such as the green transition, e-health, and artificial intelligence, which are in need of specialists with cross-disciplinary knowledge.

Preparing future generations of women for new jobs demands: skilling, re-skilling, digitalization and automation

The International Labour Organization (ILO)

Summary of text:

Globally, young women are twice as likely as young men not to be in employment, education or training. These gender gaps are even more pronounced when discrimination is compounded by intersecting factors such as disability, race and ethnicity, HIV status, SOGIESC and socio-economic status. Ensuring that current and future generations of women benefit from new or different job demands triggered by digitalization and automation requires closing digital gender divides as well as gender gaps in education, including technical and vocational education and training, and removing invisible barriers such as gender stereotypes, sticky floors and glass ceilings.

New technologies and digitalization can provide opportunities to increase women's access to decent employment, including through the facilitation of more flexible working arrangements and the potential reduction of certain occupational hazards. However, digital jobs, digital platforms and remote or teleworking working arrangements may come with risks of reinforcing gender roles and making online work a highly feminized alternative to office-based work. They may also limit women's opportunities to interact with others and remain visible in relation to career opportunities. Online work also carries an increased risk of exhaustion and burnout, a high degree of job instability and uncertainty, and the risk of gender-based violence and harassment enabled by information and communication technologies. Tackling these risks and preventing a deepening of structural gender-based discrimination and inequality requires a gender-transformative agenda.

Key recommendations:

- Equipping women with digital and technical skills is essential. Educational and vocational curricula should be updated to consider labor market trends. National training systems should offer upskilling targeted at young women, particularly those at risk of being displaced by machines or automated processes. The combination of training and on-the-job learning, including through quality apprenticeships, has proven to be successful in both developed and developing countries.

- Active labor market policies should be prioritized, including gender responsive employment policies, skills anticipation and development, to facilitate the transition to new occupations and jobs, or to changing demands withing existing jobs. Such policies should pay particular attention to specific groups of women at risk of being left behind, such as women with disabilities, young women, racialized and indigenous women.

- Adequate social protection, including care policies and services which allow the redistribution of unpaid care work between women and men and between the family and the State, can reduce the current gender gap. Respecting rights at work, including women's rights to collective action, are also crucial to tackle discrimination in pay, safety and women's access to managerial and leadership positions.

- Social dialogue between employers' and workers' organizations can play a crucial role in minimizing the adverse impacts of digitalization and automation and maximizing the potential benefits of technological progress, including for advancing gender equality, equity and non-discrimination.

Sub-theme 3: Fostering Gender Transformative innovation and technology

A social justice framework for leveraging data science to advance gender equity

Lauren Klein, Winship Distinguished Research Professor and Associate Professor, Emory University, and Brandeis Marshall, Founder and CEO, DataedX Group

Summary of text:

In today's world, data is an instrument of power, with myriad applications ranging from medical research to response efforts in humanitarian crises. While corporations, governments, and other well-resourced institutions possess the ability to design and deploy data systems, those whose lives and livelihoods are most dependent on the output of these systems remain largely absent from the conversation. This unequal balance of data power can result in interrelated and intersectional harms, including discrimination and increased surveillance. It is possible to leverage data science to advance gender equity, but only if data science and research are ethically and intentionally envisioned from the start.

The unequal balance of power with respect to data science consistently emerges in decisions about what kind of data is collected, what research is undertaken based on that data and how the data is categorized. The interests of those with power, including corporations and governments, disproportionately influence the range of issues addressed via data science. For example, in the United States, women were wholly excluded from medical trials until 1993, due largely to gender bias, as well as concerns over fertility, reproduction and women's fluctuating hormonal levels. This has resulted in generations of medical research which reflects no meaningful sex differences in terms of prevalence of illness, response to treatment and severity of outcomes.

Key recommendations:

- The social, political and historical context surrounding any dataset must be acknowledged through documentation and other qualitative forms of information gathering. Attending to the context of any particular dataset leads not only to more accurate and more truthful data analysis, but also helps to ensure the efficacy and appropriateness of any intervention developed in response to that analysis. Similarly, the ways in which structural power impacts the creation of datasets and data systems must be acknowledged and accounted for.

- Impacted community members must be included as co-designers in any data science project. Participatory design processes such as these can help to ensure data-scientific research is directed towards the issues and opportunities desired by the communities themselves.

- Transparency should be codified through meaningful audits, impact assessment, and individual and collective reflexivity, with the goal of making clear the outcomes and impact of datasets to prevent digital harms. Institutions must be held accountable for the failures and harms of data systems through forceful legal, financial and technical consequences.

- The different forms of labor involved in data work must be credited and compensated. Many forms of data work, on which gender equity increasingly depends, take a psychological toll on researchers.

The gendered impacts of AI and frontier tech: Policies and safeguards to regulate new technologies, mitigate risks and protect rights

Eleonora Lamm, Advisor, Bioethics and Ethics of Science for Latin America, UNESCO Social and Human Sciences Sector; Gabriela Ramos, Assistant Director General, UNESCO Social and Human Sciences Sector; Elettra Ronchi, Adjunct Lecturer to Science Po, School of Public Affairs, Paris; and Mariagrazia Squicciarini, Chief of Executive Office and Director a.i.,UNESCO Social and Human Sciences Sector

Summary of text

Artificial Intelligence (AI), as defined by UNESCO, are computer technologies which resemble processes associated with human intelligence, such as reasoning, learning and adaptation, sensory understanding, and interaction.

Recent rapid advances have highlighted the many opportunities of AI, as well as emphasized fundamental ethical issues of social and economic justice which must be addressed. In particular, there are significant challenges in ensuring that AI does not exacerbate societal biases, inequalities and divides which lead to discrimination against or exclusion of certain populations, notably minorities along identities of gender, race, ethnicity and religion. Such bias can be reflected or amplified in AI by simple statistical error or through conscious and unconscious assumptions about race, gender, or other ideological concepts and social stereotypes. However, present efforts to address the risks of bias in AI remain largely focused on computational factors, such as the statistical representativeness of datasets.

Despite the growing recognition of their significance as sources of AI bias, both human and systemic institutional and societal factors are still being overlooked. The pervasiveness of AI technology and the speed and scale of digital transformation mean that such issues may become impossible to fix if they are left unaddressed. To that end, the UNESCO Recommendation on the Ethics of AI, adopted at the 41st General Conference in 2021, provides a comprehensive framework to guide Member States in the formulation of policies and regulation, aimed at making AI ethical and inclusive by design.

The Recommendation includes an entire policy area dedicated to gender, which lays out a roadmap of system-wide concrete actions to ensure that AI developments do not leave behind women, the marginalized and the most vulnerable. It underlines the need for governments to put in place positive actions aimed at the full inclusion of girls and women in AI and to set up new education and training strategies which are gender-inclusive to mitigate the impact of labour market shifts triggered by AI development and deployment, both in terms of the numbers and profiles of jobs in industries, and in terms of skills requirements. Finally, the Recommendation calls for actions to ensure that AI technologies not only refrain from creating new gender divides, but that the opportunities offered by AI and automation are leveraged to help address existing ones.

Key recommendations:

- Member States should ensure that AI is made ethical and inclusive by design through system-wide actions.
- National digital policies should include a gender action plan to ensure existing gender stereotyping and discriminatory biases are not translated or amplified into AI systems and that women are not left out of the digital economy powered by AI.
- Member States should promote economic and regulatory incentives and policies which aim at balanced gender representation in all stages of an AI system life cycle, in AI research and development. Member States should encourage female entrepreneurship, and representation in AI companies' top management positions.

Driving digital financial transformation in support of SDG 5: Recent gains and remaining challenges

Yasmin Bin-Humam, Financial Sector Specialist, and Diana Dezso, Consultant, Consultative Group to Assist the Poor (CGAP)

Summary of text:
Digital financial inclusion can be defined as 'digital access to and use of formal financial services by excluded and underserved populations'. Access to and use of digital financial services, which are designed to meet women's needs and incentivized through policies which make them safe and affordable, leads to women's active participation in the formal economy, increased GDP growth, higher labor force participation, and improved household bargaining power. Despite recent progress, three quarters of a billion women are still formally excluded from the financial system.

The gender gap in digital financial inclusion is maintained by several factors. These include existing gendered social norms which dictate that financial matters are the domain of men. These social norms may lead to the perception that women are incapable of making financial decisions and that it is inappropriate for women to undertake work outside the household. Gendered social norms also influence the type of products supplied by financial service providers, who generally perceive financial products as gender-blind or neutral. This can result in product terms, marketing methods, and distribution channels which do not meet women's needs. Gendered legislation also serves as a barrier to women's financial inclusion, whereby women's ability to own, manage and control property, enter contracts and open accounts is restricted by law.

The gender gap in digital financial inclusion is also maintained by gender disparity in mobile phone ownership. Women cite mobile phone ownership and a lack of official identification documentation as key reasons for their lack of participation in the financial system. Barriers to obtaining identification are more common for married women. Limited digital skills and financial literacy similarly constrain women's access to digital financial services. These factors also make women more vulnerable to cyber fraud, SMS and voice phishing, identity theft and online harassment.

Key recommendations:

- In tandem with deepening of the digital payments ecosystem, payments of government social benefits to women should be digitized. A digitized social protection program should be reliable, accessible, flexible, secure and accountable and provide women with agency at every step. Together with this, policy frameworks should be established which encourage businesses to digitize wage payments and merchant payments, and digital remittances should be made more affordable. Enabling pervasive, gender-sensitive cash-in-cash-out networks will be crucial.

- Policies should be developed to encourage women's access to identification documents, including where appropriate the provision of women-only registration counters, mobile registration services which bring enrollment closer to women's homes and marketing campaigns which are tailored to women. Legal barriers to obtaining identification documentation should be removed and tiered, gender-sensitive know your customer requirements should be applied by financial service providers.

- Financial capability should be integrated into government cash transfer programs to reach women with timely and relevant training, while national strategies should address key aspects of consumer protection, risks and redress mechanisms.

- Policy makers should incentivize the collection, analysis and use of demand and supply side gender disaggregated data by financial service providers and legislators.

What mechanisms can ensure digital technologies favor inclusion and close gender gaps?

Elena Estavillo Flores, Chief Executive Officer, Centro-i para la Sociedad del Futuro

Summary of text:

The digital ecosystem has the capacity to accelerate the advancement of women and connect them with opportunities to improve their income, continue their education, access health services and participate politically. Despite general progress in digital uptake, emerging technologies have been shown to breed new dimensions of the gender digital divide.

Women engage in a narrower range of digital activities than men, particularly in the case of emerging technologies, such as big data, blockchain and the Internet of Things. Similarly, the participation of women as creators and decision makers in the field of digital technologies is very low. Women-led design and women's participation in investment, research, public policy design and business is paramount to the emergence of technology which responds to women's needs, aspirations, circumstances, preferences, and priorities.

Gender gaps persist across the digital ecosystem due to the failure to modify an underlying system of discrimination against women. Existing efforts to change this system have focused largely on its consequences and outputs, rather than on the drivers of discrimination. Gender perspectives remain largely absent from policy-making process and gender-disaggregated data which supports diagnosis, analysis, problem-solving and public policy evaluation is still lacking. A permanent solution to the gender digital divide requires a transformation in culture, which calls for a systemic approach.

Key recommendations:

- Gender perspectives should be applied to all processes of policy-making and technology design, including Internet governance, content moderation, algorithmic programing, research and innovation, policymaking and evaluation, and data processes, among others. Gender perspectives can be captured through the use of methodologies, questionnaires and guidelines. Stakeholder training, particularly in the case of regulators and authorities, is critical in ensuring the integration of gender perspectives. Gender-disaggregated data must be collected and utilised in all efforts to bridge the gender digital divide.

- A systemic approach must be employed to bridge the gender digital divide. Stakeholders must work collaboratively and strategies must acknowledge the cross-cutting factors which underpin patterns of gender inequality. The root causes of the gender digital divide should be addressed and the power imbalances between men and women interrupted.

- Disruptive shifts must be encouraged within technology companies, including the elimination of discrimination and gender pay gaps, and the promotion of diversity and inclusion to create workplaces which are safe for women. Digitalization should support labor flexibility and should not impede women's salary, job security, or career advancement.

- Financial resources must be directed to women-led ventures, inventions, research, and projects.

- A care economy, which redistributes social, private, and public responsibilities, must be cultivated to support women's participation in the labor market.

Embedding gender in technology development to ensure that innovation meet the needs of women and girls

The United Nations Children's Fund (UNICEF)

Summary of text:
Gender equality in innovation and technology should not concern the design of new tools, platforms or applications which serve the needs of girls. Rather, it should focus on the reimagination of how innovations in policy, management, finance, science and technology can be collectively approached and disrupted so that they become inclusive of all genders and increase awareness and availability of opportunities.

At present, gender-based discrimination reduces the average number of years girls spend at school by 16 percent, which amounts to an overall reduction in the global income of USD $6 trillion. In industry, nearly half of all countries in the Gender Index prohibit women from entering certain professions.

The conservation and availability of data on women in the technology industry is scarce, and often based on the perception that women and girls face different levels of willingness and capacity to participate and benefit from technological innovations. This 'lack of interest' rationale is misleading, as it hides social and normative determinants which hinder women and girls' access and willingness to engage with the technology industry. When out of context data is shared by the media in relation to the gender digital divide, it can lead to misinterpretation and confusion. To overcome this confusion, it is necessary to investigate digital literacy and learning with a gender lens to understand what hinders girls' ability to access and use technological tools and services.

More data is required to understand the benefits of using technology in childhood and its connection to adolescent study and career choices. This data could similarly shed light on the transferability of skills to the professional world and how early-age connectivity affects women and girls' integration into the work force. Data is also required to enable better understanding of how a lack of female perspectives in the design and development of technological products impacts the overall user experience of women and girls.

Key recommendations:

- It is crucial to advance leadership opportunities for adolescent girls. Part of this effort should involve engaging boys and men as allies.
- A systemic multi-stakeholder approach, as well as sustainable investment, is required across the tech industry to ensure technology and innovation design and development meets the needs of women and girls. Gender lens criteria should be in place for investment in technological solutions, programmes and innovation policies, including efforts to capture women and girls' voices in the design and testing phases.
- The United Nations has a legitimate, relevant, and timely role to play in fostering systemic approaches, as well as accelerating innovative solutions with a gender lens, with the aim of increasing the market's trust in women-led solutions.

Sub-theme 4: Addressing online and technology-facilitated gender-based violence and discrimination and protecting the rights of women and girls online

The impacts of online gender-based violence and disinformation on women politicians in representative democracies

Dhanaraj Thakur, Research Director, and Asha Allen, Advocacy Director for Europe, Online Expression & Civic Space, Center for Democracy & Technology

Summary of text:
Women are under-represented in government at executive, national and local levels in almost all countries. Gendered disinformation and online gender-based violence (OGBV) are part of a larger problem of violence against women in politics, with both seeking to undermine the political efficacy of women in public spaces. OGBV targeted at women politicians is predominantly directed against them because they are women and less so because of their political views or policies. As with gender-based violence, where the perpetrator uses violence to control the woman, perpetrators of OGBV against women politicians are attempting to control how the public views them. A similar trend can be observed in the case of women journalists.

Gendered disinformation is a related problem. Gendered disinformation campaigns aim to undermine women political leaders by spreading false information about their qualifications, experience, and intelligence; sometimes making use of sexualized imagery as part of their tactics. These campaigns are predicated on existing discrimination against women in society and may characterize women candidates as not being qualified for a position, lacking the requisite knowledge or experience for a role; or as persons who are too emotional for the task. The goals of gendered disinformation can include maintaining the status quo of gender inequality or creating a more polarized electorate. These campaigns can make politically engaged women more likely to reconsider their ambitions and victims can face significant long-term effects, including physical and psychological damage.

Key recommendations:

- The United Nations should provide additional resourcing to facilitate and support the development of research into gendered disinformation, with the objective of determining its collective impact on the participation of women, transgender, and non-binary individuals in public life. Addressing the challenges faced by women politicians requires intersectional analysis which takes account of multiple sources of oppression interacting simultaneously. UN Women should be provided with the requisite resources to support Member States to develop training on gendered disinformation.

- Policymakers must adopt a holistic perspective when developing responses to OGBV. Bolstering the existing legal framework or introducing new legislation is appropriate to address some forms of OGBV, while other instances require a co-regulatory approach, including improvements in content moderation mechanisms and due diligence from online platforms.

- It is vital to ensure that initiatives to combat OGBV and disinformation are proportionate and that they do not unintentionally infringe upon the rights of those they aim to protect, including their rights to freedom of expression and freedom of participation.

- Regulators should require technology companies, including social media platforms, to commission independent human rights impact assessments on incidents of OGBV and gendered disinformation, including number of incidents, reports, and resolution of cases, which are broken down by gender identity, sexual orientation, disability status, and other important demographic categories.

- Technology companies should explore ways to make more data about their platforms available to independent researchers in a manner which is secure and preserves privacy. This could enable researchers to better understand the trends and impacts of OGBV and gendered disinformation, as well as to evaluate potential solutions.

The effects of social media on girls: Keeping children safe, preventing abuse and cyber-bullying, and mental health issues

Nyama Gusona Celestina Marvel, Youth Envoy, ITU Generation Connect Africa Youth Group, and Ian Makamara, Youth Envoy, ITU Generation Connect Africa Youth Group

Summary of text:

Social media has transformed the relationship between citizens and governments and the way information can be shared across geographical boundaries. This has greatly facilitated women's rights movements, with platforms such as YouTube, Facebook and Twitter enabling activists to transmit events in real time and increase public engagement with women's rights issues. Similarly, social media has facilitated the creation of tools to tackle gender-based violence and has provided a platform for knowledge exchange around welfare and support services for victims.

In 2020, girls younger than nine years old spent an average of two hours online each day, with the majority of time spent consuming videos, especially on YouTube. This growth in Internet usage means girls and young women are increasingly exposed to stereotypes and perceived expectations related to their physical appearance, which can lead to poor body image and low self-esteem. Women and girls are also more vulnerable to non-consensual image or video sharing, rape or death threats via social media, online sexual harassment, stalking, gender-based cybercrime, and cyber flashing. Over half of girls aged 15-25 have experienced online abuse, with 20% leaving social media and a further 12% altering their online behavior as a result. Scholars have even suggested that greater use of social media may be responsible for the recent increase in suicide rates among adolescent girls. Existing initiatives to tackle social media-facilitated gender-based violence include victim helplines, awareness campaigns and incident reporting centers.

Key recommendations:

- Social media platforms should adopt international frameworks on human rights and privacy-by-design principles and make granular data on online gender-based violence available and comprehensible.

- Social media platforms should invest in content moderation and localization software to enable swift and accurate detection of incidents and make legal information and information related to mental health support services available to their users, with translations in local languages.

- Governments should establish frameworks which connect digital public goods, such as open-source software, open data and open AI models to supporting policies on data governance, data protection and cybersecurity. A strong legal framework to prevent and combat gender-based violence, online and offline, should be formulated and applied effectively.

- An operational framework should be established to support the mental health of social media users, including the provision of psychological counseling on online addiction, support to victims of online bullying and harassment, and the creation of awareness campaigns and accountability channels. Innovative methods of policy implementation should be leveraged, such as the use of gamification in efforts to educate children about online safety.

Freedom of expression and participation in digital spaces

Jan Moolman, Co-Manager, Women's Rights Programme; Hija Kamran, WRP and Gender IT Coordinator; Erika Smith, Take Back the Tech Campaign Coordinator; Association for Progressive Communication

Summary of text:
The role of Internet intermediaries in governing and regulating the Internet is being increasingly scrutinized. Poor responses to incidents of online gender-based violence are resulting in platform-based censorship and women's self-censorship, rather than recourse or redress for victims of harassment, particularly for those in non-English speaking countries. Feminist activists who denounce rights violations or engage in educational and advocacy work, especially regarding sexual rights, have their communications channels regularly targeted through social network reporting mechanisms, resulting in temporary or permanent account closure. In contrast, in cases women have reported threatening comments, they have been informed that such content does not contravene community standards. This suggests an inherent sexist bias among support staff and company policies.

States have responded to calls for action on gender-based violence with conservative, often moralistic, protectionist measures which bring tension around multiple rights. In many countries, the use of legislation to regulate social media has been used to stifle dissent and become a tool for intimidation which forces critical voices to be silent to avoid prosecution. In considering any restriction on these rights, States must consider the importance, nature and extent of any limitation proposed and opt for the least restrictive means to achieve that purpose.

Displays of women's naked bodies are frequently interpreted, both in company terms of service and by other users, from a moralist point of view which automatically sexualises the female body for the male heterosexual gaze. The censorship of women's representations of their own bodies denies their right to political, creative, sexual and other expression.

Key recommendations:

- Elaborate on and further develop a comprehensive definition of online gender-based violence which reflects both the continuum of violence and the common root causes, as well as the particular experiences of victims based on the unique specificities of digital technologies.

- States should adopt legislation which protects women's right to freedom from violence and offers means of swift redress for victims. Legislation must foreground rights to bodily autonomy, self-determination, freedom of expression and rights to participate in public debate, and should be designed through consultative processes.

- The Human Rights Council, in collaboration with the special procedure mandate holders and the Office of the High Commissioner for Human Rights, should initiate a multi-stakeholder consultative process to develop guidelines on gendered hate speech and disinformation, along the lines of the Rabat Plan of Action. As part of this, sex and gender should be recognized as protected characteristics.

Addressing Gaps and Limitations in Legal Frameworks and Law Enforcement on Technology-facilitated Gender-based Violence

Suzie Dunn, Assistant Professor, Dalhousie's Schulich School of Law

Summary of text:
Despite the widespread nature of online gender-based violence (OGBV), many victims struggle to access adequate support. Content moderation practices of social media platforms are not accessible or effective, and friends and family are often under-educated in how to respond in a supportive manner. There is a clear need for governments and law makers to respond to OGBV through the establishment and enforcement of appropriate criminal and civil laws. Some forms of OGBV are already prohibited by existing legislation, such as stalking or harassment. In other cases, legal frameworks need to be expanded and amended to ensure they account for the distinct specificities of online violence. For example, existing privacy laws may not be comprehensive enough to capture certain forms of online abuse, such as the dissemination of sexual deepfake images. Other regulation may be overly comprehensive or vague and inadvertently lead to content removal, undermining critical discussions including those around sexuality, gender and reproductive health.

Many victims of offline gender-based violence report being discredited when reporting incidents to police and experiencing inappropriate discriminatory treatment during legal proceedings. Addressing systemic bias in the legal system is critical to ensuring just legal outcomes for victims of OGBV. Some victims from marginalized communities may have legitimate distrust in the effectiveness of the criminal justice system, due to a range of factors including pervasive discrimination against their communities by legal authorities, historic and ongoing police brutality, or the financial inaccessibility of legal remedies. Victims of OGBV such as these could benefit from access to alternative legal avenues, which do not require interaction with judicial authorities, such as administrative bodies or civil torts.

Key recommendations:

- Existing legislation must be reexamined to ensure it captures the specific nature of online gender-based violence. Any new legislation on OGBV should be grounded in a victim-centered, trauma informed approach which addresses the intersectional nature of OGBV.

- Addressing sexist and other discriminatory bias in the legal system is critical to ensuring a just response for all victims of OGBV. Governments must ensure that actors in the legal system have the appropriate technical knowledge to collect and understand evidence related to technology-based offences.

- In cases where personal information or intimate images have been distributed without consent, the swift removal of content is critical to limiting the associated harms. The introduction of fast-track legal processes, which circumvent lengthy court proceedings, would enable incidents such as these to be addressed without delay.

- To eliminate OGBV, a societal shift in online behavior is necessary. To better evaluate progress, governments must invest in research which focuses on understanding and tracking patterns of OGBV, and which measures the efficacy of existing prevention initiatives.

Interlinkages between women's rights and digital technologies, civic space, data and privacy, and freedom of expression

The Office of the United Nations High Commissioner for Human Rights (OHCHR)

Summary of text:

Open, secure, affordable, and high-quality Internet access has opened space for women and girls, including those with diverse sexual orientation, gender identity or sex characteristics, to engage in new channels for influencing public debate and decision-making. Nevertheless, women and girls remain particularly vulnerable to threats and attacks in online spaces, especially in the case of those who do not conform to social norms which justify gender stereotypes and gender-based discrimination. In particular, women human rights defenders, female journalists and politicians who speak out on feminist issues, or who come from racial, ethnic, religious or minority groups, face abuse at higher rates and in different ways than men.

Surveillance technology, such as Pegasus spyware, and other tools enabling systematic monitoring of online and offline public spaces, has facilitated mass and targeted surveillance by governments, private actors and individuals, with disproportionate impacts on freedom of expression on women human rights defenders, activists, and victims of violence and abuse. Surveillance is particularly relevant for women given the recurrent use of private information and communications in attacks against them. Nearly every detail of women's intimate lives is vulnerable to multiple forms of surveillance, from domestic violence to sexual objectification and reproduction.

In addition to surveillance, women and gender nonconforming people also face censorship. Online content moderation by social media companies and platforms involves a mix of human review and algorithms. The removal of content and imagery produced by women, especially those from minority groups, has been consistently reported.

Key recommendations:

- Governments must commit to expanding the online civic space for women and girls human rights activists. Efforts to eliminate OGBV must be carefully formulated so as not to create space for expanding censorship and surveillance. Regulations with overly broad definitions may inadvertently lead to content removal, ultimately undermining women's ability to use their voice. Legislation prohibiting ill-defined concepts, such as "obscenity" or "immorality", may be used to limit critical discussions about sexuality, gender and sexual and reproductive rights.

- Human rights law provides a solid foundation for regulating online spaces. Governments, together with the private sector, should adhere to the UN Guiding Principles on Business and Human Rights in all their practices and systematically conduct human rights due diligence throughout the lifecycle of the AI systems they design, obtain or operate and incorporate a gendered lens.

Recommendations on Online and ICT-facilitated Violence Against Women and Girls

The United Nations Entity for Gender Equality and the Empowerment of Women (UN Women)

Summary of text:

The continual evolution and innovation of digital technologies facilitates existing forms of gender-based violence and breeds novel forms of online gender-based violence (OGBV) as well. The scale, speed, and ease of Internet communication combined with anonymity, pseudonymity, affordability, impunity and limited liability, coupled with the lack of preventive and response measures, facilitates the proliferation of gendered hate and harassment. Since the beginning of the COVID-19 pandemic, there has been a global increase in various forms of OGBV. In recent years, there has also been a growth in coordinated groups engaging in sexual harassment against women, including men's rights activists, incels (involuntary celibates), and other groups engaging in the 'manosphere', and there is also growing evidence of links to extremist groups.

For many years, States and private companies, including Internet intermediaries, civil society and women's rights organizations have worked to document, prevent and respond to OGBV. However, there is an absence of normative frameworks which have been explicitly developed to consider the unique contexts of technology-facilitated violations, with many countries struggling to keep pace with the rapid evolution of technology and emerging forms of OGBV. The lack of a common definition and comprehensive and accurate data collection, including standardized concepts, operational definitions and measures has led to fragmented approaches and a lack of comparable and reliable data. As a result, there are significant knowledge gaps about the nature, prevalence, impacts and drivers of OGBV, and it is often underreported.

Key recommendations:

- States must recognize OGBV as a human rights violation and private companies must work proactively to consider how to apply guidelines to their existing platforms and ongoing upgrades. UN Agencies should support this process through guidance development.

- Efforts to prevent OGBV must engage men and boys with other partners efforts to change harmful attitudes, perceptions and behaviors at a broader societal level.

- Women and girls should be empowered to participate in the technology sector and to inform the design and use of safe online spaces. Private companies, including Internet intermediaries should develop technology which is gender-responsive by design in consultation with women's rights organizations.

- Women and girls who use online spaces should be able to access information on how to ensure their safety online, including information about existing safety protocols.

Normative frameworks on gender perspectives in technology and innovation

Information paper prepared by Joann Lee
Reviewed by Hélène Molinier
November 2022

The views expressed in this paper are based on an analysis of intergovernmental resolutions and outcomes and do not necessarily represent the views of the United Nations. This paper provides an overview of a limited number of relevant intergovernmental resolutions and outcomes.

ACRONYMS

AI	Artificial intelligence
CEDAW	Convention on the Elimination of All Forms of Discrimination Against Women
CSTD	Commission on Science and Technology for Development
CSW	Commission on the Status of Women
ECOSOC	Economic and Social Council
GA	General Assembly
HRC	Human Rights Council
ICT	Information and communications technology
SDG	Sustainable Development Goal
STEM	Science, technology, engineering and mathematics
STI	Science, technology and innovation
WSIS	World Summit on the Information Society

Introduction

On 6-17 March 2023, the Commission on the Status of Women (CSW) will consider the priority theme "Innovation and technological change, and education in the digital age for achieving gender equality and the empowerment of all women and girls" at its 67th session. The agreed conclusions that are expected to be adopted at this session provide an opportunity to strengthen the integration of a gender perspective in the global normative frameworks on technology and innovation. Strong coverage of the links between gender equality and technology by the Commission can influence relevant resolutions and outcomes of other intergovernmental bodies and lead to greater attention to the topic from Member States and other stakeholders at all levels.

The Beijing Declaration and Platform for Action (1995) addressed the role of technology across various critical areas of concern and recognized that it is essential that women not only benefit from technology, but also participate in the process from design to application, monitoring and evaluation. The Platform for Action frames technology issues from an education, employment and communication perspective. This focus is no longer reflective of the breadth of gender equality challenges and opportunities that the technological evolution has triggered since 1995. The twenty-fifth anniversary review and appraisal of its implementation (E/CN.6/2020/3) recognizes some of these gaps and calls for States to set priorities for and fund technological development and innovation in a way that advances gender equality, promotes inclusion and respect, enables collective action and contributes to a sustainable environment. The review further urges States to ensure that all women and girls benefit equally from technological advancements by closing the gender digital divide and enabling women's equal participation in the design of technology, and to implement laws, policies and regulations to combat the risks inherent in technology for gender equality, including online violence, abuse and harassment, threats to privacy rights and bias in artificial intelligence and robotics.

Moreover, in the Political Declaration on the occasion of the 25th anniversary of the Fourth World Conference on Women, Member States pledged to harness "the potential of technology and innovation to improve women's and girls' lives and to close the development divide and the digital divide, including the gender digital divide, as well as addressing the risks and challenges emerging from the use of technologies."

Progress in key intergovernmental bodies

Following the Fourth World Conference on Women, the Commission on the Status of Women has twice adopted agreed conclusions in relation to gender equality in the context of technology. In the agreed conclusions of its 47th session (2003), the Commission recommended action related to women in the media and the impact and use of information and communications technologies (ICTs) for the empowerment of women, including in relation to fostering women's access to ICTs and addressing ICT- and media-based violence against women. In the agreed conclusions of its 55th session (2011), the Commission recommended action related to women's and girls' access to and participation in technology, with a focus on education and training in the field of science and technology and on women in science and technology employment.

Aside from these outcomes, the number of references related to technology in agreed conclusions of other sessions were minimal (ranging from approximately 0-11 references per session) prior to 2017. The 61st session (2017), where the Commission considered the priority theme on women's economic empowerment in the changing world of work, saw the number of references related to technology nearly triple (to approximately 30).

Since 2017, the Commission has increasingly raised issues of technology and innovation. This has included calls to mainstream a gender perspective in the conceptualization, development and implementation of digital technologies and related policies and promote the participation of women to address violence and discrimination against women and girls

in digital contexts; promote women's and girls' equal access to technologies and digital skills and bridge the gender digital divide; address the challenges emerging from the use of technology and the growing impact of violence against women and girls in digital contexts; and diversify women's educational and occupational choices in emerging fields, such as science, technology, engineering and mathematics (STEM), ICTs and technical development. Moreover, since the onset of the coronavirus disease (COVID-19) pandemic, the agreed conclusions have included more references to digital technologies and competencies as well as to cyberbullying and cyberstalking.

The linkages between access to and the use of technology and sustainable development are made in the 2030 Agenda for Sustainable Development, including across the Sustainable Development Goals (SDGs). In particular, the SDGs include targets on access to appropriate new technologies (1.4), on using ICT to promote the empowerment of women (5.b) and on ICT skills (4.4/4.5). However, other key targets and indicators related to technology lack a gender perspective. For example, the targets of SDG 9 (industry/infrastructure) and the technology-related SDG 17 targets (targets 17.6, 17.7, 17.8) all lack a gender perspective and do not reflect the need to collect disaggregated data for the associated indicators.

Efforts to mainstream a gender perspective in legislation, policies and programmes on technology and innovation have been advanced in the General Assembly (A/RES/76/213), Economic and Social Council (ECOSOC) (E/RES/2021/10; E/RES/2021/29) and Human Rights Council (HRC) (A/HRC/RES/38/5; A/HRC/RES/47/16; A/HRC/RES/50/18). In correlation with the trend of greater attention to the linkages between gender equality and technology, seen in the agreed conclusions of the Commission since 2017, the number of references to gender issues and women doubled around the same time in the ECOSOC annual resolution (July 2017) and the General Assembly biennial resolution (December 2017) on science, technology and innovation (STI).

Women farmers receiving training in drone piloting, Senegal.
Photo: UN Women/Yulia Panevina

Core issues of gender equality and technology

The areas where gender perspectives are most often integrated relate to the digital divide; access to digital technologies, ICTs and the Internet; digital literacy/skills in education and employment; online safety; artificial intelligence (AI); and technology for agriculture and climate resilience. These issues have been covered widely by the General Assembly, ECOSOC, Human Rights Council, Committee on the Elimination of Discrimination against Women and other intergovernmental bodies. The Commission may wish to consider the language used by these bodies in the consideration of the priority theme.

In contrast, key areas where the integration of a gender perspective in normative frameworks could be strengthened relate to the design and monitoring of technology, including women's participation in technological development and gender impact analysis of technology. For example, resolutions will discuss the development of technology without including a gender lens, such as the need for a gender perspective or the participation of women. If they do mention gender issues, the references will often be brief and lack specific recommendations for gender mainstreaming. Similarly, when discussing impacts of technology, there is a lack of concrete actions or strategies to assess gender impacts and to collect relevant disaggregated data to conduct an adequate gender analysis. Some areas that lack a gender perspective are in discussing health technology, international security and cybercrime, and business and human rights, among others.[1]

Moreover, intergovernmental resolutions and outcomes could be strengthened with greater recognition of the implications of intersectionality on access, use, design and monitoring of technology. Women and girls who face multiple and intersecting forms of discrimination (including poor women and girls, women and girls with disabilities, women and girls in rural or remote areas, women and girls in minority groups, elderly women, illiterate women and girls, migrant or refugee women and girls, Indigenous women and girls) experience compounded barriers to technology, especially those who live in developing countries.

This is not a comprehensive list of gaps, as not all resolutions were analyzed. However, they include important areas where a gender perspective is necessary to advance gender equality in relevant technological sectors. The 67th session provides the Commission with the opportunity to advance commitments in these areas, thereby providing impetus to other intergovernmental bodies to do the same.

Gender digital divide

Closing the gender digital divide remains a key priority across intergovernmental bodies.[2] Digital divides persist across income groups, age groups, geography and gender, including between rural-urban and youth-older persons, as well as between and within countries and regions and between developed and developing countries. These have been aggravated by the COVID-19 pandemic.[3] Improving the quality of access is also important, "using a multidimensional approach that includes speed, stability, affordability, language, training, capacity-building, local content and accessibility for persons with disabilities" (A/RES/76/189; E/RES/2021/10).

Actions to close the gender digital divide should aim at "eliminating barriers to women's full, equal and effective participation both offline and in digital contexts, increasing women's and girls' access to digital technologies, promoting equal, safe and affordable access to information and communications technologies and to the Internet, enhancing women's and girls' digital literacy and women's entrepreneurship, improving digital cooperation and harnessing the potential

1 See General Assembly resolutions on role of science and technology in the context of international security and disarmament (A/RES/76/24) and on promoting technical assistance and capacity-building to strengthen national measures and international cooperation to combat cybercrime, including information-sharing (A/RES/74/173); ECOSOC resolution on open-source technologies for sustainable development (E/RES/2021/30); HRC resolution on business and human rights: improving accountability and access to remedy (A/HRC/RES/38/1).

2 See General Assembly resolutions: 76/213, 76/189, 76/142, 75/316, 75/176, 75/157, 73/218; Economic and Social Council resolutions: 2021/29, 2021/28, 2021/10; Human Rights Council resolutions: 50/18, 50/15, 47/16, 38/5.

3 E/RES/2021/28; A/RES/75/316; CSW65 agreed conclusions

of rapid technological change to improve the lives of women and girls, promoting connectivity and socioeconomic prosperity, and addressing any potential negative impacts of digital technologies on gender equality and the empowerment of women and girls."[4] Similar language is contained in CSW agreed conclusions. It is recommended to understand "the context of the divide through sex-disaggregated data, integrating a gender perspective into strategies, policies, plans and budgets, addressing barriers, including access, affordability, safety, digital skills and relevance, and collaboration and sharing good practices"[5].

The lack of or limited access of women and girls with disabilities to digital technologies, including assistive technologies, further exacerbate the digital divide. The particular importance of accessibility for women and girls with disabilities is outlined in HRC resolution 47/15. The lack of consideration given to gender and disability aspects in policies relating to information and communications technologies and systems is recognized by the Committee on the Rights of Persons with Disabilities in its General comment No. 3 on women and girls with disabilities.

Education and economic empowerment

The Committee on the Elimination of Discrimination against Women, in its General recommendation No. 36 on the right of girls and women to education, recognizes the role of ICTs in distance and open learning settings for girls and women with limited access to conventional forms of education and training. The Committee calls on States Parties to institute measures to increase the participation of women and girls in STEM programmes at all levels of education and to develop national ICT plans or strategies with specific targets for achieving gender equality in access to ICTs in schools and tertiary-level institutions, backed by specific programmes and budgets, including for disaggregated data collection.

In order to address/mitigate the impact of the COVID-19 pandemic on women's and girls' education – such as their risk of dropping out and not returning to school, thereby increasing their vulnerability to poverty, child, early and forced marriage and early pregnancy – the General Assembly calls on Member States to ensure that girls are protected and supported in returning to school, ensure the availability of learning materials and remote learning platforms during the pandemic and to bridge the digital divide to provide distance learning opportunities (A/RES/75/157).

The Commission on the Status of Women underscores that rapid technological change, including new and emerging digital technologies, has an impact on women's employment opportunities. It therefore calls on Member States to increase women's access to digital technologies to enhance their productivity and mobility in the labour market and to eliminate occupational segregation by addressing structural barriers, gender stereotypes and negative social norms. The Commission has also called on Member States to mainstream a gender perspective into science and technology, academia, research institutions and research funding agencies; and facilitate women's access to and opportunities in emerging fields, such as STEM, ICT and technological development, by expanding the scope of education, reskilling and training, particularly in developing countries.

Member States are also invited "to support the digital entrepreneurship of women, including in e-commerce, including for micro-, small and medium-sized enterprises, to develop local solutions and relevant content and promote innovation and decent job creation" (E/RES/2021/10).

Online safety and privacy

Whereas the General Assembly[6] and ECOSOC have focused more on the economic aspects of digitalization, the Human Rights Council and the Committee on the Elimination of Discrimination against Women, notably

4 A/RES/75/316 on impact of rapid technological change on the achievement of the Sustainable Development Goals and targets
5 A/RES/73/218
6 The General Assembly recently adopted A/C.3/77/L.21/Rev.1 on intensification of efforts to prevent and eliminate all forms of violence against women and girls: gender stereotypes and negative social norms, in November 2022. The resolution includes greater attention to online and technology-facilitated violence against women and girls than previous iterations.

in its general recommendations, have further given particular attention to the online safety of women and girls. The Council has a specific resolution 38/5 (2018) on preventing and responding to violence against women and girls in digital contexts. All forms of discrimination, violence, intimidation or threats, harassment, stalking, bullying, arbitrary or unlawful surveillance and tracking, trafficking in persons, extortion, censorship and hacking of accounts or devices are recognized as a growing global concern (A/HRC/RES/38/5). In its resolution 68/181, the General Assembly expresses concern for similar technology-related violations and abuses against women human rights defenders.[7]

Additionally, the Council has found that these violations and abuses of their rights online prevent women's and girls' full enjoyment of their human rights and fundamental freedoms (A/HRC/RES/38/7), including the right to freedom of opinion and expression (A/HRC/RES/50/15), the rights to freedom of peaceful assembly and of association (A/HRC/RES/50/17), and the right to privacy (A/HRC/RES/48/4). This hinders their full, equal and effective participation in economic, social, cultural and political affairs, and may deter their use of ICTs, thus widening gender inequalities.

The Council has recognized the particular gender-specific effects of violations and abuses of the right to privacy on women and girls. Its resolution on the right to privacy in the digital age (48/4) and the corresponding General Assembly resolution (A/RES/75/176) both recognize the importance of the right to privacy to prevent gender-based violence and call for implementing and strengthening gender-responsive policies on privacy. The Council further recognizes that encryption and anonymity can contribute to the full enjoyment of human rights and empower women and girls to access information and express ideas. Member States are called upon to develop or maintain preventative measures and remedies as well as strengthen gender-responsive policies that promote and protect the right to privacy.

To prevent and eliminate gender-based violence in digital contexts and combat impunity, the Council has called on Member States to enact and enforce necessary legislative and other measures, mainstream a gender perspective in criminal justice systems and promote joint initiatives with business enterprises, including social media and digital technology companies, as well as self-regulatory mechanisms.[8]

The Committee on the Elimination of Discrimination against Women, in its General recommendation No. 36 (2017), includes recommendations to develop policies and channels to protect girls against cyberbullying. The Human Right Council also recently adopted a resolution on countering cyberbullying (51/10) in October 2022.

The Committee also recognizes linkages of digital technologies and their impacts with harmful practices[9], access to justice[10] and trafficking[11]. The Committee on the Rights of the Child, in its General comment No. 25 (2021) on children's rights in relation to the digital environment, emphasizes the protection of children against technology-facilitated and online sexual exploitation and abuse, and includes calls for data protection legislation and privacy-by-design and safety-by-design in the digital services and products that children use, as well as the decriminalization of self-generated sexual content.

The growing prevalence of violence against women and girls in digital context, especially on social media, has also received increasing attention from the Commission. It recognizes that "the lack of preventive measures and remedies underline the need for action by Member States in partnership with other stakeholders to prevent and respond to violence and harassment online and offline and other negative effects of technological development. It recalls that emerging forms of violence, such as cyberstalking, cyberbullying and privacy violations,

7 A/RES/68/181: "Aware that information-technology-related violations, abuses, discrimination and violence against women, including women human rights defenders, such as online harassment, cyberstalking, violation of privacy, censorship and the hacking of e-mail accounts, mobile phones and other electronic devices, with a view to discrediting them and/or inciting other violations and abuses against them, are a growing concern and can be a manifestation of systemic gender-based discrimination, requiring effective responses compliant with human rights,"

8 See Human Rights Council resolutions 38/5, 41/17, 47/15 as well as General recommendation No. 35 on gender-based violence against women, updating general recommendation No. 19, of the Committee on the Elimination of Discrimination against Women.

9 Joint general recommendation/general comment No. 31 of CEDAW and No. 18 of the Committee on the Rights of the Child

10 General recommendation No. 33

11 General recommendation No. 38

are affecting a high percentage of women and girls and compromising, inter alia, their health, their emotional, psychological and physical well-being and their safety."[12] Recommendations from previous agreed conclusions include establishing comprehensive multisectoral services, programmes and responses with the support of all available technologies that are adequately resourced[13]; building the capacity of public officials in executive, legislative and judicial branches of government to adopt enhanced prevention measures[14]; as well as combatting the growing sexualization and use of pornography in media content as well as ICT- and media-based violence against women, including criminal misuse of ICT for sexual harassment, sexual exploitation and trafficking in women and girls.[15]

Artificial intelligence

The Commission "recognizes the potential benefits of new forms of information and communications technology and artificial intelligence that enable the participation of women and girls in public life, while more attention needs to be paid to the impacts of such technology on all women and girls. It also recognizes that digital platforms can become public spaces in which new strategies to influence policy and politics are forged and where women and girls can exercise their right to participate fully and effectively in public life. It notes that new technological developments can also perpetuate existing patterns of inequality and discrimination, including in the algorithms used in artificial intelligence-based solutions."[16] The Commission has yet to recommend specific action related to AI.

The Human Rights Council, in its resolution 48/4 on right to privacy in the digital age expresses concern for the lower accuracy of facial recognition technologies with certain groups, particularly non-white individuals and women.

Member States are called upon to create monitoring and accountability mechanisms to ensure implementation of gender-sensitive policies and regulations, as well as analyze the gender impact of such policies in consultation and collaboration with women digital technology specialists, civil society organizations and gender equality advocates (A/HRC/RES/38/5).

UNESCO's General Conference also recognizes the wide impacts of AI technologies on gender equality, in its Recommendation on the Ethics of Artificial Intelligence, forty-first session (2021). It calls on Member States to eliminate gender gaps in the AI field (e.g., wage, representation, education, unpaid work, and digital and AI access, adoption, usage and affordability gaps), redress gender stereotyping and discriminatory biases in AI systems, encourage women's entrepreneurship and participation in all stages of AI system life cycle and ensure gender balance in research and management positions. Member States should have dedicated funds from their public budgets to finance gender-responsive schemes, ensure that national digital policies include a gender action plan, and develop relevant policies targeted at supporting girls and women to make sure they are not left out of the digital economy powered by AI.[17]

Technology for agriculture and climate resilience

In recognition of the disproportionate impacts of the digital divide on rural and Indigenous women and girls, the issues of women's equal access to agricultural technology and technology to build climate resilience are included in several outcomes and resolutions.[18]

According to General recommendation No. 34 of the Committee on the Elimination of Discrimination against Women, "States Parties should ensure that labour-saving and environmentally sound technology, including agricultural, irrigation and water-harvesting

12 CSW66 agreed conclusions
13 CSW57 agreed conclusions
14 CSW65 agreed conclusions
15 CSW47 agreed conclusions
16 CSW65 agreed conclusions
17 See also UNESCO, *Artificial Intelligence and Gender Equality* (2020). https://en.unesco.org/AI-and-GE-2020
18 A/RES/76/200; agreed conclusions for CSW58, CSW62, CSW66; CEDAW General recommendation No. 34 on the rights of rural women

technology, and technology to reduce the burden of unpaid domestic and productive work are available and accessible to rural women and create enabling environments that improve their access to technology, including ICT, in rural areas. Rural women should be consulted in the development of such technology and their access to such innovative technological solutions should be promoted."

To build climate resilience, the Commission calls on Member States to take "concrete measures to promote equal access for all women and girls to digital training, capacity-building, forecasting and preparedness, including early warning systems, through equal access to information and communications technologies, mobile devices and the Internet, so as to promote their empowerment and digital literacy and enable them to develop the skills needed to better cope with the adverse effects of climate change, environmental degradation and disasters, in particular for poor women, women in rural and remote areas, and women farmers and producers."[19]

In its General recommendation No. 39, the Committee on the Elimination of Discrimination against Women emphasizes Indigenous Women's and Girls' access to digital technologies and STEM. It further calls for ensuring their access to the benefits of scientific progress and technological innovation to be able to achieve food and water security, and compensation for their contributions and technical knowledge, as well as recommends the study of the relationship between technology and culture, as digital tools can be important to transmit and preserve Indigenous languages and culture.

Innovation

Not much is said by the Commission or other intergovernmental bodies on the gender perspectives in innovation. The term is most often included as part of the phrase 'science, technology and innovation'.

Existing innovation-specific resolutions draw attention to the need for innovation approaches to respond to the needs of poor, grassroots and marginalized communities in developing and developed countries, and to involve them in innovation processes. Inclusiveness in innovation is encouraged, especially with regard to local communities, women and youth, to ensure that the scaling and diffusion of new technologies are inclusive and do not create further divides. Increasing availability of data to support national innovation systems and empirical research on innovation and development to support the design and implementation of innovation strategies, as well as local innovation, is also supported. [20]

Assembly resolution 76/213 calls on Member States "to conduct assessments, including of gender-sensitive aspects, of national innovation systems, including digital ecosystems, drawing from foresight exercises, at regular intervals, to identify weaknesses in the systems and make effective policy interventions to strengthen their weaker components, and share outcomes with other Member States, and, on a voluntary basis, to provide financial support and expertise towards the implementation of the framework for national science, technology and innovation policy reviews in interested developing countries."

Women's participation

Member States have committed to ensure women's full and equal participation in decision-making processes related to ICTs[21], as well as in the conceptualization, development and implementation of digital technologies (A/HRC/RES/38/5). The Commission calls on Member States to enhance women's and, as appropriate, girls' participation as users, content creators, employees, entrepreneurs, innovators and leaders,[22] and encourages regulatory bodies, where they exist, to promote full participation of women in the ownership, control and management in the ICT and media sectors.[23]

19 CSW66 agreed conclusions
20 E/RES/2022/16; A/RES/76/213
21 CSW47 agreed conclusions; A/RES/76/189, A/RES/76/213, E/RES/2021/10
22 CSW61 and CSW63 agreed conclusions; see also A/RES/76/213 and E/RES/2021/28
23 CSW47 agreed conclusions

Resolution 38/5 of the Human Rights Council contains important language around assessing the gender impacts of digital policies, calling on States to prioritize "the integration of gender perspectives, and ensuring the early, full and effective participation of women and girls in the development and implementation of national policies, legislation, programmes, projects, strategies and regulatory and technical instruments in the area of digital technologies and creating monitoring and accountability mechanisms to ensure implementation of gender-sensitive policies and regulations, as well as analysing the gender impact of such policies in consultation and collaboration with women digital technology specialists, civil society organizations and gender equality advocates".

The important role of digital technologies for women and girls to exercise all human rights and in women's full, equal and effective participation in political, economic, cultural and social life is widely recognized.[24] In its General recommendation No. 36 on the right of girls and women to education, the Committee on the Elimination of Discrimination against Women calls for improving and broadening women's access to ICTs, including e-government tools, to enable political participation and to promote engagement in broader democratic processes. Both the General Assembly and Human Rights Council, in resolutions A/RES/76/227 and A/HRC/RES/49/21, respectively, express concern "that online disinformation campaigns are increasingly being used to deter women from participating in the public sphere, and that women journalists, women politicians, women human rights defenders and advocates for women's rights are targeted in particular".

Health

The CSW63 agreed conclusions call for investments in public health-care systems and facilities for women and girls, including health technologies, the systematic utilization of new technologies and integrated health information systems, as well as addressing health-care worker shortages in rural and remote areas by utilizing digital technologies for healthcare providers and patients.

The Human Rights Council "recognizes that the right of women and girls to the enjoyment of the highest attainable standard of physical and mental health includes having access to the information, education and means to exercise this right, both online and offline." It also "recognizes that digital technologies can offer access to information that enables women and girls to make informed and autonomous decisions in matters regarding their own bodies, lives and health, including their sexual and reproductive health and reproductive rights." (A/HRC/RES/38/5)

The Committee on the Rights of the Child calls on States Parties to ensure that digital educational resources do not perpetuate gender stereotypes and that curricula include guidance on finding trusted sources and identifying misinformation, including on sexual and reproductive health issues.[25]

Private sector

Comprehensive regulatory frameworks and legislation over digital technologies and services, as well as multistakeholder efforts and initiatives,[26] are crucial in the provision of and access to affordable and reliable connectivity and ICTs to close the gender digital divide and in the protection and respect of women's and girls' rights online and offline. The private sector has an important role and responsibility in expanding and improving digital infrastructure, products and services and in ensuring the safety and privacy of women and girls in the digital space.

Digital technology companies, including Internet service providers and digital platforms, are encouraged "to strengthen or adopt positive measures, including internal policies, to promote gender equality in

24 CSW47 agreed conclusions, A/RES/75/316, A/HRC/RES/38/5, A/HRC/RES/50/15, A/HRC/RES/48/2, Recommendations on the Ethics of AI, etc.

25 See General comment No. 25, paragraphs 94, 104 and 105 in relation to sexual and reproductive health education and services online.

26 E/RES/2022/16; E/RES/2022/15; E/RES/2021/10; A/RES/75/316; A/RES/76/213; A/RES/76/200; A/RES/76/189; A/RES/74/235; A/RES/75/157; A/HRC/RES/50/15; A/HRC/RES/47/16; A/HRC/RES/47/15; A/HRC/RES/41/7; A/HRC/RES/38/5; CSW66, 65, 63, 55 and 47 agreed conclusions; CEDAW General recommendations No. 36, 38 and 33; CRC General comment No. 25; Recommendations on the Ethics of AI

the design, implementation and use of digital technologies"[27] and "to respect standards and implement transparent and accessible reporting mechanisms"[28]. Businesses are further encouraged to protect the private data of women and girls, create processes for reporting violence and develop policies to protect them from violence in digital contexts.[29]

States are called upon "to provide effective and up-to-date guidance to business enterprises on how to respect human rights by advising on appropriate methods, including human rights due diligence, and on how to consider effectively issues of gender, vulnerability and/or marginalization" [30]. The Human Rights Council further calls upon States to collaborate with civil society actors, the private sector, social media companies, digital technology companies and other relevant actors, as part of their efforts to develop targeted and accessible responses, programmes and policies[31]; to enact and enforce the necessary legislative or other measures[32]; and to collect, share, positively recognize and widely publicize good practices[33].

Business actors are urged to assist the States in which they operate in their efforts to fully realize women's right to freedom from violence.[34] The Committee on the Elimination of Discrimination against Women calls for social media and messaging platform companies to take responsibility for exposing women and girls to trafficking and sexual exploitation through use of their services and put in place controls to mitigate risks and the appropriate governance structure and procedures to respond. It also calls for digital technology companies to increase transparency, including around the use of electronic currencies.[35]

The role of civil society is also crucial in the monitoring and evaluation of digital policies. States are called upon to analyze the gender impacts of digital policies in consultation and collaboration with women digital technology specialists, civil society organizations and gender equality advocates.[36]

Recognizing the lack of women's representation at top management positions, boards of directors, or research teams in the AI field, the Recommendation on the Ethics of Artificial Intelligence calls on Member States to "promote policies that aim at a balanced gender participation in AI research in academia and gender representation on digital and AI companies' top management positions, boards of directors and research teams".

Alignment with other processes

The upcoming CSW67 session provides an opportunity to discuss emerging issues – such as AI impacts, FemTech, disinformation, surveillance and censorship – as well as the significance of intersectionality in relation to the access, use, design and monitoring of digital technologies. It can also promote further alignment between the agreed conclusions of the Commission and other intergovernmental outcomes, including resolutions of the General Assembly, ECOSOC and the Human Rights Council and recommendations of the Committee on the Elimination of Discrimination against Women and other treaty bodies. Greater collaboration between the Commission and other functional commissions of ECOSOC, as well as with existing multi-stakeholder processes, will also strengthen strategies to advance gender equality in the context of technology and innovation.

In Our Common Agenda, the Secretary-General proposes a **Global Digital Compact** to be agreed at the Summit of the Future in September 2024 through a technology track involving all stakeholders. The

27 A/HRC/RES/38/5
28 CSW65 agreed conclusions
29 A/HRC/RES/38/5; A/HRC/RES/48/4; A/RES/75/176
30 A/RES/75/176; A/HRC/RES/48/4
31 A/HRC/RES/41/17
32 A/HRC/RES/38/5
33 Ibid.
34 CEDAW General recommendation No. 35
35 General Recommendation No. 38
36 A/HRC/RES/38/5

process on the Global Digital Compact presents an important opportunity for UN Women to integrate the key recommendations from the agreed conclusions of CSW67 into the document.

The **Commission on Science and Technology for Development** (CSTD) is a subsidiary body of ECOSOC and provides advice on STI issues, including in the preparation of the resolutions of ECOSOC and the General Assembly on STI. Since 2006, the CSTD has been mandated to serve as the focal point in the system-wide follow-up to the outcomes of the World Summit on the information Society (WSIS). ECOSOC decision 2021/254 of 22 July 2021 extended, until 2025, the mandate of the Gender Advisory Board of the Commission. ECOSOC resolution 2022/16 calls for the CSTD and the CSW to strengthen and deepen collaboration, including sharing good practices and lessons learned in integrating a gender perspective into science, technology and innovation policymaking and implementation, and, in this context, to follow up on the work done by the Commission on Science and Technology for Development at the workshop on applying a gender lens to science, technology and innovation, held in Vienna on 18 January 2019.

The 2030 Agenda for Sustainable Development announced the launch of the **Technology Facilitation Mechanism** (TFM) to support the implementation of the SDGs and facilitate multi-stakeholder collaboration and partnerships. The components of the TFM include: 1) IATT, the UN Interagency Task Team on Science, Technology and Innovation for the SDGs; 2) 10-Member group, a Group of High-level Representatives of Scientific Community, Private Sector and Civil Society appointed by the Secretary-General; 3) STI Forum (see next paragraph); and 4) 2030 Connect, an online platform as a gateway for information on existing STI initiatives, mechanisms and programs.

The President of ECOSOC convenes annually the **Multi-stakeholder Forum on Science, Technology and Innovation for the SDGs** (STI Forum), in May, to discuss STI cooperation around thematic areas for the implementation of the Sustainable Development Goals. The forum is co-chaired by two Member States and results in a summary of discussions. Through the summary of its STI Forum, the TFM provides formal mandated input in support of the HLPF's SDG review and its mandated science-policy function.

The **High-Level Political Forum on sustainable development**, the platform for the global review of the 2030 Agenda for Sustainable Development and the SDGs, includes a meeting on STI issues, including the summary of the STI Forum.

The **Action Coalition on Technology and Innovation for Gender Equality** is one of the Six Action Coalitions that were launched during the Generation Equality Forum in 2021 to mark the 25th anniversary of the Beijing Declaration and Platform for Action. The Action Coalition is a multi-stakeholder initiative, bringing together actors from civil society, governments, private sector, philanthropy, youth groups and inter-governmental agencies to catalyze collective action and drive increased public and private investments and commitments to leverage technology and innovation to advance gender equality and the empowerment of women and girls. The Coalition developed a 5-year Global Acceleration Plan and recently issued a joint statement to place gender equality at the heart of the Global Digital Compact.

Other ongoing UN processes, initiatives, and events include:

- UN Secretary-General Roadmap for Digital Cooperation (A/74/821) (2020)
- Office of the Secretary General's Envoy on Technology
- World Summit on the Information Society (WSIS) Forum
- Broadband Commission
- Internet Governance Forum (IGF)
- Partner2Connect Digital Coalition
- UNESCO AI ethics work
- Business and Human Rights in Technology Project (B-Tech Project)
- EQUALS Global Partnership
- United Nations Group for the Information Society (UNGIS)

Appendix I

Business and Human Rights

The UN Guiding Principles on Business and Human Rights (2012) reflect and build on the three-pillar structure of the "Protect, Respect and Remedy" framework, comprising of 31 principles. Per the Guiding Principles, States should provide appropriate guidance to businesses on "how to consider effectively issues of gender, vulnerability and/or marginalization," as well as adequate assistance to business enterprises operating in conflict affected areas "to assess and address the heightened risks of abuses, paying special attention to both gender-based and sexual violence". Furthermore, business enterprises "should make particular efforts to track the effectiveness of their responses to impacts on individuals from groups or populations that may be at heightened risk of vulnerability or marginalization... using gender-disaggregated data where relevant".

To give further consideration to the differentiated impacts of business-related human rights abuses on women, the UN Working Group on Business and Human Rights issued additional guidance on the Gender dimensions of the Guiding Principles on Business and Human Rights (A/HRC/41/43) in 2019. The report achieves three results: 1) provides a brief overview of discrimination and differentiated impacts experienced by women and girls in the context of business activities, and analyses selected existing gender equality standards; 2) develops a three-step gender framework – i.e., gender responsive assessment, gender transformative measures, and gender transformative remedies – that States, business enterprises and other stakeholders could use to achieve substantive gender equality; and 3) uses this gender framework to provide specific guidance for each of the 31 principles of the UN Guiding Principles.

Women farmers receiving training in drone piloting, Senegal.
Photo: UN Women/Yulia Panevina

Appendix II

This paper reviews a select number of relevant resolutions and outcomes, due to limited time and capacity, and is not meant to represent a complete overview. The following resolutions and outcomes were reviewed and used in this analysis:

Commission on the Status of Women – Agreed Conclusions

- Achieving gender equality and the empowerment of all women and girls in the context of climate change, environmental and disaster risk reduction policies and programmes (CSW66)
- Women's full and effective participation and decision-making in public life, as well as the elimination of violence, for achieving gender equality and the empowerment of all women and girls (CSW65)
- Political declaration (CSW64)
- Social protection systems, access to public services and sustainable infrastructure for gender equality and the empowerment of women and girls (CSW63)
- Challenges and opportunities in achieving gender equality and the empowerment of rural women and girls (CSW62)
- Women's economic empowerment in the changing world of work (CSW61)
- Women's empowerment and the link to sustainable development (CSW60)
- Challenges and achievements in the implementation of the Millennium Development Goals for women and girls (CSW58)
- Elimination and prevention of all forms of violence against women and girls (CSW57)
- Access and participation of women and girls in education, training and science and technology, including for the promotion of women's equal access to full employment and decent work (CSW55)
- Participation in and access of women to the media, and information and communication technologies and their impact on and use as an instrument for the advancement and empowerment of women (CSW47)

General Assembly

- A/RES/76/227. Countering disinformation for the promotion and protection of
- human rights and fundamental freedoms
- A/RES/76/213. Science, technology and innovation for sustainable development
- A/RES/76/200 Agricultural technology for sustainable development
- A/RES/76/189. Information and communications technologies for sustainable development
- A/RES/76/173. The safety of journalists and the issue of impunity
- A/RES/76/142. Follow-up to the Fourth World Conference on Women and full implementation of the Beijing Declaration and Platform for Action and the outcome of the twenty-third special session of the General Assembly
- A/RES/75/316. Impact of rapid technological change on the achievement of the Sustainable Development Goals and targets
- A/RES/75/176. The right to privacy in the digital age
- A/RES/75/157. Women and girls and the response to the coronavirus disease (COVID-19)
- A/RES/75/156. Strengthening national and international rapid response to the impact of the coronavirus disease (COVID-19) on women and girls
- A/RES/74/235. Women in development
- A/RES/74/174. Countering child sexual exploitation and sexual abuse online
- A/RES/73/218. Information and communications technologies for sustainable development
- A/RES/68/181. Promotion of the Declaration on the Right and Responsibility of Individuals, Groups and Organs of Society to Promote and Protect Universally Recognized Human Rights and Fundamental Freedoms: protecting women human rights defenders

Economic and Social Council

- E/RES/2022/16. Science, technology and innovation for development
- E/RES/2022/15. Assessment of the progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society
- E/RES/2021/10. Socially just transition towards sustainable development: the role of digital technologies on social development and well-being of all

Human Rights Council

- A/HRC/RES/50/18. Elimination of all forms of discrimination against women and girls
- A/HRC/RES/50/17. The rights to freedom of peaceful assembly and of association
- A/HRC/RES/50/15. Freedom of opinion and expression
- A/HRC/RES/49/21. Role of States in countering the negative impact of disinformation on
- the enjoyment and realization of human rights
- A/HRC/RES/48/4. Right to privacy in the digital age
- A/HRC/RES/48/2. Equal participation in political and public affairs
- A/HRC/RES/47/23. New and emerging digital technologies and human rights
- A/HRC/RES/47/16. The promotion, protection and enjoyment of human rights on the Internet
- A/HRC/RES/47/15. Accelerating efforts to eliminate all forms of violence against women and girls: preventing and responding to all forms of violence against women and girls with disabilities
- A/HRC/RES/47/6. The right to education
- A/HRC/RES/47/5. Realization of the equal enjoyment of the right to education by every girl
- A/HRC/RES/44/4. Trafficking in persons, especially women and children: strengthening

- human rights through enhanced protection, support and empowerment of victims of trafficking, especially women and children

- A/HRC/RES/41/17. Accelerating efforts to eliminate all forms of violence against women and girls: preventing and responding to violence against women and girls in the world of work

- A/HRC/RES/38/7. The promotion, protection and enjoyment of human rights on the Internet

- A/HRC/RES/38/5. Accelerating efforts to eliminate violence against women and girls: preventing and responding to violence against women and girls in digital contexts

Committee on the Elimination of Discrimination against Women

- General recommendation No. 39 on the rights of Indigenous Women and Girls

- General recommendation No. 38 on trafficking in women and girls in the context of global migration

- General recommendation No. 37 on gender-related dimensions of disaster risk reduction in the context of climate change

- General recommendation No. 36 on the right of girls and women to education

- General recommendation No. 35 on gender-based violence against women, updating general recommendation No. 19

- General recommendation No. 34 on the rights of rural women

- General recommendation No. 33 on women's access to justice

- Joint general recommendation No. 31 of the Committee on the Elimination of Discrimination against Women/general comment No. 18 of the Committee on the Rights of the Child (2019) on harmful practices*

Committee on the Rights of the Child

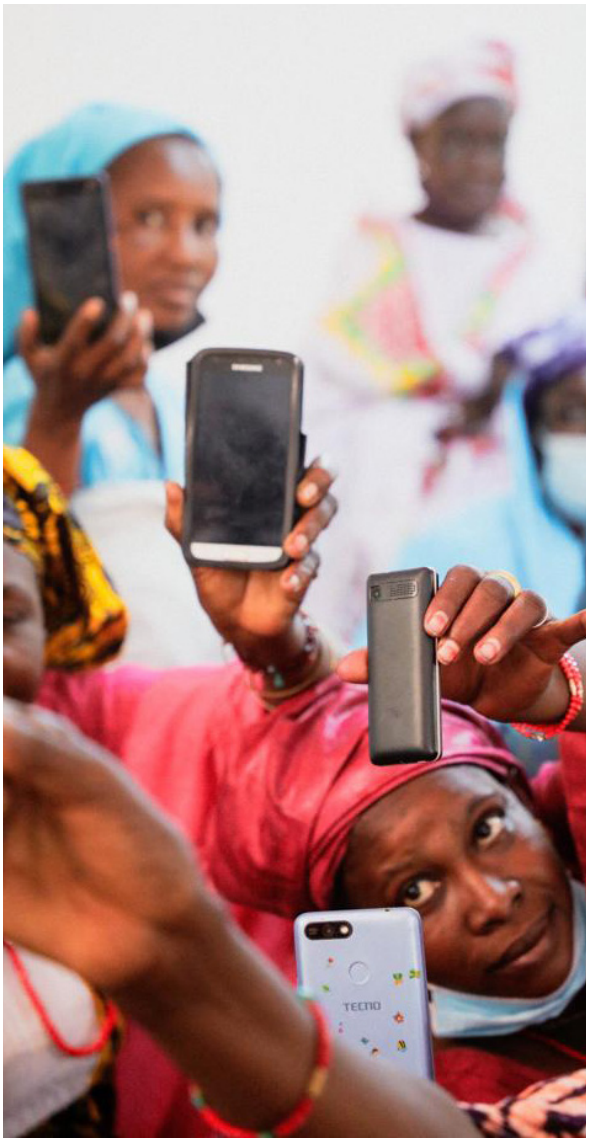
- General comment No. 25 on children's rights in relation to the digital environment

Committee on the Rights of Persons with Disabilities

- General comment No. 3 on women and girls with disabilities

Other

- Recommendation on the Ethics of Artificial Intelligence (UNESCO General Conference 41st session)



Women farmers receiving training in drone piloting, Senegal.
Photo: UN Women/Yulia Panevina