Findings and recommendations from the Expert Group Meeting on the priority theme (10-13 October 2022)

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

Acknowledgements

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.

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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

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

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

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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.

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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

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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

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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]

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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;

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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

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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

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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.

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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**.

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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 <u>Gender dimensions of the Guiding Principles</u> 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

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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

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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

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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.

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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.

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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].

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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].

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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

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